



MAKING A DIFFERENCE AROUND THE WORLD

USING R-PET FOR INNOVATIVE RECYCLABLE FOAM CORED THERMOPLASTIC SANDWICH STRUCTURES

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JEC Asia 2026



// AGENDA

- 01 ABOUT ARMACELL
- 02 PET FOAM SOLUTIONS
- 03 ARMAPET PRODUCTS
- 04 ARMAPET IN ACTION

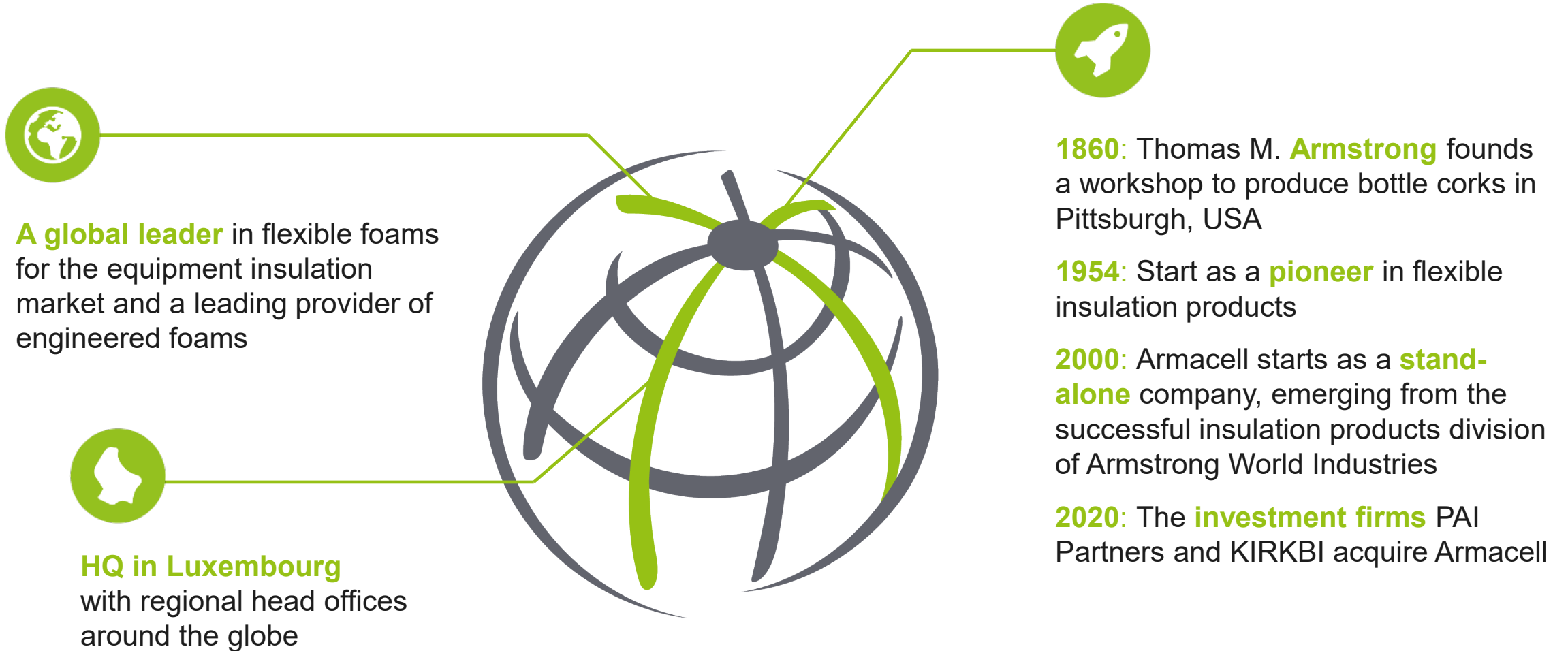




01

ABOUT ARMACELL

// Leading in **high-tech** products & **complex systems**



// Armacell at a glance

 3,372 employees worldwide	 25 production facilities in 19 countries on 4 continents	 € 30m invested in R&D over the past three years
 Regional head offices in Chapel Hill (AMERICAS), Singapore (APAC), Münster (EMEA)	 € 836m net sales € 155m EBITDA	 Enabling Energy Efficiency for Equipment

HVAC | HEATING & PLUMBING | REFRIGERATION | OIL & GAS | SOLAR | TRANSPORTATION
WIND ENERGY | SPORTS & LEISURE | CONSTRUCTION | OTHER

// Two business divisions



ADVANCED INSULATION

Flexible foams for the insulation of technical equipment utilised for the transport of energy

- Heating, Ventilation & Air Conditioning (HVAC)
- Plumbing
- Refrigeration
- Oil & Gas
- Commercial & Residential Equipment

