Current Challenges and Opportunities for European Tyre Recycling Industry

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Tyre Recycling Consulting Since 1999

STATUS QUO - European Tire Collection – Recycling/Incineration/Pyrolysis

		ELT/year (for recycling) ª ETRMA 2016 report							…high …medium …low
Association Name	Country	Material recovery (k)ª	Energy recovery (k)ª	Total (k)ª	Collection fee in €/tire (car/truck)	Includes Tire Recyclers and Recyclers also producing TDF	TDF for cement only Producer	ELT derived Pyrolisis operators (working)	Dependent on overseas baled tires and TDF, local TDF clients (in % of total ELT)
ALIAPUR	**FR**	208	149	**357**	1.25/9.20	3	16	1	**42%**
FINISH TYRE RECYCLING	**FI**	31	11	**42**	1.40/6.89	1	0	1 is starting	**26%**
VALORPNEU	**PT**	51	19	**70**	1.20/8.86	3	7	0	**27%**
ECOPNEUS	**IT**	216	129	**345**	est. 1.2/9	20	6	0	**37%**
RECYBEM	**NL**	69	11	**80**	1.1 incl collection	4	1	1	**14%**
ECO ELASTIKA	**GR**	31	7	**38**	est. 1.2/9	6	2	2 (inofficial)	**18%**
SIGNUS/TNU	**ES**	155	76	**231**	1.25/9 (TNU) 1.38/10.28 (SIGNUS)	15	8	1	**33%**
NORSK DEKKRETUR	**SE**	47	37	**84**	1.61/1.61	1	1	1	**44%**

STATUS QUO - European Tire Collection – Granulate Markets

	Market situation for <4 mm, <2 mm			...strong ...moderate ...weak	Markets for <1 mm
Association Name	Moulded Goods	Artificial Turf	Asphalt	Other	Other
ALIAPUR	😐 🙁	😐	🙁	export markets 😐	🙁
FINISH TYRE RECYCLING	🙁	🙁	🙁	export markets 🙂	🙁
VALORPNEU	🙂 😐	🙂 😐	🙁	export markets 🙂	🙁
ECOPNEUS	🙂	🙂	🙁	export markets 🙂	🙁
RECYBEM	🙂	🙂 😐	🙁	export markets 🙂	🙁
ECO ELASTIKA	😐	😐	🙁	export markets 🙂	🙁
SIGNUS/TNU	😐	🙂 😐	🙁 😐	export markets 🙂	🙁
NORSK DEKKRETUR	🙁	😐	🙁	export markets 🙂	🙁

THREATS BY INTERNAL & EXTERNAL FACTOR

<u>Internal</u> Factors include:

- Rising production cost
- Declining rubber granulates prices
- Increased regulation & market intervention
- Lack of consistent incentives paid by state governments

THREATS BY INTERNAL & EXTERNAL FACTOR

External Factors include:

- Foreign subsidized rubber entering markets (regional problem)
- Public misinformation about health concerns
- Unsustainable markets

PROBLEM OF GOVERNMENT AND AGENCIES MARKET-PUSH TIRE RECYCLING PROGRAMS

Typically provide incentives to Collectors and Processors as a short term solution to increase “recycling” of ELTs.

Disadvantages:

- Increased dependency on incentives
- Discourages development of local sustainable markets
- Encourages fraud
- Encourages dumping of end product into other jurisdictions
- Anti-competitive, with government/agencies picking the winners and losers

WHY MARKET-PULL TIRE RECYCLING PROGRAMS ARE A BETTER SOLUTION

Typically provide incentives to end users and recyclers to develop local sustainable markets.

End users include:

- Schools for artificial turf, playgrounds, etc.
- Universities (R&D)
- Cities and provinces for rubber modified asphalt
- Infrastructure developers (civil engineering applications)
- R&D driven recyclers (innovation)

ADVANTAGES OF MARKET-PULL PROGRAM

- Encourages development of sustainable markets
- Develops a local circular economy
- Increased transparency and accountability
- Encourages free-markets and a level playing field
- Eliminates the motivation to dump end product into other jurisdictions

MARKET THREATS

Europeans heavily dependent on baled and TDF exports to overseas markets. India may close its doors! North African countries too!

