

High Rate Recycling in Batch Plants



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Ecological and Economic Consequence of the Global Asphalt Production

	Asphalt Production	US\$	Market Trend
World	1'200 Mio. t/a	50 Mia.	→
USA	600 Mio. t/a	25 Mia.	→
Europe	300 Mio. t/a	13 Mia.	→
China	130 Mio. t/a	5.5 Mia.	↗
Rest of the World *	170 Mio. t	7.0 Mia.	↗

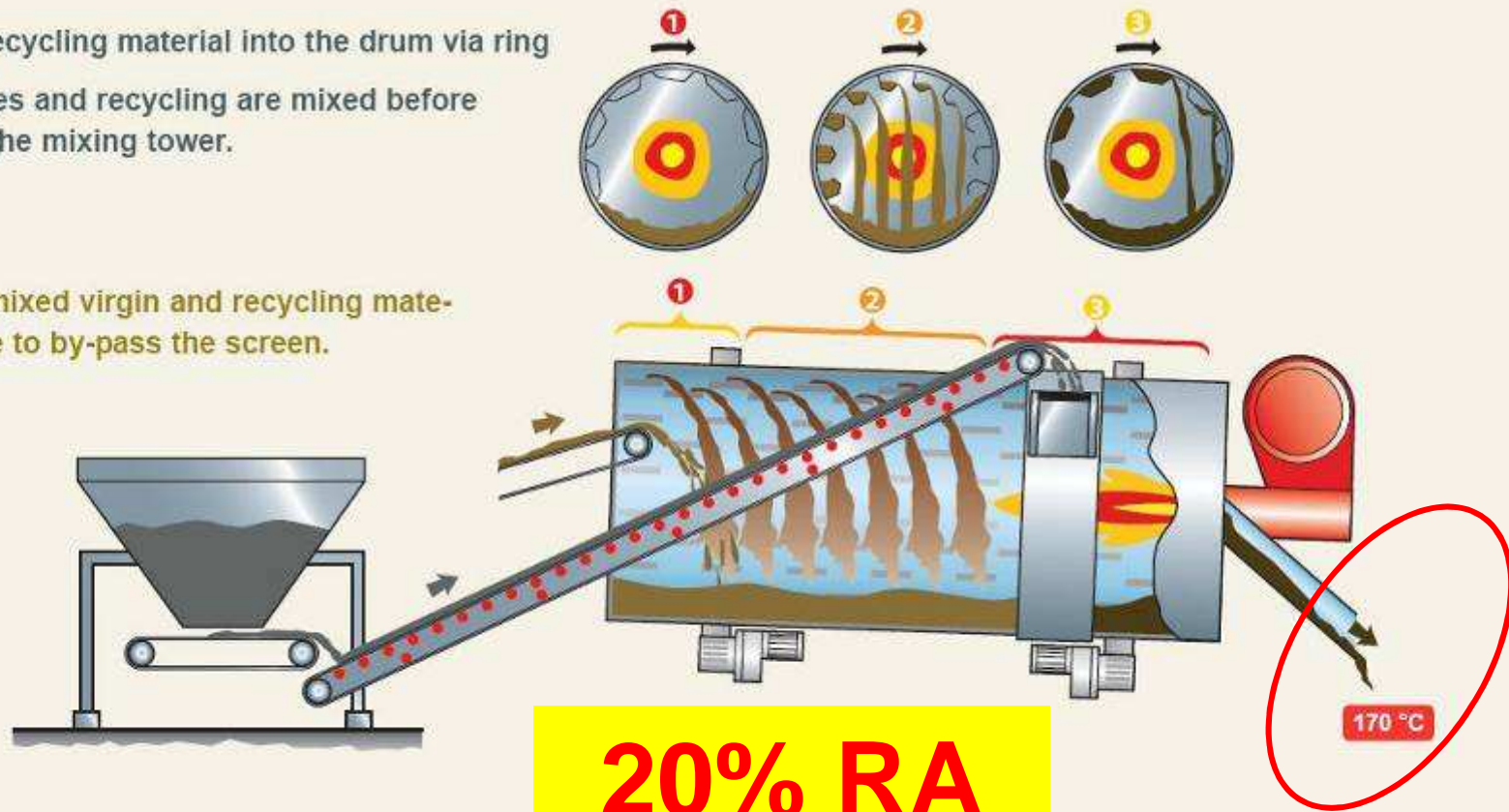
* Eastern Europe, Middle East, India, SEA, Australia, Africa etc.

1'140 Mio. t of processed aggregate → Mountain of 1'200 m² > x 1'800 m h
 60 Mio. t of bitumen → 2 Mio. fuelling vehicles

RAR – RA ring (cold RA addition into drum)

Feed of recycling material into the drum via ring
Aggregates and recycling are mixed before entering the mixing tower.

The pre-mixed virgin and recycling materials have to by-pass the screen.

