

NorGeoSpec Seminar

Experiences from supplying large projects

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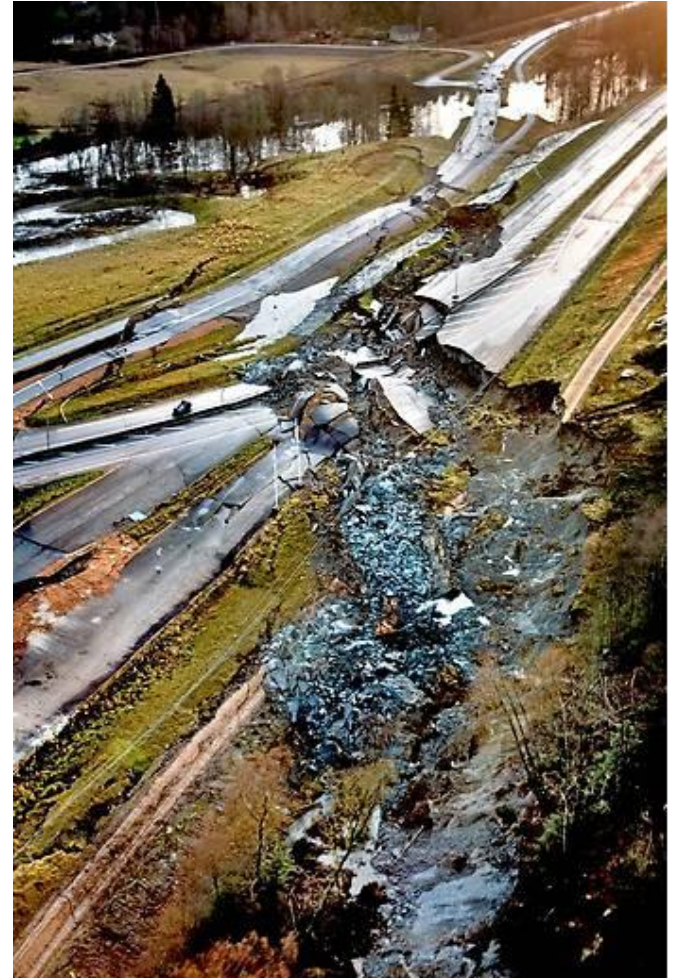
Agenda

- **Sweden Highway Collapse**
- **Hydraulic Engineering Project in France**
- **2 Railway projects in France**
- **Railway project in Romania**
- **Power plant project in South Africa**
- **Future trends in environmental drivers, and the impact on Geosynthetic Engineering**

Highway collapse, Sweden

Munkedal, Highway E6. Dec 2006 – 2007

- Heavy rainfalls prior to collapse
- A pile of unstable clay was stocked above the highway



Highway collapse, Sweden

The repair

1. Build extreme stable platforms for mobile cranes. Two layer construction with Geotextile + Geogrid
2. Very careful measurements of shear resistance in the terrasse, and NorGeoSpec Profile N4 certified geotextile as separation layer. Partially also Geogrid
3. Quantity 150.000 m² Geotextiles



