Bio-Sourced Bituminous Materials

Overview, Development and Solutions

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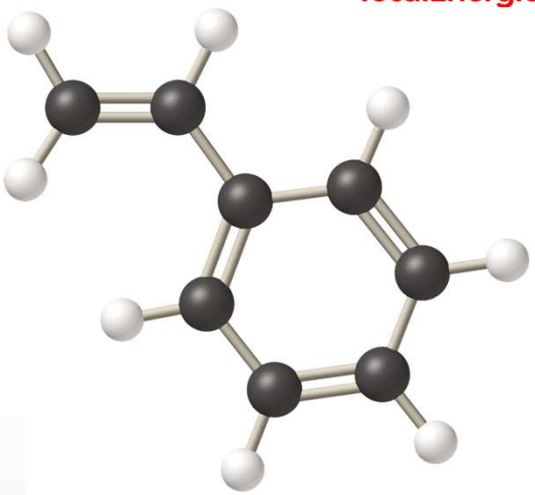
Bio-Bitumen/Bio Asphalt?

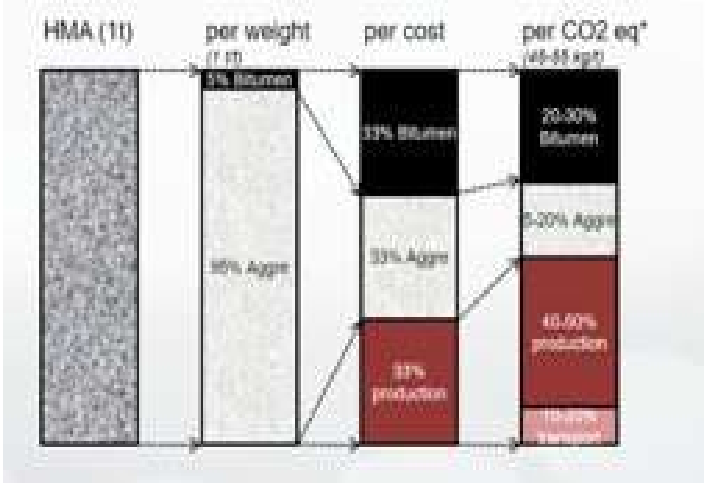
- Predominantly Bitumen based material + added bioagents
- Virgin products such as Starches, Vegetable oils , Tree and Gum resins, Algae, Sugar, Molasses, celluloses, Animal fats, by-products or other process waste streams.

- Total commissioned recent study (past twenty years)
- Growth in patents Filed since 2010 (**32**%)
- Growth in publications since 2010 (**800**%)
- 630 patents filed 1370 industry articles
- Predominantly VO formulations

BIO Contribution -Positives and Negatives

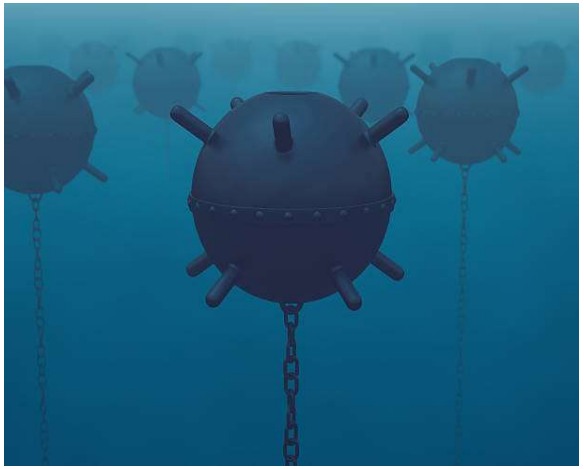
- Polymer type system
- Viscosity Modifier
- Lower working temperatures
- Lower volatility
- VOC/PAH reduction
- Rejuvenation
- Fluxing agent
- Carbon Footprint
- Adhesion
- Ageing
- Costs