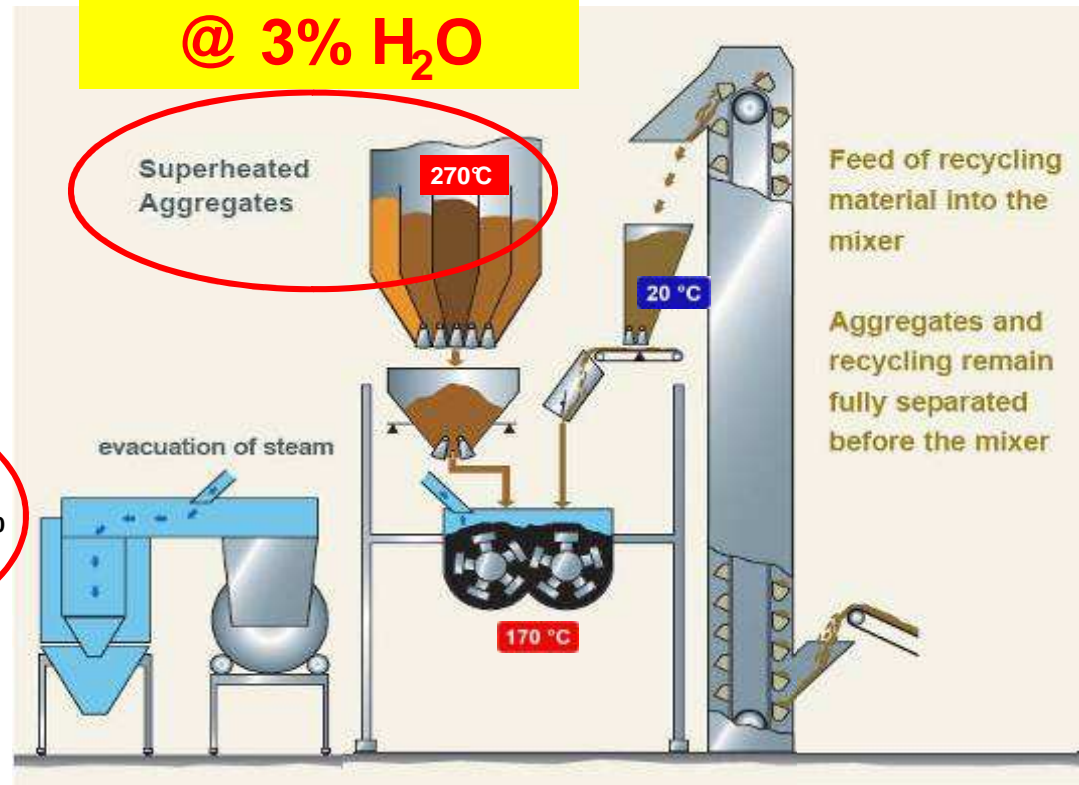
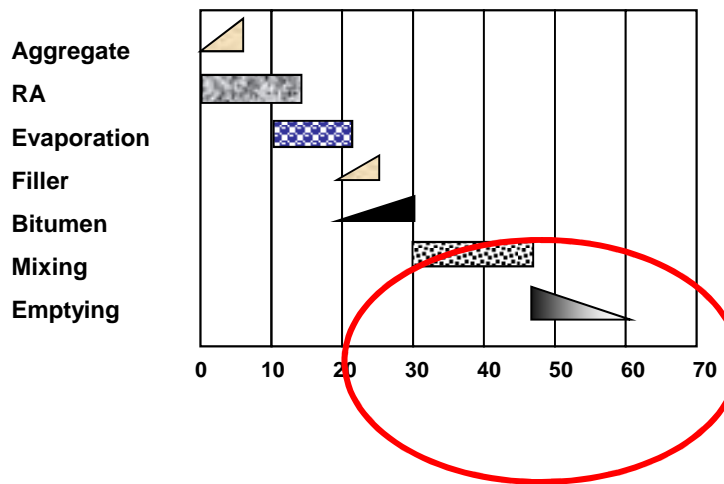