Project owners

Vägverket and Bahnverket

Contractor

PEAB

Distributor

Svenska Geotech

Geotextiles

Fibertex

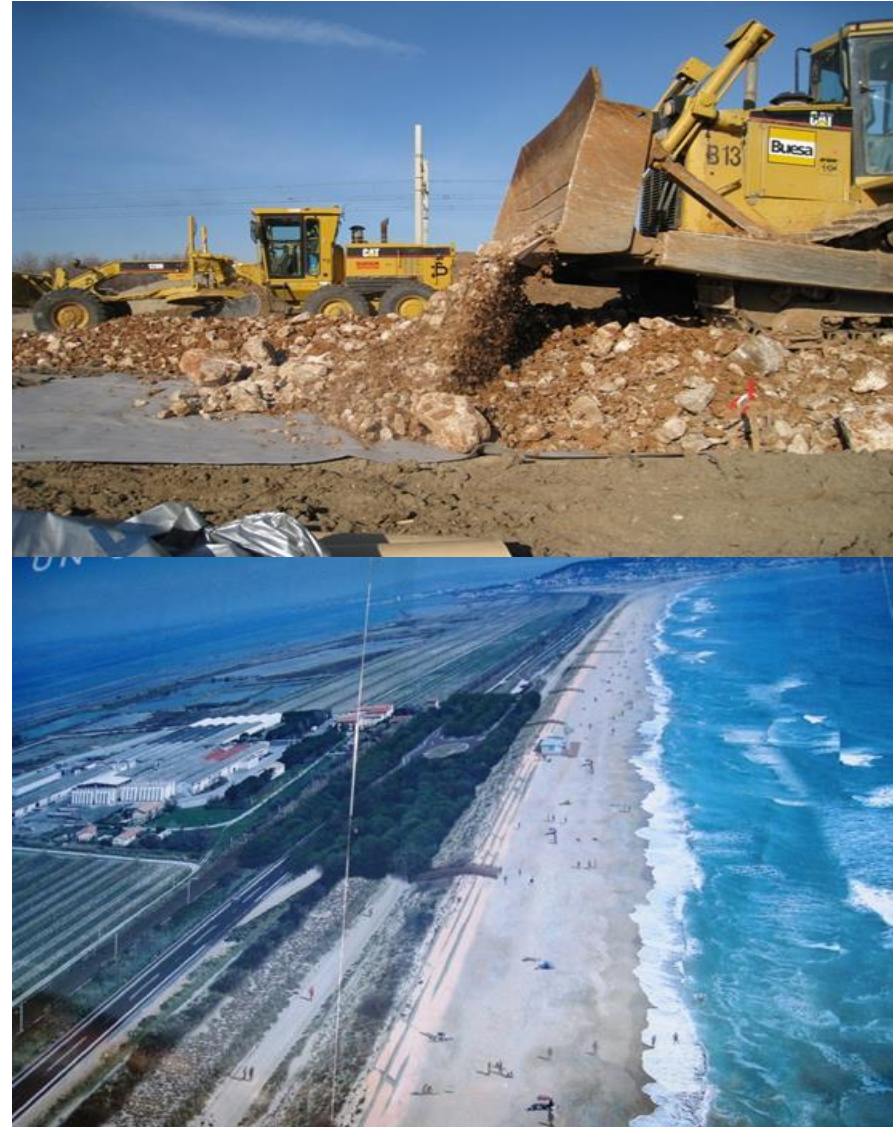
Lido France Sete - Montpellier

Reconstruction of coastline & road 2008

- To prevent further erosion of the coast line, the littoral zone was re-designed, and the alignment of the road along the coast was moved further inland 100m .

Geotextile design criteria

- To stabilize the subbase and prevent wash out of the fine sandy material in the subbase
- Documented ability to create a high functional filter. This should be the case, even in areas where dynamic water flows could be expected, causing higher risk of movement and wash out of fines.
- High resistance to damage during installation



Lido France Sete - Montpellier



Project owner

French Government

Contractor

Entreprise Buesa, Beziers

Geotextiles

500.000 m² Asqual certified

Fibertex F-400M and F-500M

High Speed Train Tours - Bordeaux

302 km new railway and 38 km connections

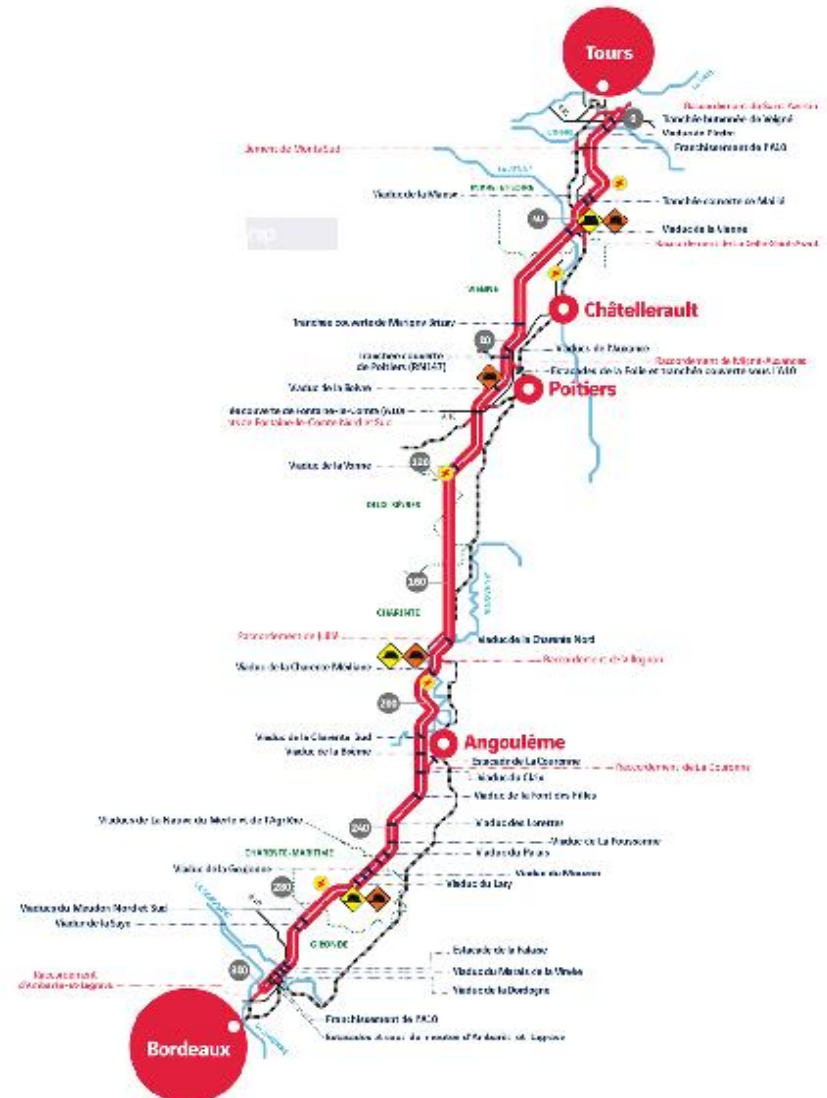
- This line will connect Bordeaux with Paris in 2:05 hours . Max speed 320 km/hour