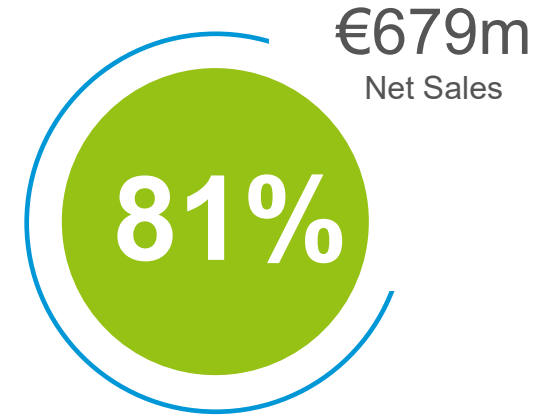


ENGINEERED FOAMS

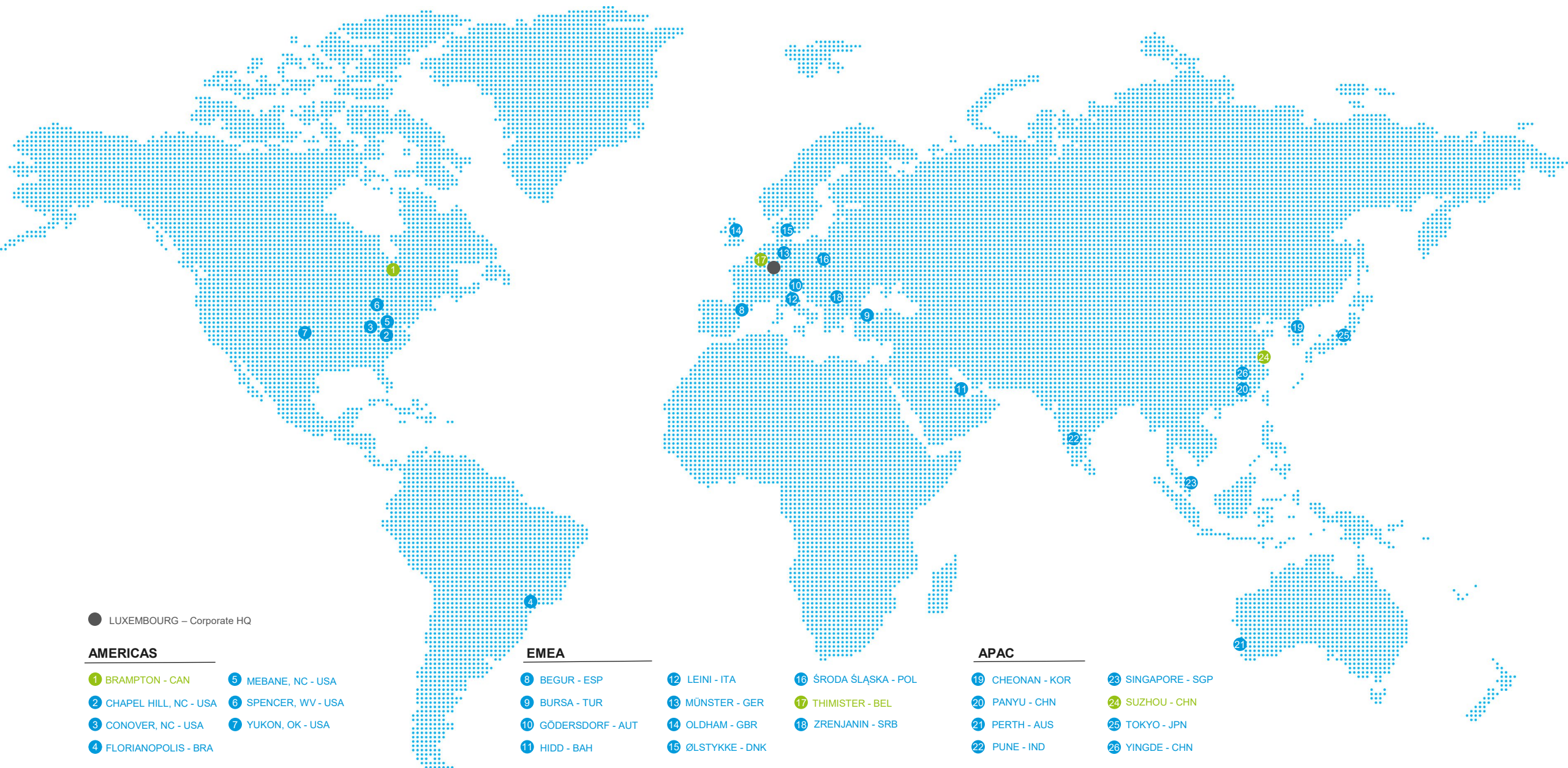
High-performance foams for the use in a broad range of end markets

- Wind Energy
- Automotive
- Transport
- Sports & Leisure

ArmaPET product range is a part of the engineered foams division



// Global presence



// Driving sustainability with **EcoVadis**

- **Recognition for leadership in sustainability** across Environment, Labour & Human Rights, Ethics, and Sustainable Procurement
- In 2025, Armacell's plants producing our core advanced insulation and PET products in continental Europe and UK have all achieved **EcoVadis Gold or Silver status**

- **Münster**, Germany: **Gold** – Top 5%
- **Oldham**, UK: **Gold** – Top 5%
- **Begur**, Spain: **Silver** – Top 15%
- **Leini**, Italy: **Silver** – Top 15%
- **Środa Śląska**, Poland: **Silver** – Top 15%
- **Thimister**, Belgium: **Silver** – Top 15%
- **Brampton**, Canada: **Silver** – Top 15%