**20% RA
@ 3% H₂O**

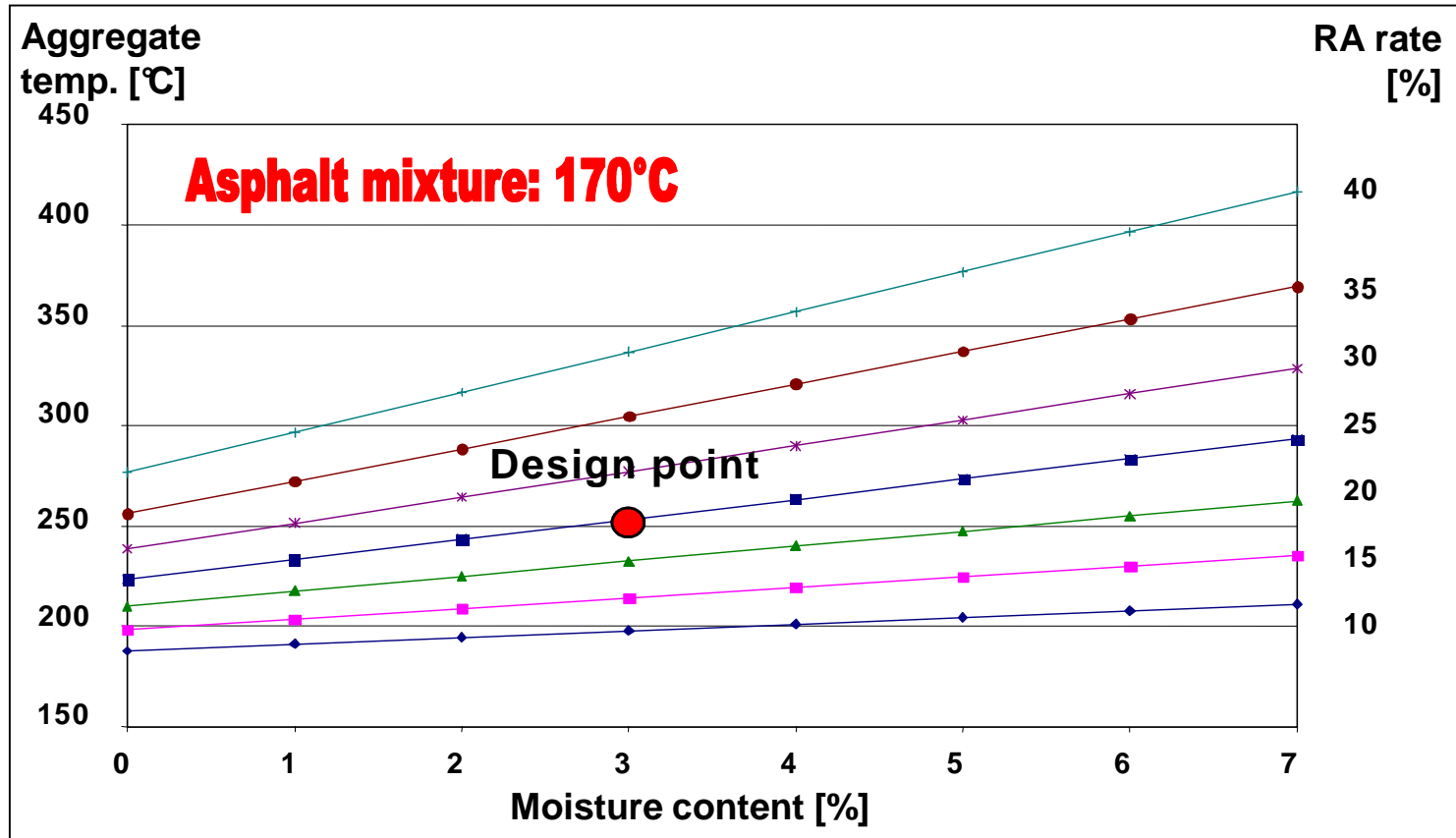
RAC – Cold RA (directly into mixer)