Largest construction site in Europe

- Started 2012, finish 2017
- 700 bulldozers, scrapers and other heavy machinery involved
- More than 5000 people work on this project, including 19 viaducts, 15 junctions and 7 tunnels. In total 400 civil engineering structures

Geotextile requirements

- SNCF type A1 and A2 under ballast and around drains



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Entreprise Cosea ((Vinci Group)

Delivered up til now 570.000 m2 Asqual
certified Fibertex F-300M and F-46 v2

Spécifications des géotextiles

A1	A2s
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Caractéristiques descriptives

Masse surfacique (MS)	g/m ²	385 / 415	260 / 300
PRV95	%	± 10%	± 10%

Caractéristiques mécaniques

Résistance à la traction	(kN/m)	24	20
PRV95		- 13 %	- 13%
Déformation à l'effort de traction maximal	%	≥ 50%	≥ 50%
PRV95		± 23%	± 23%
Poinçonnement statique (pyramidal)	kN	≥ 1,2	≥ 1,0
PRV95	%	- 30 %	- 30 %
Perforation dynamique (chute de cône)	mm	< 15	< 18
PRV95		+ 20 %	+ 20 %

Caractéristiques hydrauliques

Perméabilité normale au plan	m/s	> 50.10 ⁻³	> 30.10 ⁻³
PRV95	%	- 30 %	- 30 %
Ouverture de filtration caractéristique (a)	µm	≥ 63 ≤ 100	≥ 63 ≤ 100
PRV95	%	± 30 %	± 30 %
Transmissivité sous 100 kPa	m ² /s	≥ 5.10 ⁻⁷	≥ 2.10 ⁻⁷