02

PET FOAM SOLUTIONS

// Environmentally friendly **PET foam** solutions

- PET-based foams used as structural core material in composite sandwich construction
- Innovative and eco-friendly customer solutions from **100% post-consumer PET**
- **Patented** recycling technologies with lowest ecological footprint
- Unique process technology allowing consistent foam qualities



limited density variation



process versatility



thermo-formability



high processing temperature (+150°C)



unrivalled structural stability



patented r-PET technology

>5,500,000,000 PET bottles re-used since 2010

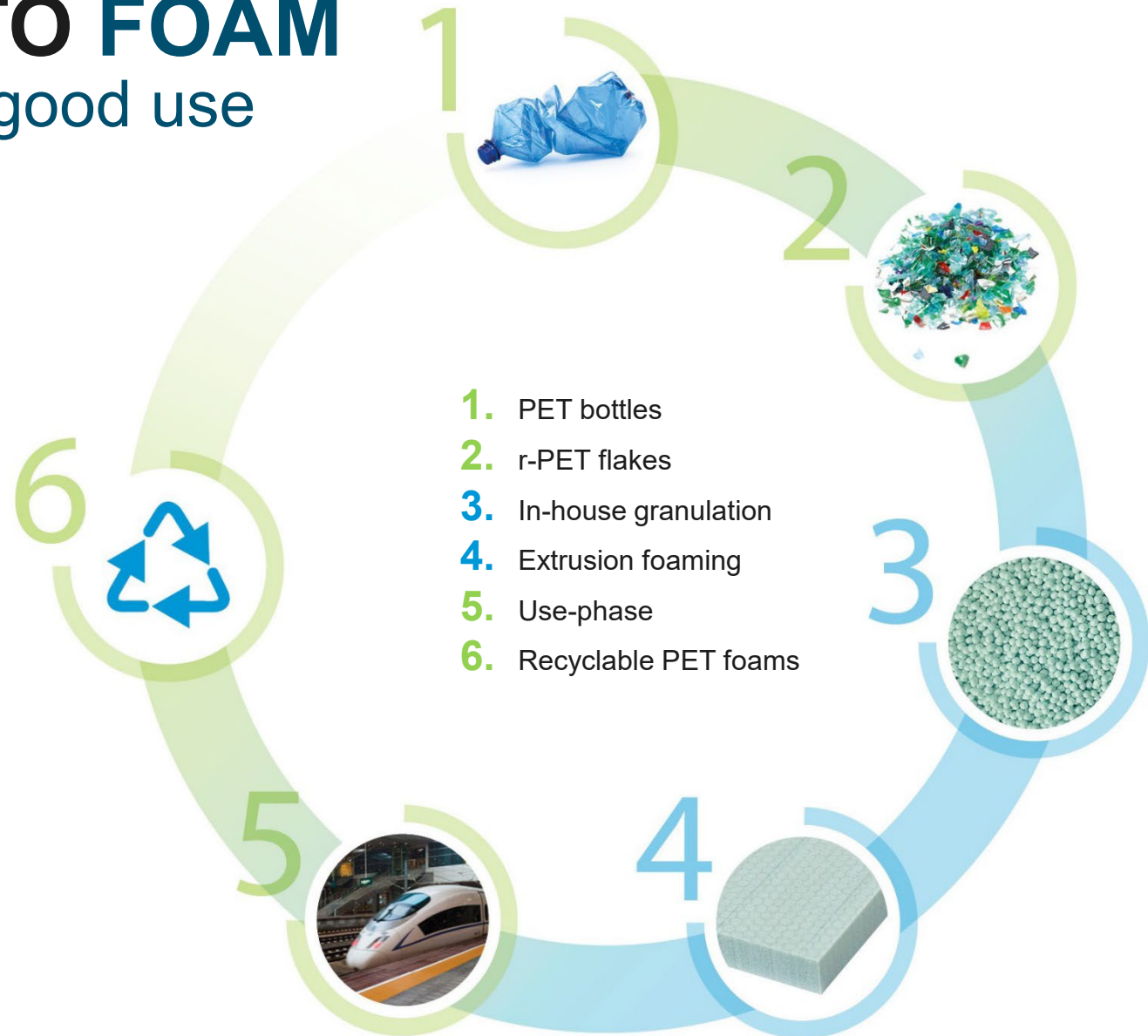


// FROM BOTTLE TO FOAM

• Putting plastic waste to good use

At Armacell we constantly innovate, improve and rethink what we are doing and are focused on sustainable, profitable growth through the development and manufacturing of our products to ensure a positive impact on our community.

Our unique ArmaPET products meet the stringent technical requirements of today's composite core materials and follow the circular economy guidelines to preserve our environment.





03

ARMAPET PRODUCTS

// ArmaPET[®] product solutions



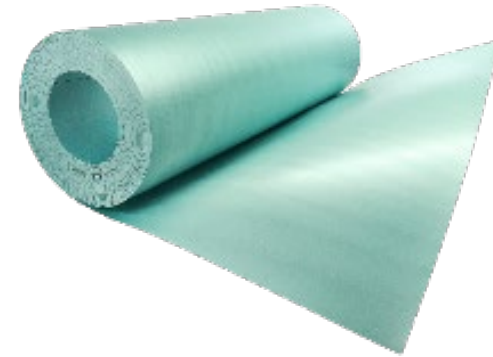
ArmaPET Struct

ArmaPET Struct is the versatile and durable solution for structural sandwich applications, with a more environmentally responsible approach.



ArmaPET Eco

ArmaPET Eco combines insulation and structural integrity, ensuring energy and emission efficiency for decades of use.



ArmaPET Curve

ArmaPET Curve is designed for recyclable thermo-formable micro sandwich solutions produced in continuous manufacturing processes.

What are the key drivers for public transport ?