30% RA
@ 3% H₂O

Mixing cycle



RAC – Superheated Aggregates

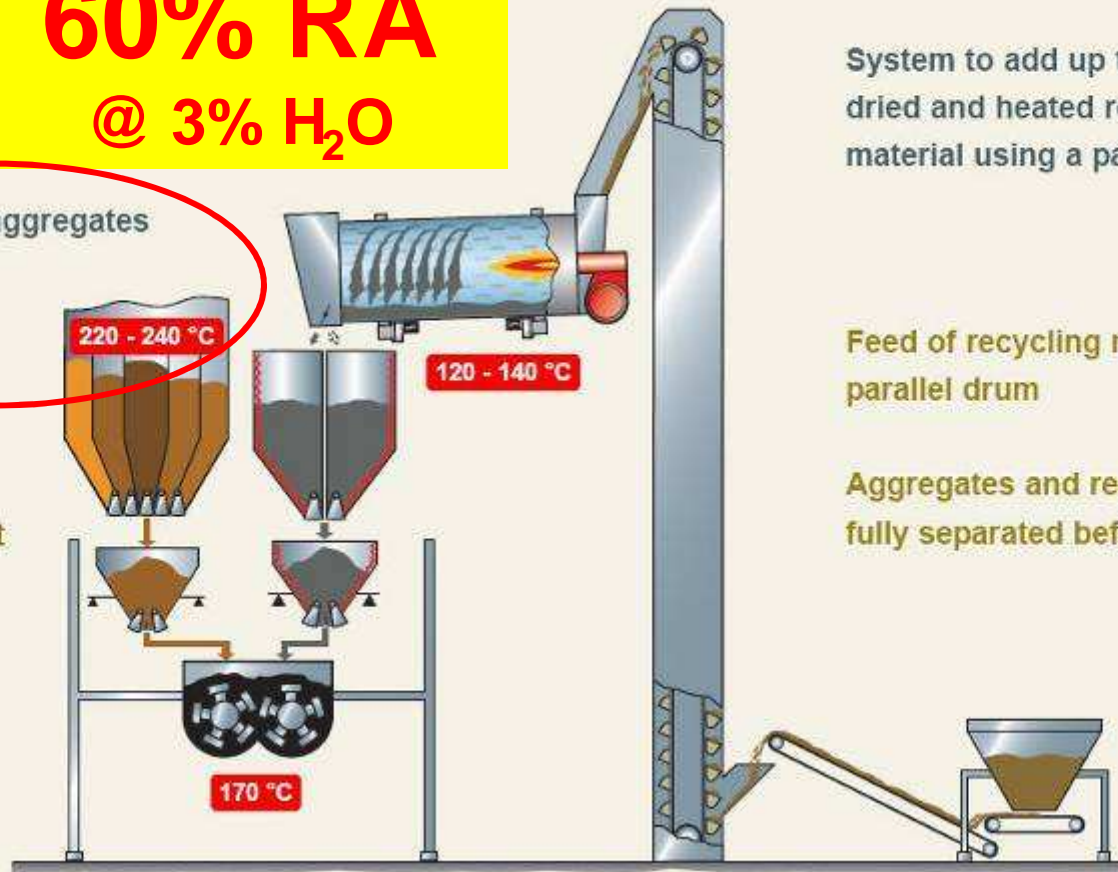


RAH – Hot Recycling

**60% RA
@ 3% H₂O**

Superheated aggregates

Storage of different material qualities

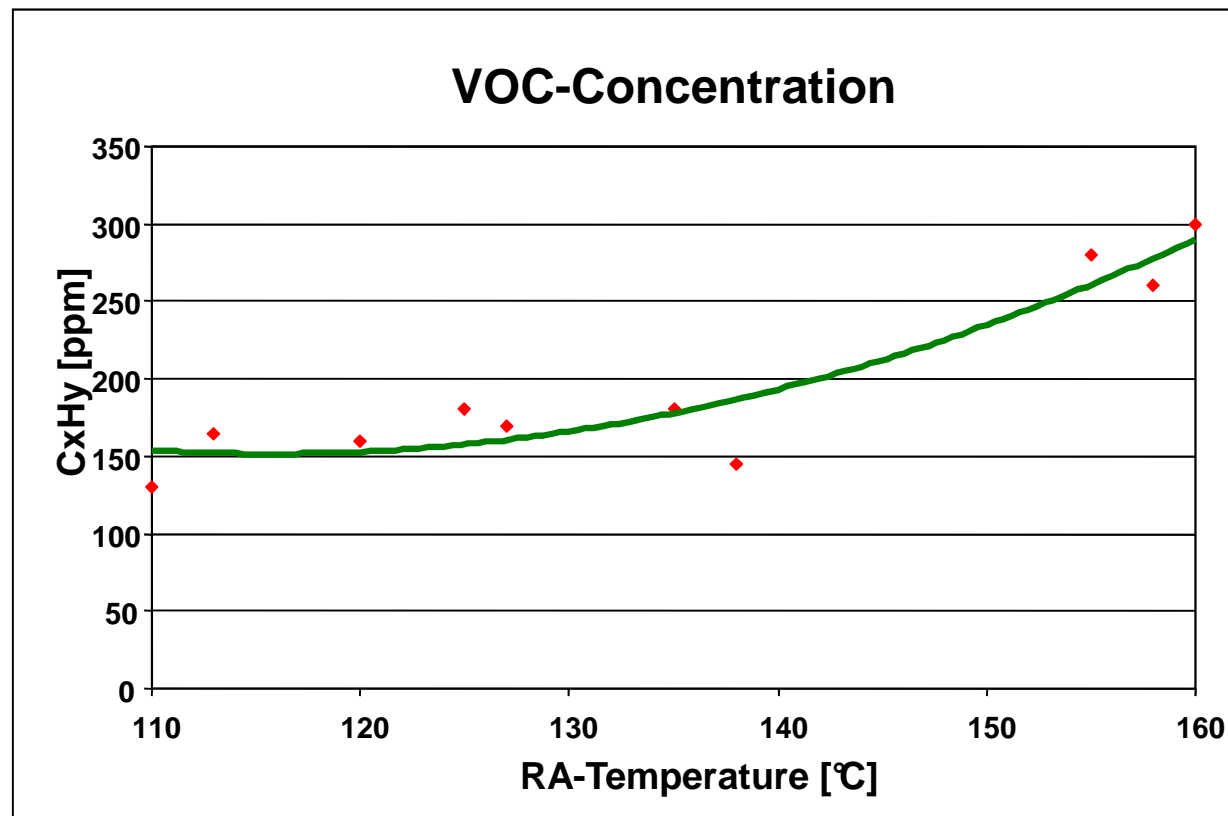


System to add up to 60% of dried and heated recycling material using a parallel drum

