



# SUPERLOW-CARBON FAQS

# SUPERLOW-CARBON ASPHALT FAQs

## BIOGENIC BINDER

- **Biomass/Biogenic material – what is it and where does it come from?**

Our bitumen supplier Shell intends to use a range of biogenic materials depending on what is available within a particular region, these materials will be sourced from suppliers which meet responsible sourcing standards. Land use and land use change will be included in life cycle assessments when Shell are assessing potential land based sources of carbon.

Biogenic carbon is the emissions related to the natural carbon cycle, as well as those resulting from the combustion, harvest, digestion, fermentation, decomposition or processing of biologically based materials.

- **Is it grown specifically for the product or is it a waste product/by-product of another product?**

Shell's focus is residues and by-products from the bio-domain. Products are not being grown for the specific purpose of binder production.

- **Does the growing of the biogenic matter take land that could otherwise be used for growing food or is the biogenic matter a waste product from a food source?**

Land use and land use change will be included in the life cycle assessment. Shell has investigated many sources of potential biogenic materials, including some wastes from food sources for example, used cooking oils. Wastes from food sources can require extra regulatory considerations which Shell would discuss with customers prior to developing binders based upon these sources.

- **What is the definition of a carbon sink?**

A reservoir that absorbs carbon dioxide from another part of the carbon cycle and stores it. Natural sinks include forests, soils, peat, permafrost, and the ocean; man made reservoirs include buildings and factories outfitted with carbon-capture technologies -International Food Policy Research Institute (IFPRI) (2014). The concept of storing biogenic materials in asphalt pavements is similar in concept to BECCS (Bio Energy Carbon Capture and Storage but without the combustion step to release the bio- energy)

- **Is it one source, multiple sources?**

Shell is focused on multiple sources of biogenic materials globally. Currently, UK based part biogenic binder would be of the same material origin but may come from different suppliers.

Not all sources of biogenic carbon are rapidly renewable or deliver a net reduction in carbon released to the atmosphere. Clear examples of this include old growth forests, peat bogs, or fast-growing edible plants; where the carbon invested for growth can higher than the carbon absorbed during growth.

Thus biogenic carbon sources need to be;

- From sustainably managed biomass sources with zero deforestation
- Delivers a reduction in net carbon footprint
- Traceability through the supply chain
- Protection of land with high biodiversity value and high carbon stock

To ensure long term above ground carbon storage, components of biomass processing are carefully chosen to ensure bitumen compatibility and do not compromise the performance characteristics of the asphalt pavement. This delivers a binder that can be recycled at the end of its life and retains the bio carbon captured over the long term.

- **Does the biogenic component degrade with time and thus release carbon back into the atmosphere? If not then what evidence do you have to prove this?**

The below is taken from the Oil and Gas Sector Science Based Targets Initiative consultation documents.

“Asphalt/bitumen are composed of heavy hydrocarbons which are known to persist in the environment (Brown et al., 2017) and undergo a slow biodegradation and release of CO<sub>2</sub>; (McCoy et al., 2015) estimated a half-life of 108 years for their biodegradation and ultimate release as CO<sub>2</sub>; and (IPCC, 2006, Chapter 5.4) states that “the production and use of asphalt results mainly in emissions of NMVOC, CO, SO<sub>2</sub> and particulate matter, while the fate of the remaining hydrocarbons are stored in the product (much less than one per cent of the carbon is emitted).” The end-of-life destination for road pavement asphalt is usually re-used in substructure (road base) and no significant energy uses are currently known (Butt, 2014). Overall, emissions from asphalt/bitumen use are negligible. As such, these flows can be discounted from Indirect/S3 Use of Sold Product emission estimations.”

Storing biogenic material in pavement which are recycled can be demonstrated as constituting long term storage (>100 years), the carbon stored in the pavement will not be released back into the atmosphere. Even if the asphalt pavements eventually end up as lower grade fills and base materials the carbon will not be released by future combustion.