Lightweighting



**Sustainable
sourcing**



Multi-material



**Enhanced
passenger safety**



Electrification



**ESG
reporting**

**Sustainable, lightweight, fire
safety, cost-effective and
multi-material solutions are
needed**

Results overview

5. LCA: Results

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE OR INDICATOR NOT DECLARED; MNR = MODULE NOT RELEVANT)

Product stage			Construction process stage		Use stage							End of life stage				Benefits and loads beyond the system boundaries
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	MND	MND	MNR	MNR	MNR	MND	MND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 m³ ArmaPET Struct

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C3/1	C4	D	D/1
GWP-total	kg CO ₂ eq	1.3E+02	1.83E+01	1.19E+01	0	3.93E-01	3.81E-01	1.2E+02	0	-6.55E+01	-3.59E+01
GWP-fossil	kg CO ₂ eq	1.42E+02	1.81E+01	1.02E-01	0	3.87E-01	3.75E-01	1.2E+02	0	-6.54E+01	-3.59E+01
GWP-biogenic	kg CO ₂ eq	-1.18E+01	0	1.18E+01	0	0	0	0	0	0	0
GWP-luluc	kg CO ₂ eq	4.08E-01	1.62E-01	-6.14E-04	0	6.4E-03	6.21E-03	2.22E-03	0	-7.96E-02	-3.28E-03
ODP	kg CFC11 eq	3.12E-06	1.61E-12	-4.04E-11	0	3.84E-14	3.72E-14	9.06E-12	0	-2.34E-06	-3.25E-10
AP	mol H ⁺ eq	3.84E-01	1.65E-01	-7.78E-03	0	4.6E-04	4.46E-04	1.3E-02	0	-2.55E-01	-3.8E-02
EP-freshwater	kg P eq	3.47E-02	4.34E-05	-1.74E-06	0	1.62E-06	1.58E-06	2.72E-06	0	-2.61E-02	-6.06E-05
EP-marine	kg N eq	1.29E-01	6.88E-02	-1.39E-03	0	1.58E-04	1.53E-04	3.98E-03	0	-7.77E-02	-1.16E-02
EP-terrestrial	mol N eq	1.1E+00	7.57E-01	-1.18E-02	0	1.91E-03	1.85E-03	6.34E-02	0	-6.27E-01	-1.24E-01
POCP	kg NMVOC eq	9.8E-01	1.89E-01	-4.44E-03	0	4.34E-04	4.21E-04	1.11E-02	0	-2.29E-01	-3.27E-02
ADPE	kg Sb eq	5.67E-04	1E-06	-2.4E-07	0	3.24E-08	3.14E-08	3.64E-07	0	-4.13E-04	-3.15E-06
ADPF	MJ	3.6E+03	2.23E+02	-1.23E+02	0	4.97E+00	4.82E+00	2.39E+01	0	-1.15E+03	-6.42E+02
WDP	m³ world eq deprived	2.71E+01	1.59E-01	1.76E+00	0	5.67E-03	5.5E-03	1.08E+01	0	-2.41E+01	-3.98E+00

GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential)

3.2 System boundary

The type of the EPD is cradle to grave. The following information modules are defined as system limits in this study:

A1–A5 Product development:

A1 – Production of raw materials

A2 – Transport to the manufacturer

A3 – Production

A4 – Transportation to the construction site

A5 – Installation in the building

End of life stage (C1- C4):

C1, deconstruction/demolition,

C2, transport,

C3, waste treatment ,

C4, disposal.

Reuse, recovery and recycling potential (D)

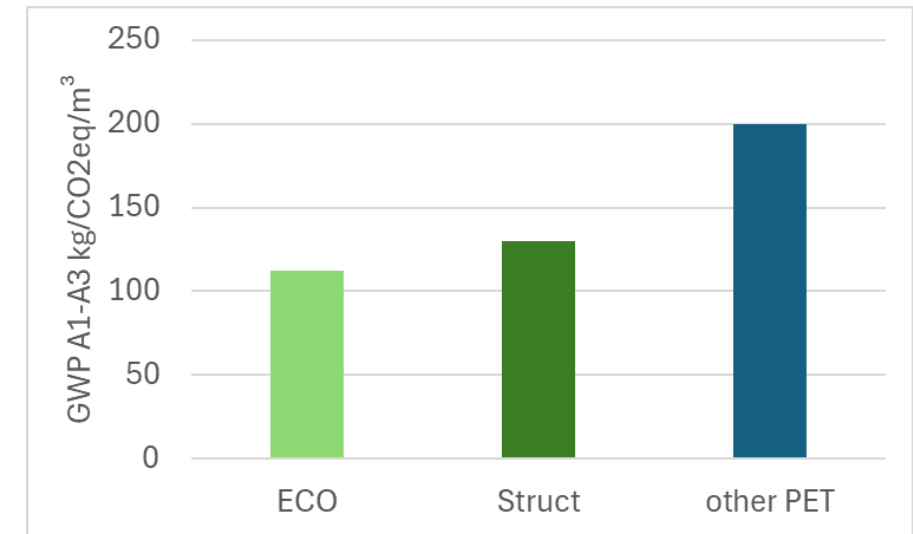
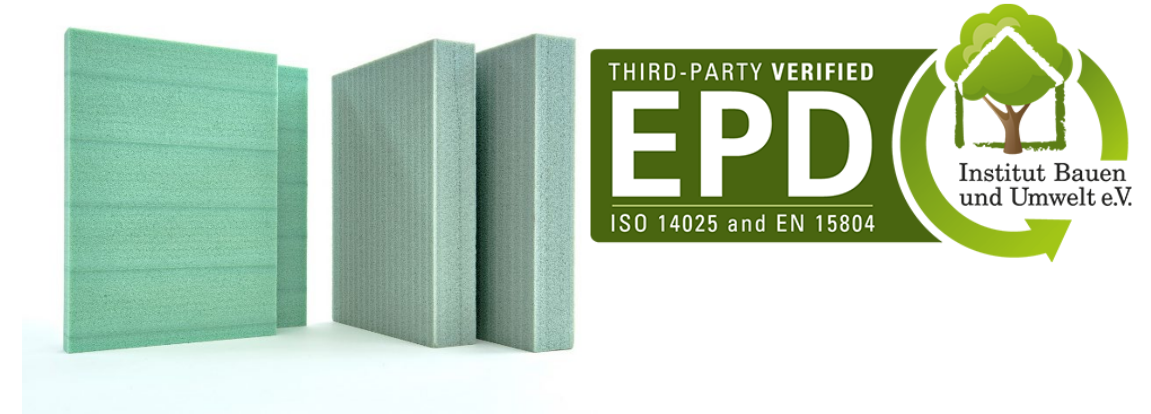
// ArmaPET® Environmental Product Declarations

