



OPENING NEW HORIZONS

ANNUAL REPORT 2018



ABOUT US

Armacell is the inventor of flexible elastomeric foams for equipment insulation. We develop innovative and safe thermal, acoustic and mechanical solutions that create sustainable value for our customers. Day in, day out, our products make a significant difference around the world. As a multi-material and multi-product company, we operate two main businesses: Advanced Insulation and Engineered Foams. Our product focus is on insulation materials enhancing the energy efficiency of technical equipment, high-performance foams for sophisticated and lightweight applications, 100% recycled PET products and next-generation aerogel technology.



REXUS/BEXUS SPACE PROGRAM

ArmaFlex® flew to the stratosphere by balloon to help students from Hamburg-Harburg Technical University collect micrometeoroids. The aim of this scientific project was to collect cosmic dust to improve our understanding of the Earth's atmosphere. ArmaFlex® protected the sensitive space technology deployed in the balloon from extreme temperatures, changing atmospheric pressure and condensation.

 For more of our projects, please see pages 12–15

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DRIVING
INNOVATION





INNOVATION

»INNOVATION IS OUR ACCELERATOR« A CONVERSATION WITH PAVEL HOLUB, DIRECTOR GLOBAL INNOVATION

HOW DO YOU DEFINE INNOVATION?

Innovation is the process of translating an idea or invention into a good or a service that creates added value. Whether it is a market-driven or technology-driven idea, to be successful, it has to address customers' requirements. At the same time, innovation is not merely R&D. Ideas can come from everybody within or outside of Armacell. We are revolutionising our approach to innovation by engaging our employees in delivering creative and market-leading ideas and turning these ideas into solutions we develop, manufacture, market and sell. Everyone at Armacell is involved in innovation.

WHAT IS THE MISSION OF INNOVATION@ARMACELL?

Our mission is derived from Armacell's corporate vision of being a global leader in innovative technical insulation solutions and components to conserve energy and make a difference around the world. In practical terms, this means innovation is a differentiator. It delivers new technologies with superior and reliable premium products as the outcome. And it makes Armacell a benefit leader for best-in-class equipment insulation solutions.

WHAT IS YOUR FOCUS IN INNOVATION?

Our innovation focus is aligned with Armacell's goal of accelerated, sustainable growth. We are contributing to this goal by increasing our innovative capabilities through creating an innovation-focused team, engaging peers, and staging internal brainstorming sessions and innovation workshops to encourage a mindset change. To foster a culture of curiosity and creativity we are specifically rewarding innovations from within our multi-materials company. To define our future focus, we are identifying white spaces based on market opportunities.

WHAT BENEFITS IS INNOVATION@ARMACELL DELIVERING?

One concrete outcome has been the recent launch of new products, such as ArmaGel HT and ArmaShape globally, ArmaFlex LS B_L-s2,d0 in the EU and ArmaFlex Shield in the USA. In my view, innovation is forward-looking. We are building an innovation roadmap driven by market-pull, sustainability and technology-driven factors focusing on new materials, product performance enhancement and aerogel technology. This is how innovation will continue to play its vital accelerator role at Armacell.



SAFETY



CONSERVATION



COMFORT



SAFETY CONSERVATION COMFORT

RESPONDING TO GLOBAL MEGATRENDS

Whether it is health and **SAFETY**, road safety or safety from extreme weather or political strife, the desire for a safe existence is a basic human instinct. With our planet increasingly impacted by resource shortages, **CONSERVATION** has become a global priority. Moreover, noise and vibration levels affect the **COMFORT** levels of city dwellers worldwide. These global trends are significant for Armacell, and our product portfolio offers solutions to mitigate the fire and smoke risk, conserve resources, and enhance acoustic comfort and vibration control.