Feed of recycling material via parallel drum

Aggregates and recycling remain fully separated before the mixer

RAH – Hot Recycling

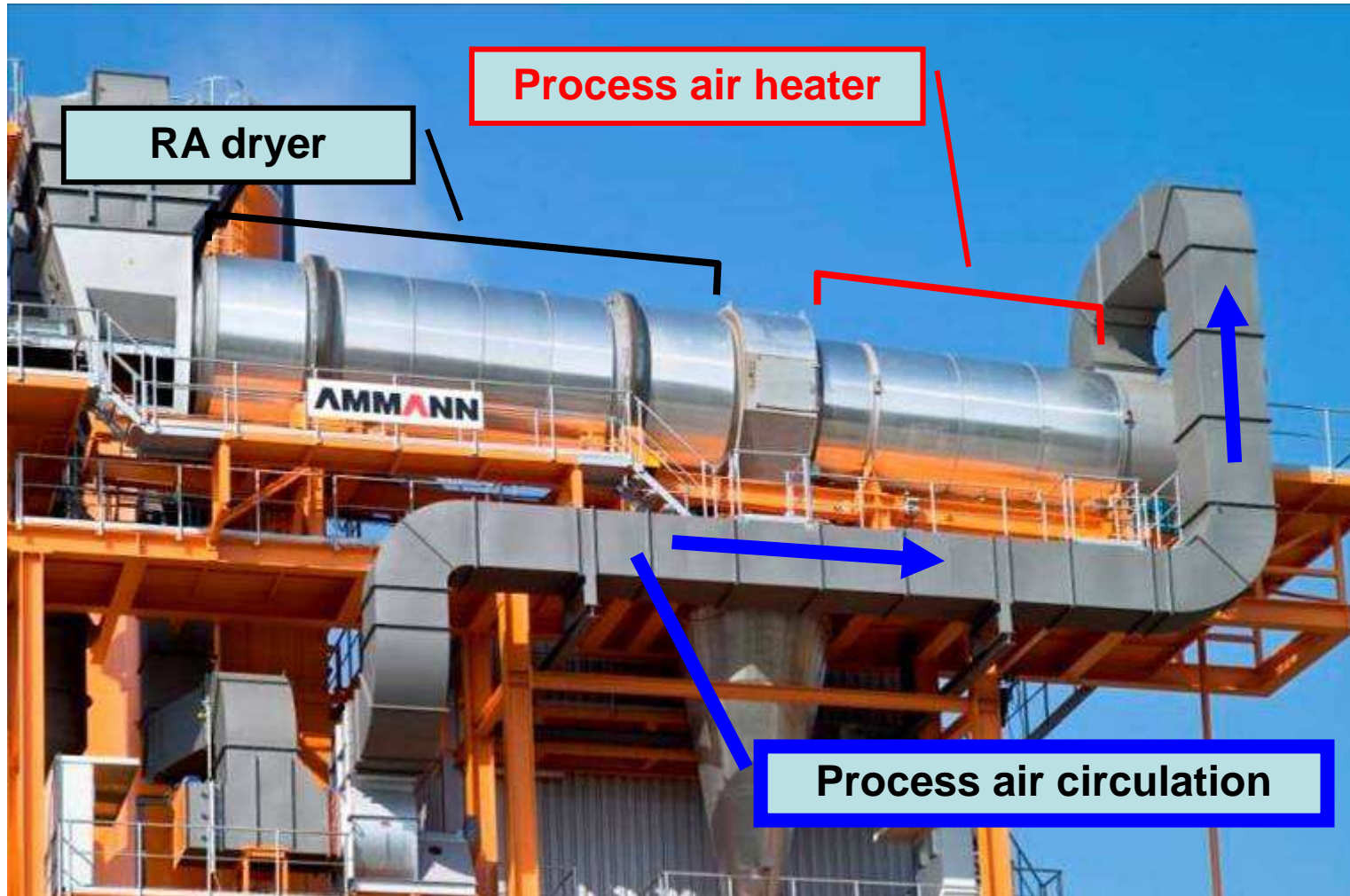


Worldwide 1st plant using up to 100% recycling asphalt

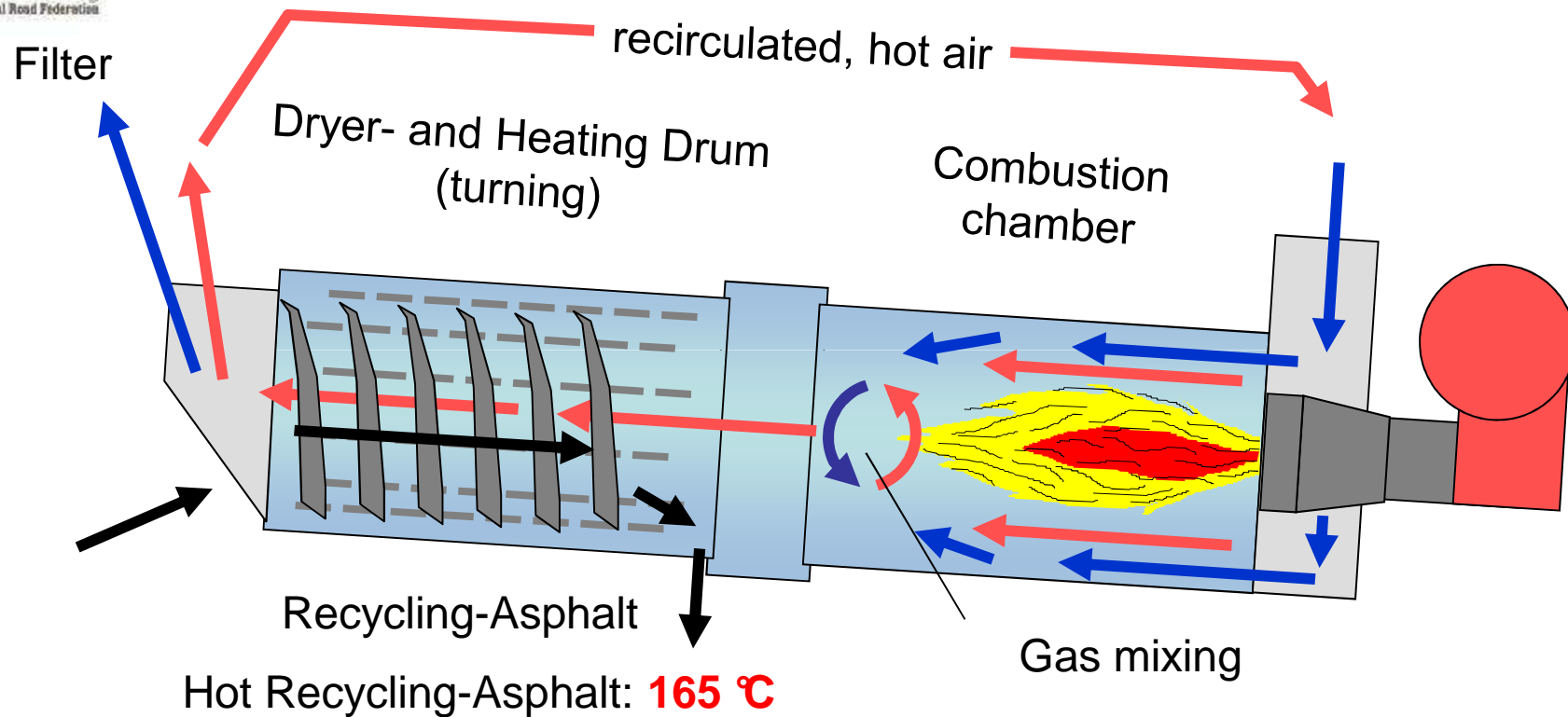
100%
recycling
device



100% recycling device



100% recycling device (protected)



Low ageing of bitumen

- No radiation heat
- Low oxygen content

High efficiency

- Counter flow dryer
- Air recirculation

Low emissions (VOC)