Our Environmental Product Declarations (EPDs) showcase ArmaPET strong environmental performance and commitment to sustainability.

EPD result at 100 kg/m³ density (module A1-A3 only):

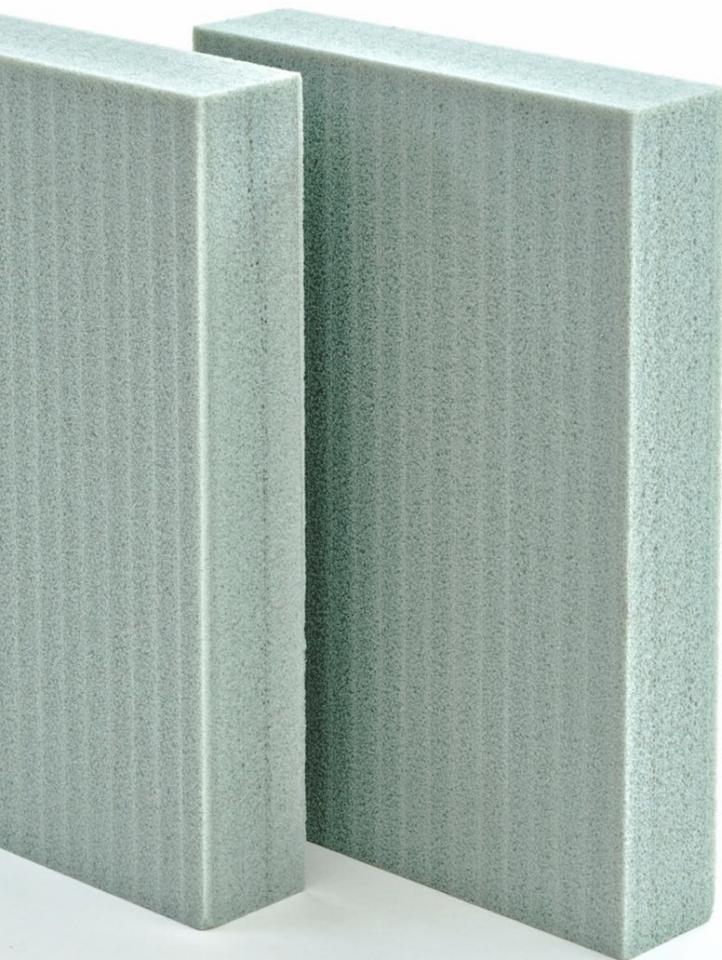
- ArmaPET Struct 130 kg CO₂ e/m³
- ArmaPET Eco 112 kg CO₂ e/m³
- Industry benchmark 200 kg CO₂ e/m³

Compared to the benchmark, ArmaPET offers a ~35% lower carbon footprint — and that's just considering life cycle stages A1-A3. With our full A-D results, the advantage is even greater due to our recycled PET content and circular approach.



// ArmaPET® Eco50

CO₂ potential



5. LCA: Results

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Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	MND	MND	MNR	MNR	MNR	MND	MND	X	X	X	X	X