RELEVANT PRODUCT PORTFOLIO

// Smoke reduction

As smoke is a significant risk in a building fire, smoke density requirements for equipment insulation products are becoming stricter. Armacell's low-smoke pipe insulation products ArmaFlex® LS and ArmaFlex® Ultima are certified to these new standards. By reducing smoke development, they improve visibility and respiration, thus extending the time available to evacuate safer in the event of fire.

50%

LESS SMOKE RELEASED
BY ARMAFLEX LS TUBES

// Resource conservation

With energy consumption significantly driving global warming, energy is a resource to conserve. Armacell contributes to saving energy by contributing to reducing fuel consumption in transport (e.g. in the global food cold chain), improve cooling systems, increase energy efficiency, lower the total lifecycle costs of buildings, reduce manufacturing costs and enable lightweighting.

67%

OF GLOBAL POPULATION
URBANISED BY 2040

// Acoustic comfort

Health concerns, disturbance and discomfort are the effect of urban noise and vibration. Armacell products help to attenuate these stress factors in road, rail and construction applications. Acoustic solutions are a key pillar of Armacell's product portfolio, and the company is underlining its commitment to meeting the growing global demand through acquisitions, R&D and innovations.

76%

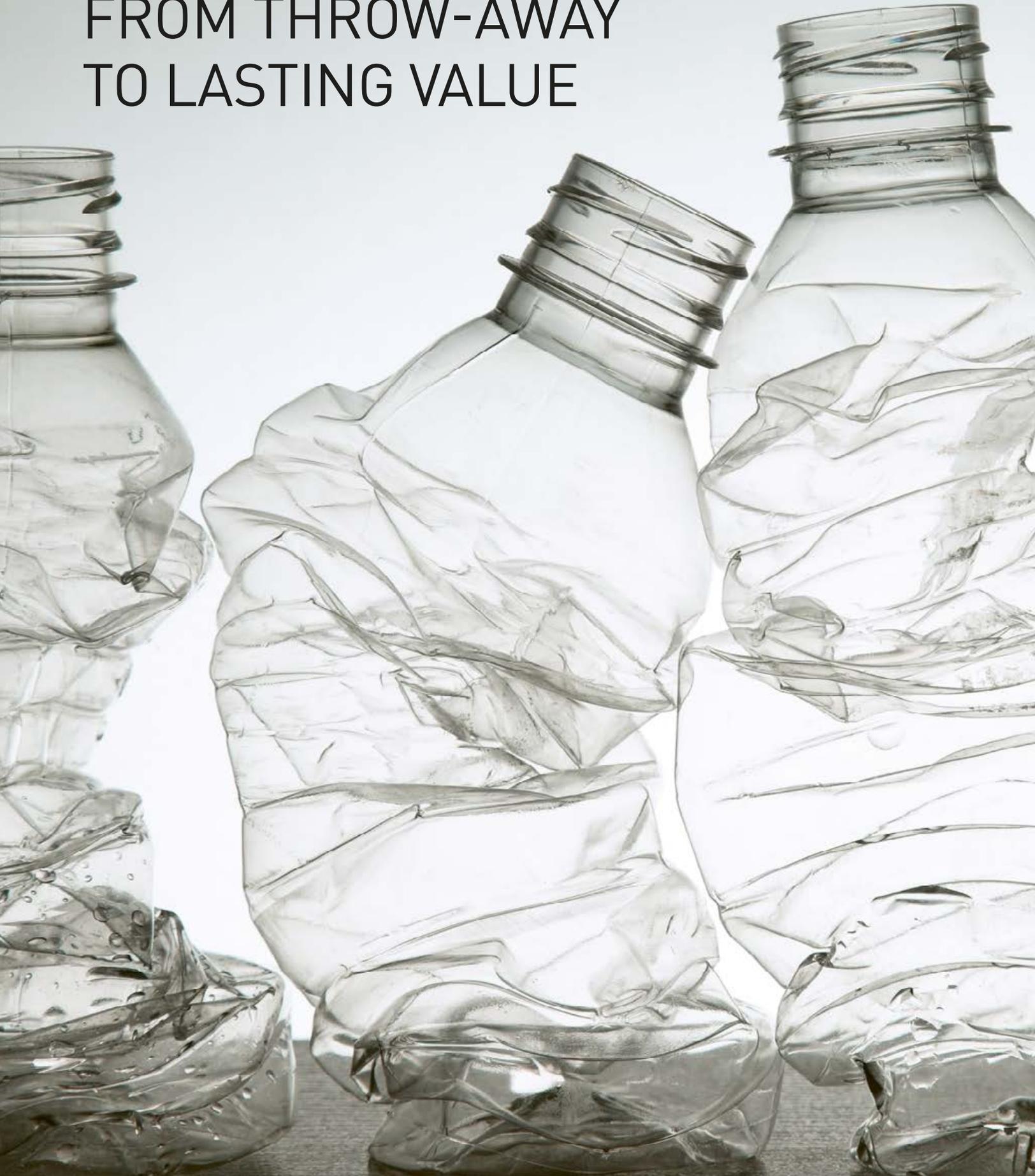
OF POPULATION AFFECTED
BY NOISE NUISANCE