- Indirectly heated recycling drum

Storage: well separated recycling material fractions



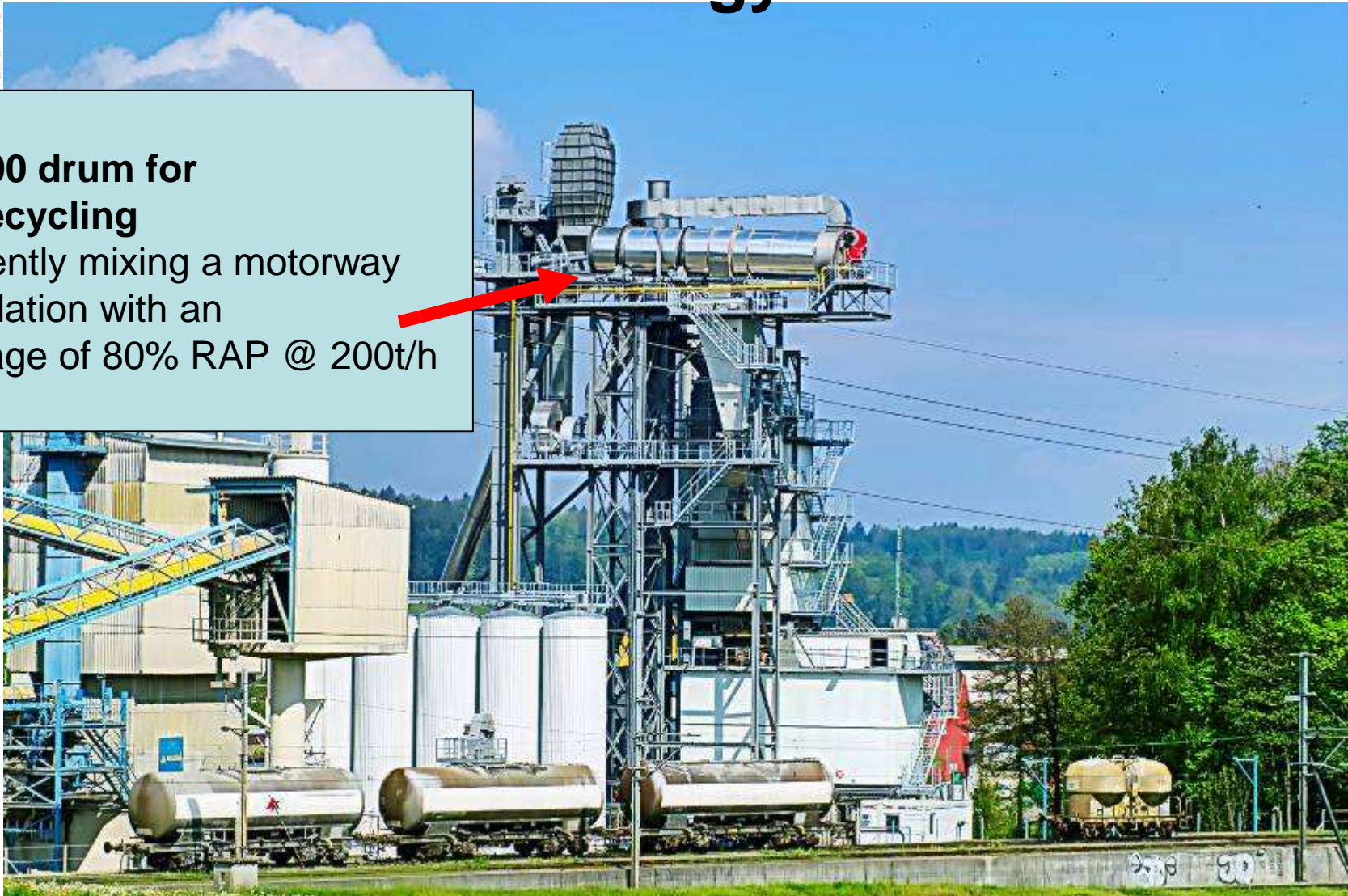
Blending of recycling material



First Plant in Switzerland using latest technology

RA 100 drum for hot recycling

-Currently mixing a motorway foundation with an average of 80% RAP @ 200t/h



Comparison of Recycling Methods in batch Plants

Economy	Ecology	Quality	Technology
<ul style="list-style-type: none"> •Low investment •Maintains mixing time 	<ul style="list-style-type: none"> •Risk of higher emissions •Up to 20% RAP 	<ul style="list-style-type: none"> •Only Bypass Production • inflexible (change of recycling % or recipe) 	<p>via ring in drum RAR</p>
<ul style="list-style-type: none"> •Medium investment •Increase mixing time 	<ul style="list-style-type: none"> •Low emissions •Up to 30% RAP 	<ul style="list-style-type: none"> • Production via Bypass and Screen • flexible •Superheated stones necessary 	<p>direct in mixer RAC</p>