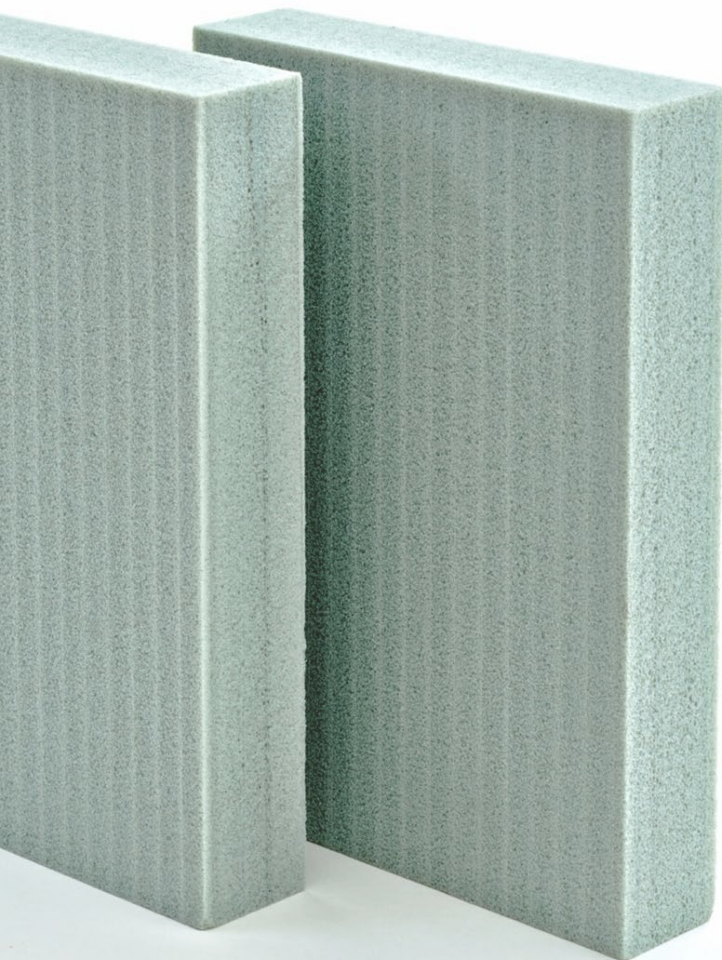
RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 m² ArmaPET Eco 50

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	kg CO ₂ eq	3.48E+01	1.98E+00	6.22E+00	5.44E-02	1.88E-01	1.63E+00	5.96E+00	-2.76E+01

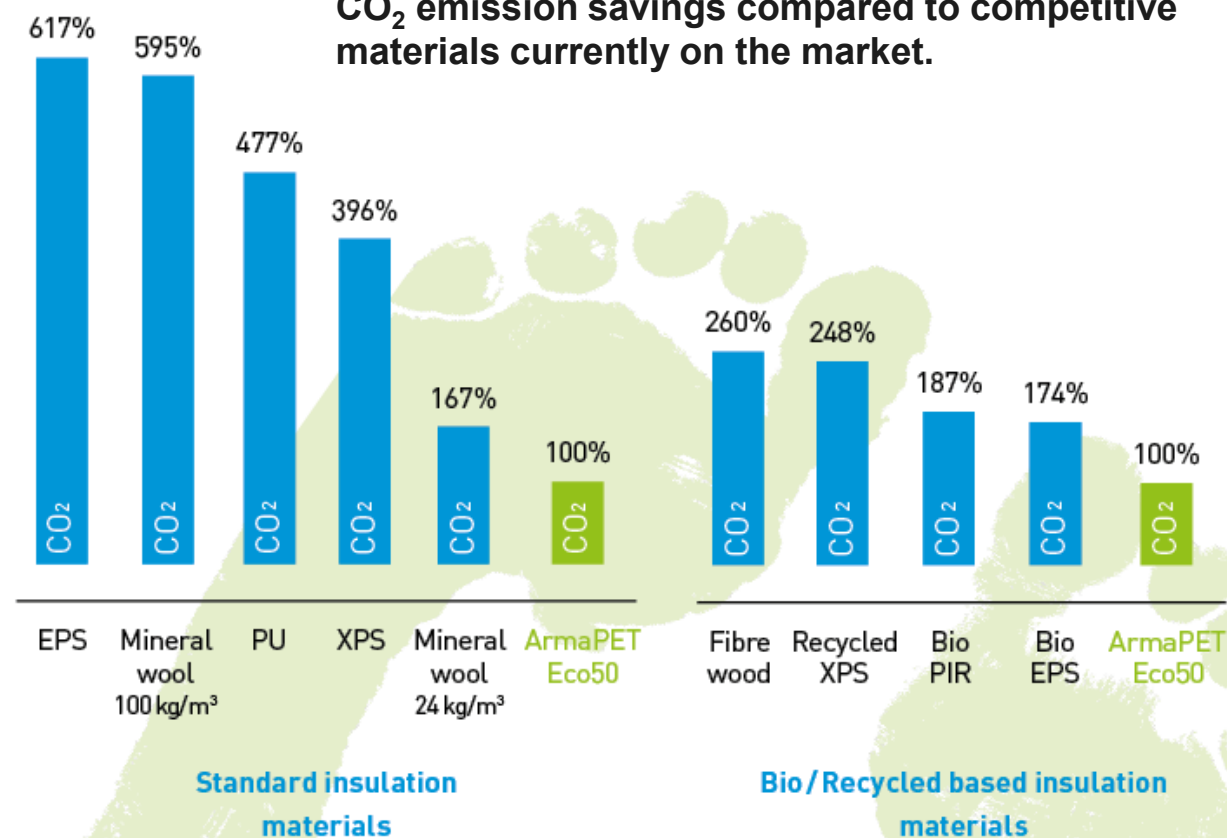
A1-A3	Product stage	3.48 E+01	34,8
A4	Transport from the gate to the site	1,98 E+00	1,98
A5	Assembly	6,22 E+00	6,22
B1-B7	Use stage	-	-
C1	De-construction demolition	5,44 E-02	0,0544
C2	Transport	1,88 E-01	0,188
C3	Waste processing	1,63 E+00	1,63
C4	Disposal	5,96 E+00	5,96
D	Recycling potential	- 2,76 E+01	-27,6
			23,23 kg CO₂ eq

// ArmaPET® Eco50

CO₂ potential



The use of 100% recycled PET as the raw material base for ArmaPET product family offers significant CO₂ emission savings compared to competitive materials currently on the market.