Armacell offers a wide range of environmentally friendly solutions based on 100% recycled polyethylene terephthalate (PET). Until today, more than 1 billion PET bottles have been re-used to produce ArmaForm® products. Our green foams made from post-consumer PET are installed, for example, in the rotor blades of wind turbines. Instead of a service life of just weeks, our PET foam cores endure several decades.





FROM THROW-AWAY TO LASTING VALUE





»WITH OUR PET FOAM PRODUCTION, WE ARE LOOKING BACK ON A PIONEERING 13-YEAR HISTORY IN THE COMPOSITES INDUSTRY.«

Bart Janssen, Armacell's Vice President of Engineered Foams

RECYCLING PLASTIC

Armacell converts recycled PET bottles that would otherwise end up as single-use plastic waste. Recycled PET material is deployed to manufacture closed-cell, fully recyclable structural core materials for composite sandwich constructions and as eco-friendly lightweight material for thermal insulation. PET foam applications range from up to 90-metre-long wind turbine blades to ship hulls, decks, interiors, road and rail vehicles, roofs, facades, domes and bridges.

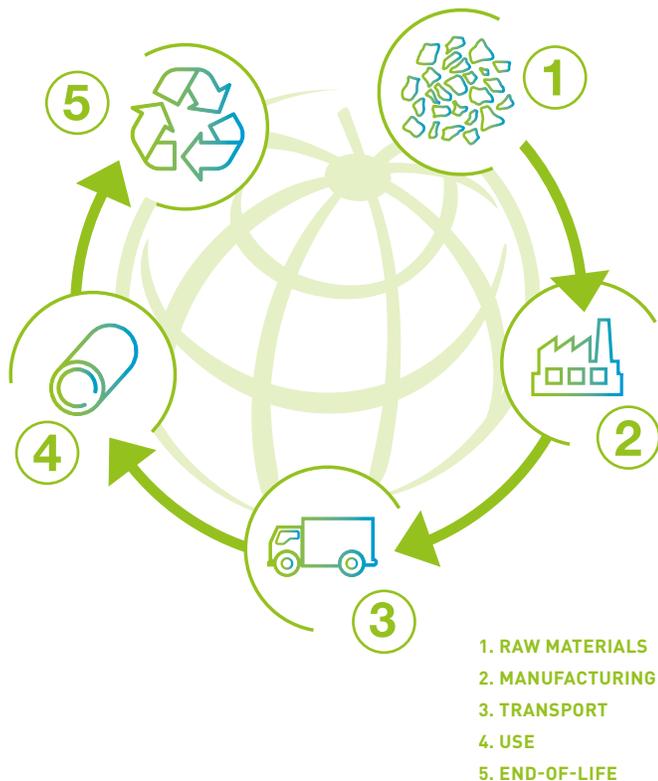
WASTE-FREE OPERATIONS

Armacell is committed to closing the loop in polyethylene (PE) production. As PE is fully reprocessable, it is a suitable material for reuse in the production process. As far back as 2001, the first equipment for recycling foamed products was installed at Armacell's plant in Środa Śląska, Poland. Once PE output increased, a more efficient solution was required to enable the conversion of both foams and solid residues. Since Armacell invested in a new recycling line, 99.8% of PE process scrap is today recycled and returned to the production process, guaranteeing nearly waste-free PE operations.

Reusing internal production scrap is commonplace in our industry. Armacell has gone one step further by collaborating with two of its largest European converters for the return of sorted residual material from their operations. Following reprocessing at Armacell's plant in Thimister-Clermont, Belgium, this material is re-used to limit waste generation along the value chain. Just two examples of thermoplastic foam-related initiatives that demonstrate how Armacell translates circular concepts into real business cases.

CLOSING THE LOOP

The circular economy involves switching from a linear 'make-take-dispose' economy to a circular one based on 'reduce, reuse and recycle'. An economy in which waste and pollution are designed out, products and materials kept in use longer, and natural systems regenerated. Both the UN and the EU have launched circular economy initiatives. This macro level is being matched by undertakings at the micro level of companies, NGOs and citizen action groups. Although no manufacturing company can claim to have truly closed the loop, at Armacell, we are working towards a circular economy in multiple ways. Right now, we are recycling PET from bottles, finding new sources of recycled PET and maximising the collection of internal scrap, which is then returned to the production process.