<ul style="list-style-type: none"> •High saving of resources 	<ul style="list-style-type: none"> •Low emissions •Up to 60% RAP 	<ul style="list-style-type: none"> • Production via Bypass and Screen • flexible • Superheated stones necessary 	<p>Recycling drum RAH</p>
<ul style="list-style-type: none"> •Higher Investment •Very high Recycling rate and output 	<ul style="list-style-type: none"> •Very low emissions •Up to 100% RAP •High output (240 t/h) 	<ul style="list-style-type: none"> •All productions possible •Very flexible •No superheated stones 	<p>Recycling drum RA 100</p>



Discussion

- *Thank you for your attention*

Profit with higher RA addition

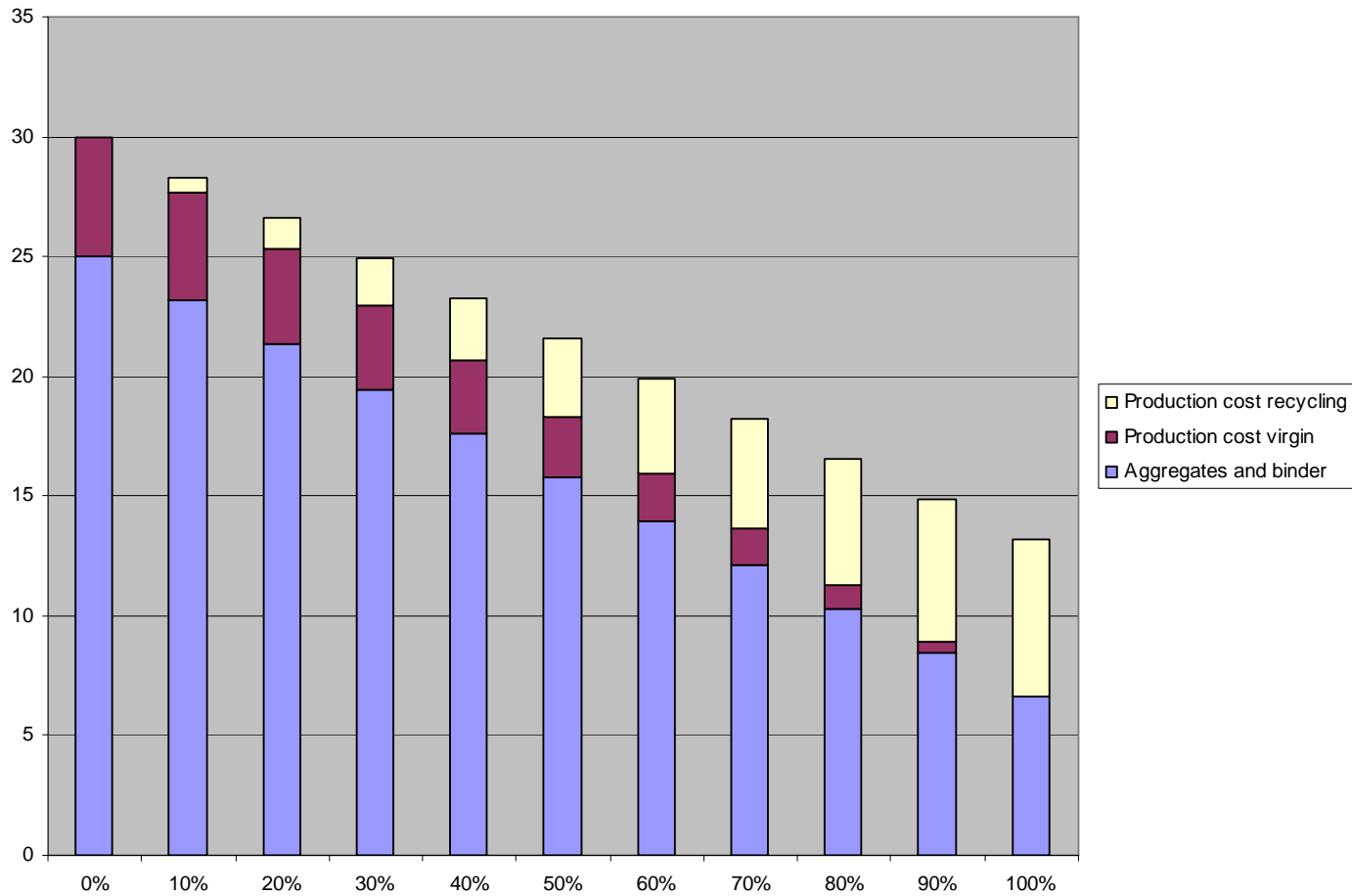
	binder content	5%
aggregates		10,00 €
binder	300,00 €/t	15,00 €
	cost per t	25,00 €

cost RA	3,00 €
RA preparation handling crushing, screening, etc.	3,00 €
RA analysis	0,60 €
Total cost / t	6,60 €