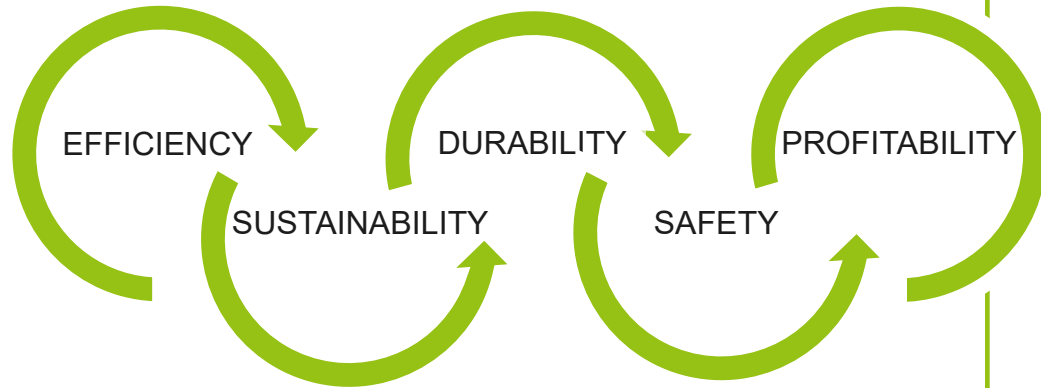
A white semi-truck is driving away from the viewer on a two-lane asphalt road. The road is flanked by green grass and trees. In the background, the sun is setting, creating a bright glow and casting long shadows. The sky is blue with some clouds.

04

ARMAPET APPLICATIONS

// Road transport

Body structure of lightweight trucks



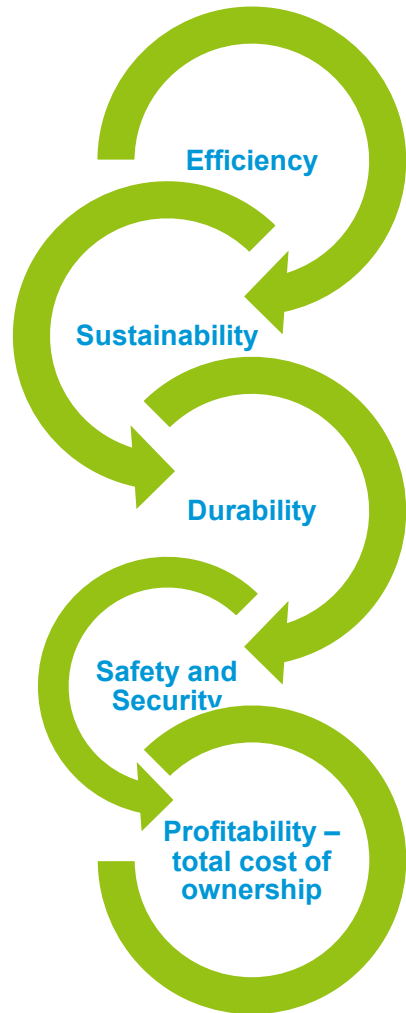
BODY STRUCTURE

Penso's *Blue Ocean Home Delivery Pods* are made of ArmaPET Struct.



// CASE STUDY: PENSO TRUCKS

• OPTIMIZE TRANSPORT EFFICIENCY



EFFICIENCY

- **Weight** reduction
- Aerodynamic optimisation
- **Fuel** savings -> £2,400 per vehicle/year
- Long-term **thermal insulation**

SUSTAINABILITY

- Reducing **CO2 emissions** -> 6.3 tons per vehicle/year
- **Recycling** of Core + Skin
 - Carbon is recycling using pyrolysis process
 - PET Core can be re-granulated and recycled

SAFETY & SECURITY

- Design optimized for **fewer accidents**, better **access** and **safe operations**

DURABILITY

- Equivalent material tested on train door:
 - Core passes 1 Mio **durability** cycles and **pressure** testing with loads up to 7000N
- All structural load-cases proven for **10 year warranty** and 1250 kg **payload**
- Easy **repair**