PLASTICIRCLE – FOR A CLEANER TOMORROW

A coffee to go, a handy water bottle, a plastic straw, a disposable lunch container – plastic packaging is everywhere. Since recycling plastic is more important than ever, Armacell is participating in the EU-funded PlastiCircle project as a research partner. PlastiCircle aims to improve plastic packaging waste collection, transport, sorting and recycling rates across Europe. By enhancing the plastic packaging waste chain through a circular economy approach, PlastiCircle is striving to reinvent the plastic packaging treatment process and transform waste into valuable products. Besides its own research in this field, Armacell is using the PlastiCircle network to find new opportunities for post-consumer PET sourcing and its conversion into full-value products.

IN 2009, WE BECAME THE WORLD'S FIRST MANUFACTURER OF FLEXIBLE TECHNICAL INSULATION MATERIALS TO CARRY OUT LIFE CYCLE ASSESSMENTS (LCAS) AND PUBLISH ENVIRONMENTAL PRODUCT DECLARATIONS (EPDS).

A Life Cycle Assessment (LCA) quantifies the direct and indirect environmental impact associated with the life cycle of a product from the raw material extraction, materials' processing and manufacturing through distribution and use to its ultimate disposal. As an LCA provides specific information on an individual manufacturer's products, the results serve as a valuable benchmark.

An Environmental Product Declaration (EPD) is a neutral, independently verified document that provides information about the impact a product has throughout its life cycle – and in particular its impact on the environment. The fact that one EPD can be compared with another facilitates product evaluation, especially when designing green buildings in line with certification schemes such as Leadership in Energy and Environmental Design (LEED®).



INDOOR AIR QUALITY

In 2011, the Empire State Building in New York was extensively renovated and LEED® GOLD certified. ArmaFlex® was installed on the air ducts to ensure indoor air quality.



ENERGY CONSERVATION

Sathorn Square in Bangkok, Thailand, is a Grade A office building and a LEED-certified project that achieved GOLD level certification in 2013. ArmaFlex® was installed on the chilled water system to prevent condensation and minimise energy losses.

ADVANCING SCIENCE
AND TECHNOLOGY

HEADING FOR THE FUTURE





COLLECTING STARDUST



Temperatures are low on the ground in Sweden but not as chilly as in the stratosphere where the average can be as cold as -51°C . Those are the kind of conditions where high-performance materials deliver. And where one Armacell product prevailed.