## CARBON CALCULATIONS

- **What is the methodology used to calculate the carbon footprint of the Binder?**

Product Carbon Footprint (PCF) calculations are based on the following premises:

- Methodology conforms to ISO 14040 (2006): Environmental management - Life cycle assessment - Principles and framework, ISO 14044 (2006): Environmental management Life cycle assessment - Requirements and guidelines.
- The functional unit is 1 (one) kg of product. The PCF is expressed in “kg CO<sub>2e</sub>/kg product”. Shell follows a conservative approach by using maximum emission figures.
- Currently there is no industry standard in the UK for the calculation of carbon footprints and assumptions around emission factors can differ depending on databases used.

- **Is SuperLow-Carbon asphalt carbon neutral?**

No, however we can offset the remaining carbon at the customer’s request.

- **Are we providing carbon saving certificates or carbon calculations for SuperLow-Carbon asphalt?**

Yes, Please contact your technical support manager for more details and carbon calculations.

- **How is the reduction in carbon calculated? Does this carbon saving vary from product to product?**

Calculation is undertaken using the industry recognised software asPECT (asphalt pavement embodied carbon tool). The carbon saving varies slightly by product type, the bigger difference is by plant due to the different heat energy fuels we use. (For carbon calcs contact your technical manager).

## ASPHALT PERFORMANCE

- **Does Shell Bitumen CarbonSink have any impact on the asphalt performance?**  
Shell Bitumen CarbonSink meets the specifications and performance of the conventional corresponding bitumen or PMB grade.
- **How does the warm mix surfactant additive affect the performance of the asphalt?**  
It improves aggregate/binder adhesion; It improves workability and compaction at lower temperatures; and does not adversely affect the performance characteristics of the product in any way.
- **Can Shell provide any technical data or outcomes of laboratory studies using this biobased binder?**  
On request and case to case of business nature
- **Apart from the lower carbon footprint, does SuperLow-Carbon offer our customer any other benefits?**  
Yes, as SuperLow-carbon is manufactured as a WMA it offers the following benefits:
  - Safer - Lower asphalt temperatures, reduce nuisance fuming, odour and steam, at the project site, which improves visibility, and better working conditions for operatives.
  - Longer Lasting - Lower temperatures during production, reduces binder ageing, and enhances in-service life expectancy.
  - Consistent Quality - Even at lower temperatures SuperLow-Carbon asphalt remains highly compactable for longer, allowing more time for full compaction and delivering enhanced performance and durability.
  - Quicker - SuperLow-Carbon asphalt reaches trafficking temperatures quicker than conventional hot asphalt, enabling earlier reopening of carriageways to the travelling public, resulting in less traffic disruption and reduced build cost.
- **Is SuperLow-Carbon HAUC approved?**  
The final product is a standard 70/100pen asphalt and therefore would comply with HAUC regulations.

## MANUFACTURING & INSTALLATION

- **Does it require any operational changes to implement?**  
No, it can be used in the same way as conventional binders
- **Does it require any additional precautions while blending with asphalt mixture?**  
No
- **Does it require any additional conditions, precautions to transport the materials to job/ paving site?**  
No
- **Can it be paved similar conditions like conventional materials?**  
Yes, no change is required.
- **What temperature must asphalt be manufactured at in order to qualify as a WMA?**  
National Highways stipulate that all WMA must be manufactured at a temperature of <150°C.

- Is there a lead time on SuperLow-Carbon orders?**  
Our production requires 4 weeks notice of supply.
- Is there a minimum order value?**  
Yes, a minimum order of 200T is required to match the availability of small loads of biogenic bitumen binder.
- Can SuperLow-Carbon be manufactured at all of our plants?**  
The low carbon (biogenic) binder is used as a like for like replacement for pen grade bitumen, we can therefore supply SuperLow-Carbon from most Mainstream plants. However, we are currently constrained by bitumen tank capacity so please contact your area technical manager to identify which plants in your region can produce SuperLow-Carbon.
- What penetration grade can SuperLow-Carbon be manufactured in?**  
The biogenic component of the mixture is oil based and therefore in effect it “cuts back” penetration grade bitumen. For this reason the hardest pen grade available is 70/100pen. Softer grades are available. Combined with high RA contents (>30%) a base 40/60pen may be possible (please contact your area technical manager to discuss).
- What is the shelf life of the SuperLow-Carbon binder?**  
Superlow Carbon binder has the same shelf life as regular bitumen (28days).
- Can SuperLow-Carbon binder be supplied in PMB Grades?**  
Yes they are available on request, (please contact your area technical manager to discuss availability).

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