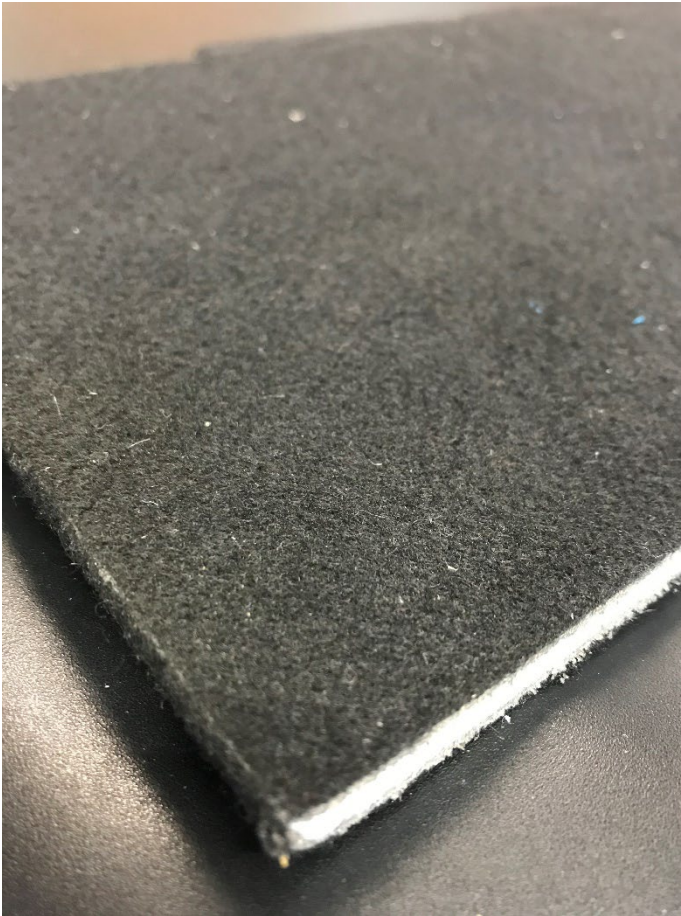
PROFITABILITY

- Optimized **Payload** (33%) and **operating efficiently**
- Fleet Savings
- Reduced **Total Cost of Ownership** by £6,700 per vehicle/year



// EXAMPLES: THERMOPLASTIC SANDWICH STRUCTURES

• FULLY THERMOPLASTIC SANDWICH STRUCTURE



PET + PP

- PET Foam + PP Skin
- **Sandwich** structure by **thermal lamination**
- The **cell structure** of the surface allows welding of the compatible materials
- → **no adhesive** needed, **no additional process** steps required -> increased **labour productivity**
- Easily **recyclable**



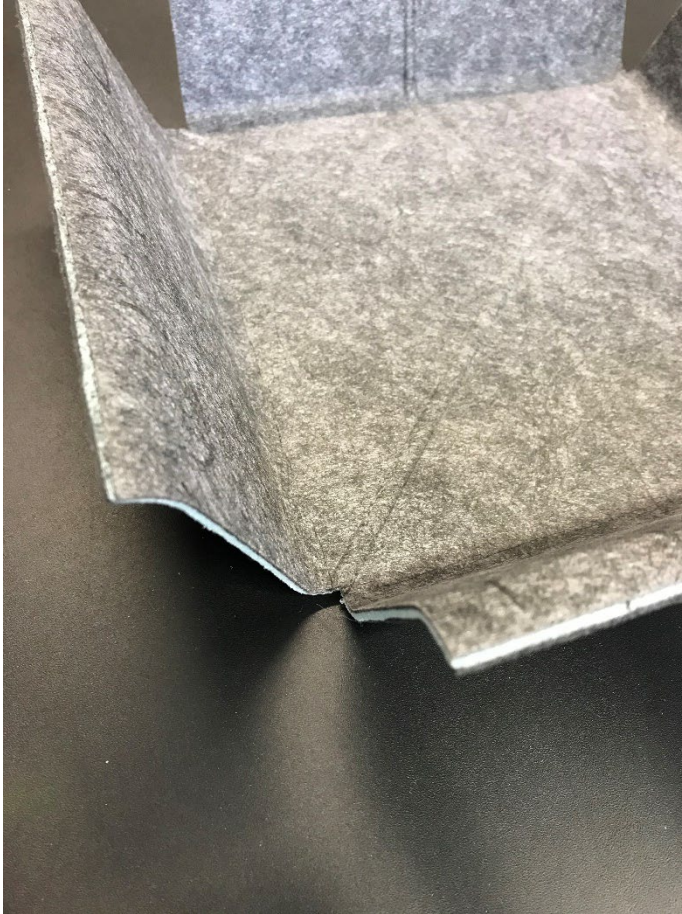
PET + Glass PP

- **Automotive** part for backpanel
- PET Foam + Glass PP
- Skin is combined with **hotmelt adhesive** layer for easy processing



// EXAMPLES: THERMOPLASTIC SANDWICH STRUCTURES

• FULLY THERMOPLASTIC SANDWICH STRUCTURE



PET + PET

- PET Core + PET Fleece
- **Thermal lamination** possible during **thermoforming** process due to material compatibility without intermediate layer, **cycle times** comparable to PP
- → **no adhesive needed, no additional process** steps required
- Fully **recyclable**



PET + natural fibre PP mix

- PET Foil Core + needled natural fibre PP mix
- can be produced in **large rolls**
- Easy **thermoforming** without any additional adhesive layer
- for **micro sandwich applications**

// Road transport

Body structure of lightweight trucks, RV
A real commitment to sustainability:
ArmaPET Eco50, utilised for walls and insulation, offers a lightweight, structurally sound, and thermally efficient option, while **ArmaPET Struct GRX enhances floors and panels** with its refined cell structure, high shear strength, and minimised resin absorption. Both foams, crafted from 100% recycled PET and **paired with natural-fibre skins**, provide exceptional strength, insulation, moisture resistance, and durability,



// Road transport

Body structure of lightweight trucks, RV



// SUMMARY

Advantages for r-PET Structural cores vs. Conventional solutions.

- Thermoplastic base polymer
- No moisture sensitivity
- Excellent fatigue properties
- Low density variation and flat sheets
- Excellent processing stability, up to 200 C
- Possibility to recycle the core, scrap from kitting today and the rest after the end of the product life cycle
- A core solely based on recycled PET material, improves LCA
- Lower weight after infusion
- Lower produced cost, LCC



Q&A

THANK YOU