Ratio new / RA	100 / 0	90 / 10	80 / 20	70 / 30	60 / 40	50 / 50	40 / 60	30 / 70	20 / 80	10 / 90	0 / 100
cost per t (5% binder) €	25,00	23,16	21,32	19,48	17,64	15,80	13,96	12,12	10,28	8,44	6,60
benefit € / t	€	1,84	3,68	5,52	7,36	9,20	11,04	12,88	14,72	16,56	18,40

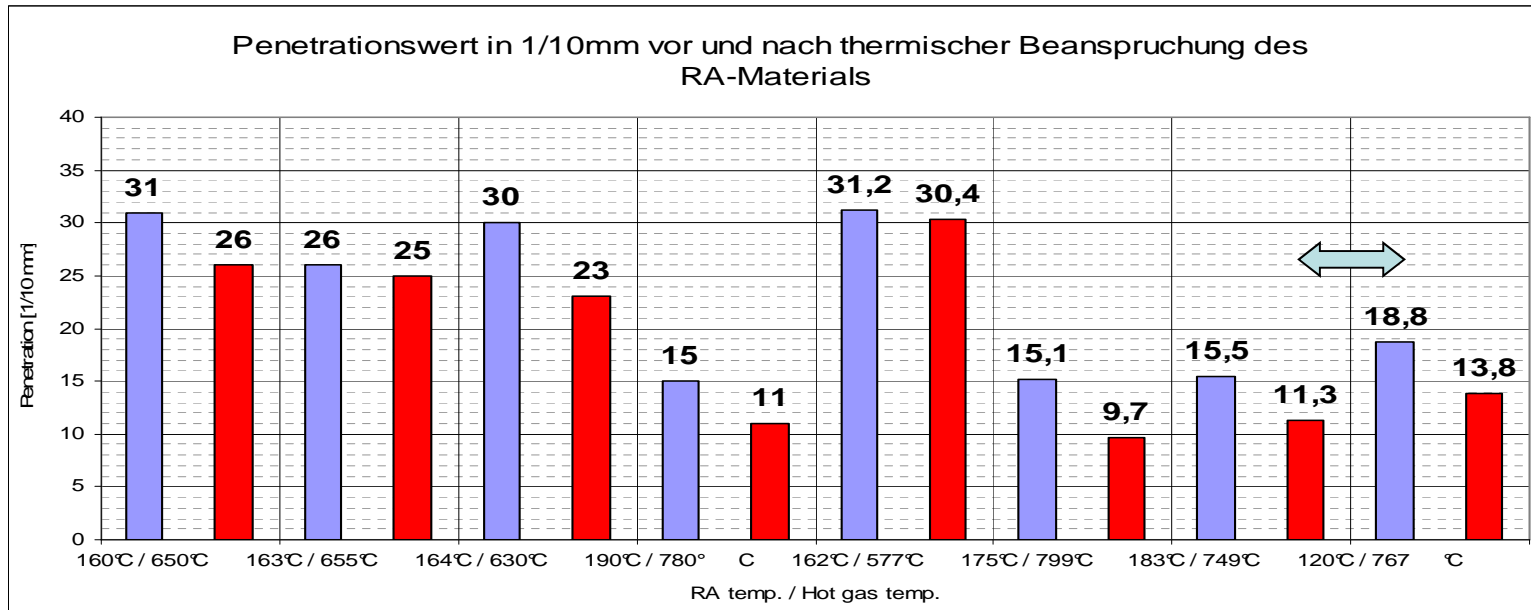
Asphalt production per year 100.000 t
 30.000 t , 50% RA → 276.000 €
 30.000 t , 70% RA → 386.400 €
110.400 €

Cost decreasing versus RAP%



Properties of reclaimed bitumen

- Penetration**



- Durchschnittliche Verringerung der Penetration von 4 1 /10 mm; bzw. 20%**

Grenzwerte für Frischbitumen nach thermischer Belastung gemäß DIN52016 and DIN52010:

	B200	B80	B65	B45
Verringerung der Penetration	50%	40%	40%	40%
Erhöhung der Temperatur R&K	8°C	6,5°C	6,5°C	6,5°C

RAP-Feeder

RAP feeder designed to fit the purpose



Recycling Drum (Parallel flow)





Sharing the road

16th World Meeting
International Road Federation

RAC Feeding and dosing in Mixer

Belt weighing unit



Recycling Drums (Parallel flow)



AMMANN



www.irf2010.com



Sharing the road



Recycling Drum



RAR RAP Feeding via Ring





Sharing the road

16th World Meeting
International Road Federation

RAP Feeding via Ring