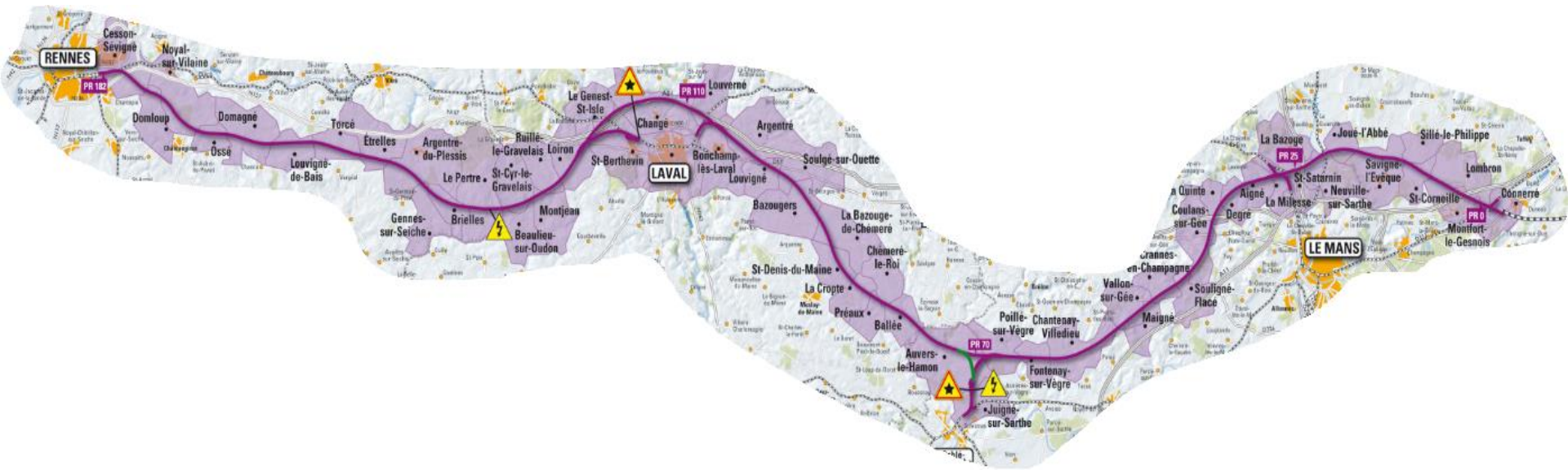
High Speed Train Le Mans - Rennes

182 km new railway and 32 km connections

- This line will connect Rennes with Paris in 1:20 hours .
- Started 2012, finish 2017
- More than 3000 people involved. 250 engineering structures (viaducts, tunnels and junctions)

Geotextile requirements

- SNCF type A1 and A2 under ballast and around drains



High Speed Train Le Mans - Rennes



Project owner

SNCF

Contractor

Entreprise Eiffage

Geotextiles

Delivered up til now 390.000 m² Asqual
certified Fibertex F-300M, F-46 v2 and F-61

High Speed Train Le Mans - Rennes



Railway rehabilitation Romania

Lot 2, Sighisoara - Coslariu

- 37 km rehabilitation

Geotextile requirements

- Detailed spec. incl. detection strips which detect movements of soil



Technical specification

Geotextile 250g with aluminium	
	Tender specification
Tip polimer si fibra/Polymer Type	Polimer sintetic, fibra calitate I/ Synthetic polymer, first quality fibre
Tip textil/Type	Netesut/Non woven
Mod de consolidare/ Consolidation	Mecanic sau termomecanic/ Mechanic or thermally bonded
Masa pe unitatea de suprafata/ Weight	≥ 250g/sqm
Forta de poansonare CBR	≥ 3100 N
Grosimea la 2 kPa/ Thickness at 2 kPa	≥ 1.4 mm
Rezistenta la tractiune trans/long Tensile strength MD/CMD	≥ 18 kN/m
Alungirea long/trans Elongation MD/CMD	≥ 50/60 %
Inercarea de perforare dinamica/ Dynamic perforation resistance	≥ 20 mm
Dimensiunea porilor/ Opening size	≥ 70 µm
Permeabilitatea la apa normala pe plan/ Water permeability	≥ 0.04 m/sec
Determinarea capacitatii de curgere a apei in plan/ Water flow	≥ 1.0 10 ⁻⁶ m ² /sec
The strips of aluminium to be maxim 10cm and the distance between strips is 5m	

Railway rehabilitation Romania

Contractor

- Consortium FCC Alpine, Azvi and Straco

Geotextiles

- 90.000 m² Fibertex F-40 detect



Power Plant projects in South Africa



Kusile Power Plant

4800 MW coal fired power plant

- 1335 ha site 100 km east of Johannesburg
- Started 2010 – finish 2018
- First of six turbines to operate 2014
- At peak 12.000 people involved

Geosynthetic requirements

- Specified according to SANS and ASTM standards
- Applications: Protection, separation, filtration and reinforcement in Ash Dumps and Coal Stock Yard lining systems



Kusile Power Plant

Project owner

- Eskom

Geosynthetics from Fibertex

- F-750M: 3.300.000 m²
- F-950M: 110.000 m²
- Leakdrain: 93.000 m²



Medupi Power Plant

4800 MW coal fired power plant

- Located near border to Botswana and Zimbabwe
- Started 2007 – finish 2017
- First of six turbines to operate 2014
- At peak 8.000 people involved

Geosynthetic requirements

- Specified according to SANS and ASTM standards
- Applications: Protection, separation, filtration and reinforcement in Ash Dumps and Coal Stock Yard lining systems



Medupi Power Plant

Project owner

- Eskom

Geosynthetics from Fibertex and Naue

- F-30: 1.250.000 m²
- F-55: 370.000 m²
- F-1000M: 112.000 m²
- Bentofix NSP4000: 340.000
- Secugrid 120/40 R6: 36.000 m²
- Leakdrain: 65.000 m²
- Geocell: 62.000 m²



