Beaulieu International Group
Technical Textiles

Case Study | Woven Geotextiles Durability Reference

The woven geotextile Terralys LF57/57 was installed over 160.000m² of runway at Ostend-Bruges airport. The woven geotextile was selected over the conventional method of applying 10cm of gravel to strengthen the asphalt structure. We analysed the reduction in carbon impact on multiple levels.

Our calculations predict an extended life span of the runway, thanks to the superior durability and resistance to degradation of the Terralys product. The full analysis and benefits for polypropylene woven geotextile can be consulted in this **GEO Case Study.**

Reduced carbon impact comes on multiple levels:
- ✓ Product : Geotextile versus Gravel
- ✓ Raw Material : PP – PET Granulate
- ✓ Geotextile Type : Woven versus Non-woven geotextile

Product : Geotextile versus Gravel

For a new runway of 160.000m² at Ostend Airport, Terralys LF57/57 (220 gsm), a woven geotextile, is given priority over 10 cm of gravel (1,5 t/m³).

A 10 cm layer of gravel on a surface of 160.000 m² results in 24.000 tonnes of material. Taking into account 25 tons/truck, this results in 960 trucks bringing material to the site. Counter wise, the transport of geotextiles is already feasible with 3 trucks.

Cradle-to-Grave (Production – Transport – Installation)

Layer	Global Warming Potential (kg CO_2 eq.)				Truck Transport (#)
	Production	Transport	Installation	Total	
10 cm gravel	58	1.320	72	1.450	960
Terralys LF 57/57	111	4	0	115	3

*Calculations are based on EPD 'Beaulieu Woven Geotextiles' and EPD of gravel manufacturer. For the installation of 10 cm gravel, a caterpillar is used for 2880 hours with a fuel consumption of 10 l/hour.

The choice of woven geotextile Terralys LF57/57 resulted in a CO_2 saving of 1.335 ton, which is a reduction of 92% CO_2 emissions compared to a 10 cm gravel layer.

Benefits for geosynthetic layer
- ✓ Significantly less CO_2 emissions
- ✓ Minimized transport
- ✓ Reduced use of materials
- ✓ Possibility to reuse soil of the excavation (even if the soil has a poor quality)

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Raw Material : PP – PET Granulate

The most common polymers used in the manufacture of geotextiles are polypropylene and polyester. What is the impact of the raw material?

Functional unit: 1 kg granulate

Cradle-to-Gate

- PP-granulate: 1,63 kg CO_2/ kg granulate
- PET-granulate: 2,19 kg CO_2/ kg granulate

The choice of PP raw material over PET raw material results in CO_2 saving:

$$\mathbf{160.000\ m^2 \cdot (2,19 - 1,63) \cdot 0,2\ \frac{kg}{m^2} = 17.920\ kg\ CO_2}$$

Benefits for PP raw material
- ✓ Best-in-class polymer in CO_2 emission
- ✓ Low environmental impact
- ✓ Durable long life span
- ✓ Non-toxic, no harmful substances
- ✓ Highly resistant to microbiological and chemical degradation

Geotextile Type : Woven versus Non-woven (17 kN/m)

Functional unit: 1m²

Cradle-to-Grave

Performance characteristic: Tensile strength of 17 kN/m (valid for NorGeoSpec 3)

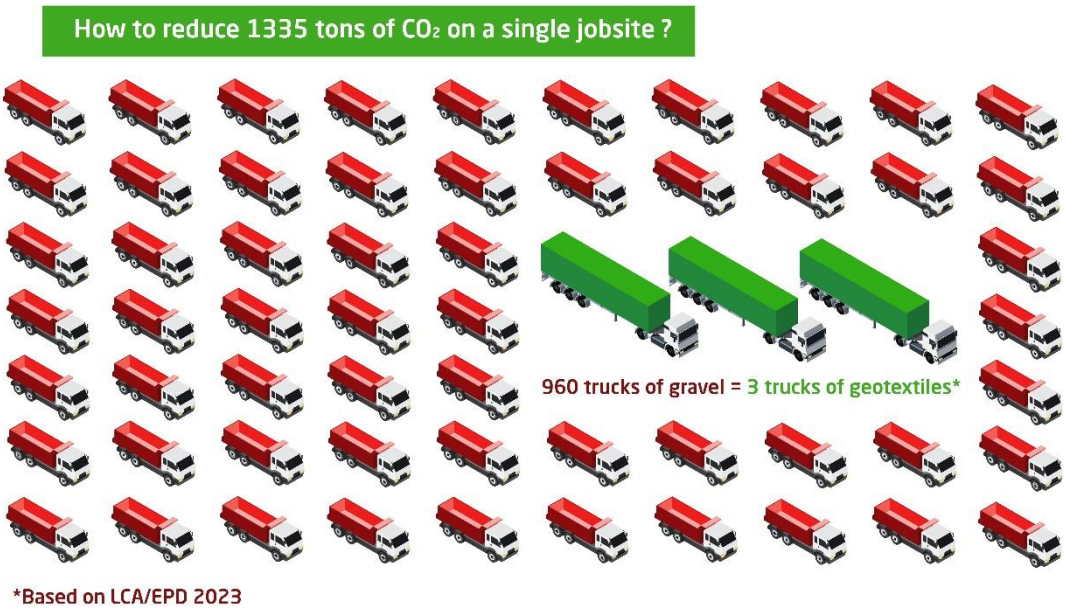
- Woven (92 g/m²): 0,48 kg CO_2/m²
- Non-woven (190 g/m²) : 0,99 kg CO_2/m²

Woven geotextile versus non-woven geotextile brings CO_2 saving:

$$\mathbf{160.000\ m^2 \cdot (0,99 - 0,48) = 81.600\ kg\ CO_2}$$

Benefits for woven geotextile
- ✓ > 50% less virgin material
- ✓ Less weight
- ✓ Less volume, less transport
- ✓ Reduced CO_2 emissions

The woven geotextile was installed over 160.000m² of runway at Ostend-Bruges airport *(Photo: © Beaulieu Technical Textiles)*



How to reduce 92% CO2 eq. on a single jobsite? Replace 960 trucks of gravel by 3 trucks of geotextiles and reduce 1335 tons of CO2. *(Image: © Beaulieu Technical Textiles)*

Sources:

- https://www.norgeospec.org/acms/ (performance characteristics on certificates)
- Sphera – GaBi software (https://sphera.com/product-sustainability-software/)
- EPDs on Environdec (https://www.environdec.com/library/epd5133)
- Plastics Europe (comparison PET and PP granulate)