3.65 mio to ELT collected in 2016 break up into:

- 1.9 mio to (52%) material recovery (falsified statistics)
- 1.1 mio to (30%) energy recovery
- 0.64 mio to (18%) reuse of part-worn tires

MARKET THREATS – export markets close

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MARKET THREATS – artificial turf's bad press

Europeans heavily dependent on artificial turf markets

- unjustified bad press
- despite scientific proof industry significantly affected

A SUSTAINABLE MARKET OPPORTUNITY FOR RUBBER GRANULATES IN EUROPE

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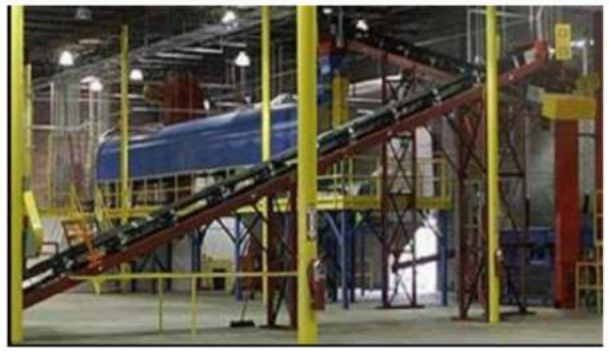
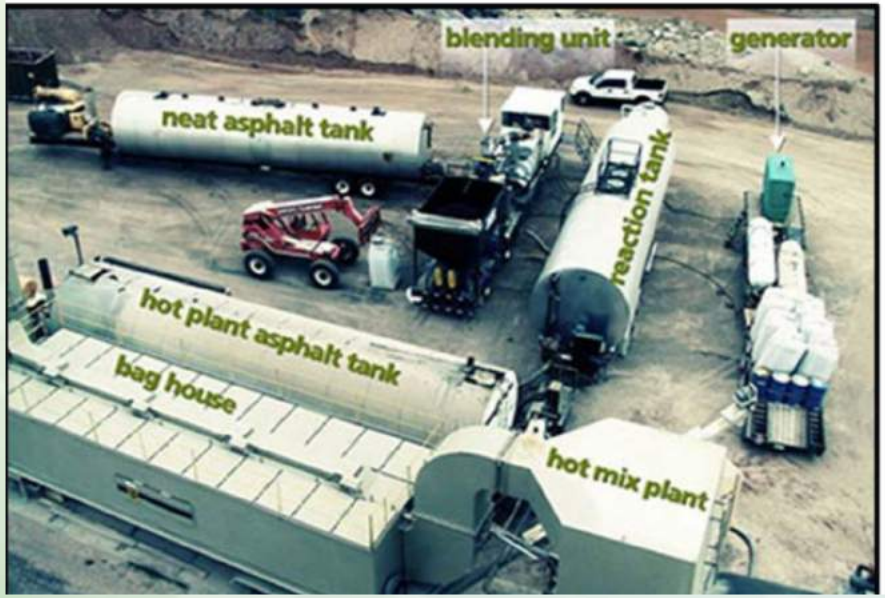
THE LARGEST SUSTAINABLE OPPORTUNITY IS RUBBER MODIFIED ASPHALT





Source: CRM Co, LLC

RUBBER MODIFIED ASPHALT MARKET POTENTIAL

- approx. 282 mio tons of hot mix asphalt is used in Europe
- approx. **3.6 mio** tons of scrap tires were generated in Europe in 2016
- based on 1.5% of mix, **4.2 mio** tons of recycled rubber can theoretically modify 282 mio tons of hot mix asphalt
- problem solved 😉

ENGINEERING BENEFITS OF ASPHALT RUBBER PAVEMENTS

- Increased Durability
- Increased Fatigue Life
- Reduces Permanent Deformation (Rutting)
- Reduced Pavement Noise

CONVENTIONAL, RUBBER & POLYMER MODIFIED ASPHALT MIXES

Conventional Asphalt Mix:
- 5.5% Liquid Bitumen Asphalt
- 94.5% Aggregate
- Liquid asphalt: €450-500/ton [a)]