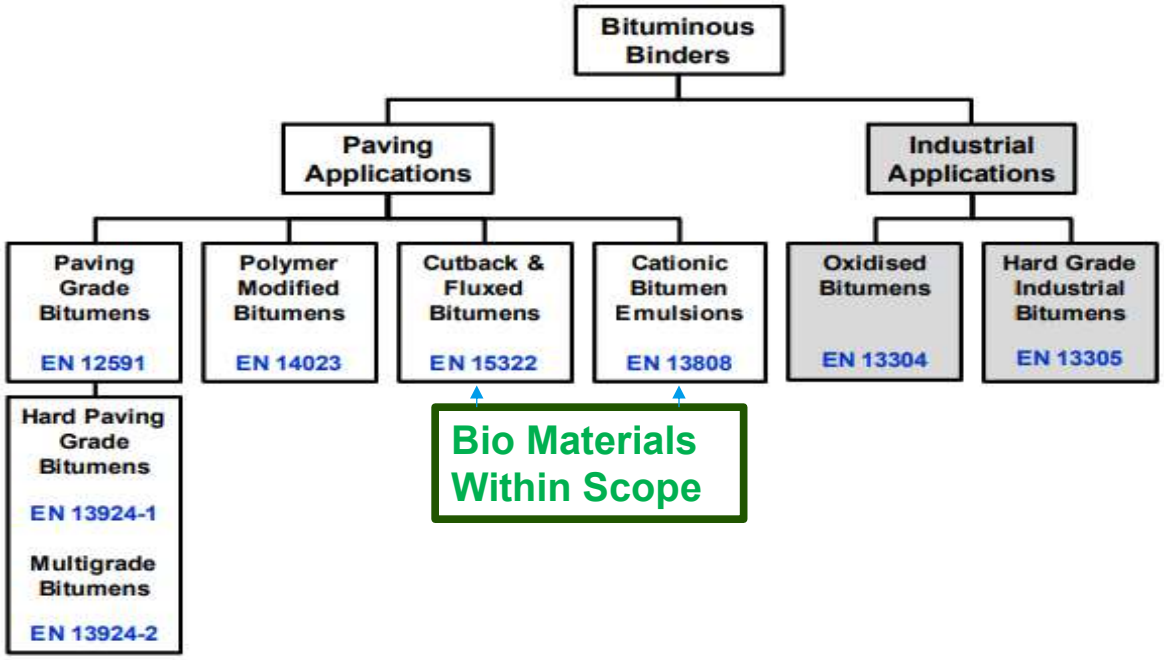
New Binder Product Design Factors

- Performance
- Price/Cost
- Industry standard compliant
- H&S
- Compatibility
- Reach
- Sustainable
- Recycling
- Carbon Footprint
- Locally sourced
- LCI/LCA
- Secondary Impacts



EN Standards

- **EN 15322 :2013** Bitumen and bituminous binders — Framework for specifying cut-back and fluxed bituminous binders
- **EN 13808 :2013** Bitumen and bituminous binders — Framework for specifying cationic bituminous emulsions



Existing Portfolio –**Bio- Styrelf ® 103**

- EN15322 (**FV9 BP4**)
- Developed 10 years ago
- Sold predominantly in Denmark
- Lower viscosity CL PMB
- Locally sourced Bio Additives
- Good low temperature performance
- Good adhesion
- Application temperature 160-180°C
- Road Maintenance

Revision 7-08/2020

TotalEnergies

BIO® STYRELF 103

Biobitumen

Preliminary remark
The product corresponds to a fluxed bituminous binder according to DIN EN 15322: 2013 and fulfills the requirements according to TL Sbit-StB 15.

Product specifications

Test procedure	Dimension	Range		Method
		min.	max.	
Initial Binder	-			-
- Dynamic viscosity at 60 °C	Pas	30	100	DIN EN 13702-1
Adhesivity with reference aggregate	%	90		EN 15626
Flash point PM	°C	200		DIN EN ISO 2719
Solubility	M.-%	99,0		DIN EN 12592
Recovered binder	-			DIN EN 13074-1
- Softening point (R+B)	°C	35,0		DIN EN 1427
Recovered and stabilised binder	-			DIN EN 13074-1 u. 2
- Softening point (R+B)	°C	39,0		DIN EN 1427
- Needle penetration at 25 °C	mm/10		220	DIN EN 1426
- Elastic recovery at 10 °C	%	50		DIN EN 13398
- Cohesion energy by pendulum	J/cm²	to be	reported	DIN EN 13588

Delivery form
The product can be delivered hot in trucks.

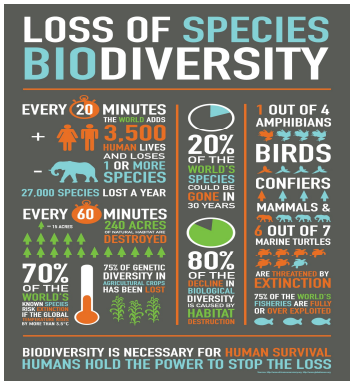
Further Developments – Soft Penetration / V Grades

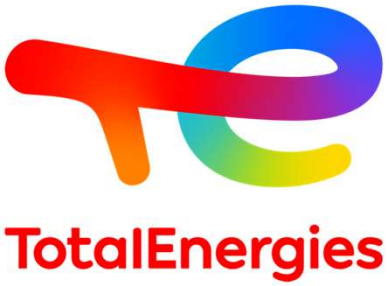
- EN12591 Compliant?
- Fluxed Bitumen
- PAB-V, PAB-B Finish asphalt
- Locally sourced VVO
- Oil gravels , patching etc.
- HSE benefits
- Mixing temp 80-120°C
- Cold and warm mix applications
- Other EN grades available.

Summary –Going Forward

Valid Bio-Technologies are available though as an industry, ensure you have a defined and Bio product procurement strategy, preferably with the stakeholders.

- Industry Leadership
- Ensure you have a robust selection criteria
- Evidence based performance
- Agreed environmental standards
- Try to keep it simple
- What are you trying to achieve
- Managed expectations
- A spirit of innovation and collaboration





Thank you