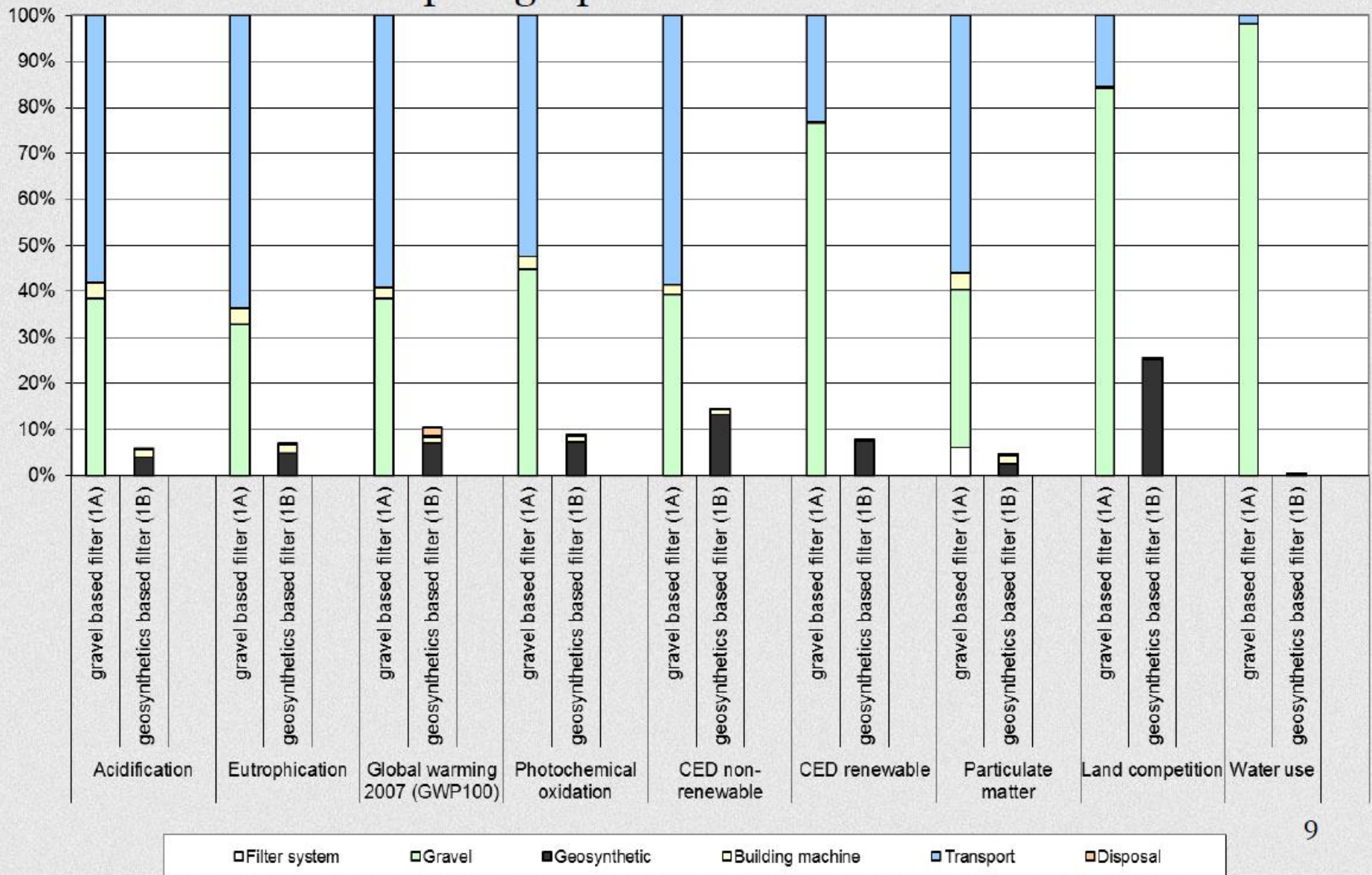
The E.A.G.M. commissioned ETH Zürich and ESU-services Ltd. to quantify the environmental performance of commonly applied construction materials. A comparison was undertaken between:

- conventional materials like concrete, cement, lime or gravel
- geosynthetic materials

A set of Comparative Life Cycle Assessment studies are carried out concentrating on various civil application cases, namely:

- *filtration (case 1)*
- foundation stabilised road (case 2)
- landfill construction (case 3)
- slope retention retaining structures (case 4)

Environmental impact graph



THIS STUDY SHOWS

The use of geosynthetics leads to:

- **75% (min.) lower environmental impact for all indicators**
- **~ 85% lower non-renewable cumulative energy demand**
- **~ 90% lower cumulative greenhouse gas emissions**

Thank you for your attention