Rubber Modified Asphalt Mix:
- 6% Liquid Bitumen Asphalt
- 1.5% Crumb Rubber
- 92.5% Aggregate
- Liquid rubber-modified asphalt: €525/ton [a)]

Polymer Modified Asphalt Mix:
- 5.2% Liquid Bitumen Asphalt
- 0.3% Polymer ($3,000/to)
- 94.5% Aggregate
- Liquid polymer-modified asphalt: €650/ton [a)]

[a)] Davide Lo Presti, rubberized asphalt expert, Nottingham University

THE OPPORTUNITY TO REPLACE POLYMER MODIFIED ASPHALT WITH RUBBER MODIFIED ASPHALT

- Typical tire composition: **55% Polymer**, 30% Carbon Black, 9% Process Oil, 6% Ash 94.5% Aggregate
- Europe consumes roughly 188k tons of virgin polymer as a modifier in asphalt products
- The market for polymer modifiers in asphalt products is approx. €470 mio per year

POLYMER MODIFIED vs. RUBBER MODIFIED ASPHALT BINDER COSTS

Average Price of Modifiers:

- Recycled rubber powder: € 250/to
- Virgin polymer: €2,500/to

Average Price of Liquid Asphalt Binder:

- Liquid asphalt (bitumen): € 450-500/to
- Rubber modified binder: € 525/to
- Polymer modified binder: € 650/to

8 mio tons or 30% of total US liquid asphalt are modified with virgin Polymer.

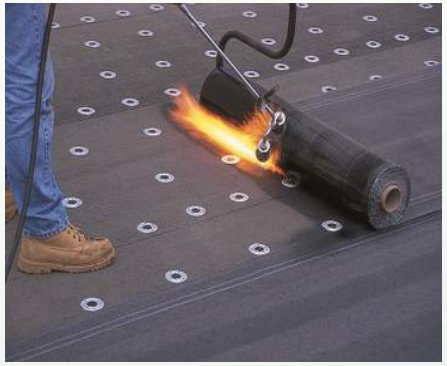
With a cost advantage of €125/to, replacing 8 mio tons could save €1 bn per year and recycle an additional 1 mio tons of car tires (27% of Europe's annual scrap tyres)

CONCLUSIONS

- **Overseas export markets may close for European baled tires and TDF suppliers**
- **Market Pull is more effective than Market Push**
- **Traditional important markets under threat (artificial turf)**
- **Use of recycled rubber in asphalt a win-win for recyclers, governments, tax payers, environment (according to the European Asphalt Pavement Association (Eurobitume), polymer modified asphalt increases Green House Gas (GHG) by 60%)**
- **Continued education on the cost benefit of rubber-modified asphalt in lieu of polymer modified asphalt**
- **Financial support for R&D efforts to develop new markets (also includes pyrolysis)**
- **Strong support from trade organizations representing tire recycling industry**

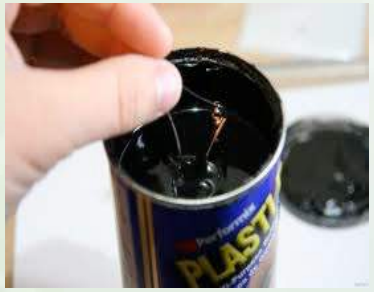
POTENTIAL MARKETS ON THE RADAR

modified asphalt



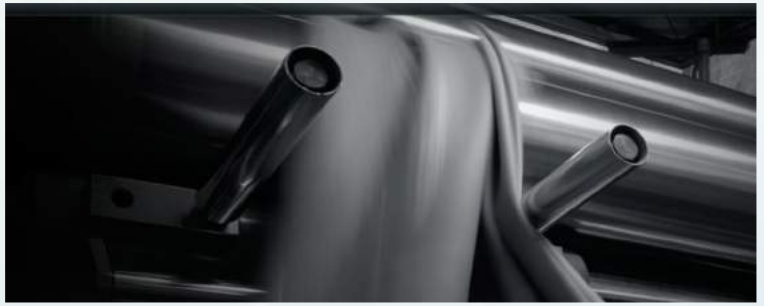
bitumous applications

thermoplasic elastomers



coatings

concrete



rubber compounds

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Thank you!

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