ArmaFlex® flew to the stratosphere by balloon to help students from Hamburg-Harburg Technical University collect micro-meteoroids. The aim of this scientific project, which is part of the REXUS/BEXUS space program, was to collect cosmic dust in order to improve our understanding of the Earth's atmosphere. ArmaFlex®, the high-performance insulation material donated, shaped and sized by Armacell, protected the sensitive space technology deployed in the balloon from extreme temperature changes, falling air pressure and condensation. When a product actually designed for insulating HVAC, plumbing and refrigeration pipes proves its worth in the stratosphere, you know how reliable it is.

-51°C

conditions in the stratosphere
can hardly get any tougher

TURNING WOOD INTO FOAM



Can we decrease our dependency on finite fossils fuels? Is there a more sustainable alternative to petroleum as the raw material for foam products? To find answers to these questions Armacell is one of the partners in the EU-funded SWEETWOODS project.

SWEETWOODS has brought together nine bio-innovation oriented partners from all over Europe with the aim of creating added value for lignocellulosic biomass. The value chain starts with enzymatic lignin depolymerisation and the conversion of sugars to produce high-purity wood-derived intermediates, which are then processed into a variety of biofuels and biochemicals. Armacell's researchers are currently developing lignin-based feedstock recipes in the laboratory. The next stage will include pilot-scale testing, with industrial-scale production as the longer-term goal. What is driving Armacell? The desire for true bio-based feedstock, the replacement of organic flame retardants and potential cost savings.

1 of 9

bio-innovation oriented companies
part of Horizon 2020 Flagship project

THE RECYCLED BOTTLE BOAT



Is it possible to develop an innovative, efficient and sustainable solution for transporting goods on inland waterways? Team Maverick was convinced they could – and with Armacell’s support won the Eco Race Challenge.

Team Maverick, a group of nine international students from Leuven University in Belgium, were determined to build an eco-friendly cargo catamaran to take part in the Eco Race Challenge 2017 on the Leuven-Dijle canal. To make the boat as sustainable as possible, Team Maverick used 100% recycled PET foam provided by Armacell for the sandwich construction of the hulls and deck. This hull structure brought the benefits of improved stability – even with an uneven load – and more cargo space on deck. The design made it safer for the crew as they could exit faster, and the hydrodynamic hulls made the boat faster, too. Team Maverick fulfilled all the Eco Race criteria with their innovative, efficient and sustainable solution for inland navigation and won the cargo category of the race.

100%

made of recycled PET bottles
and 100% recyclable

SOLAR POWERED TO THE SOUTH POLE



The first-ever solar-powered expedition to the South Pole took place in a vehicle built from recycled plastic. This experiment in clean technology was also a model of collaboration to enhance sustainability – with Armacell as a partner.

The idea came over dinner. As the Dutch couple Liesbeth and Edwin ter Velde used up yet another piece of plastic packaging, they began thinking about the plastic waste issue. The outcome was Solar Voyager, a vehicle powered by the sun and built from ArmaForm®, an Armacell material made from recycled plastic. The 2,400 km trip to the South Pole and back was a major test for man and machine – in the harsh, zero-waste environment of the Antarctic. And that was the inspiration for the scientists to motivate others to reduce and reuse plastic. Edwin ter Velde: “The great advantage of Armacell’s core foam, which we utilised for several constructional items, is that it is made from 100% recycled plastic. With our project we are challenging industry to use recycled material.” Armacell is already playing its part.

250 kg

rPET filament from waste
utilised for the expedition

CITIC TOWER, A 108-STOREY, 528-METRE HIGH SKYSCRAPER POPULARLY KNOWN AS CHINA ZUN, IS THE TALLEST BUILDING IN BEIJING AND THE NINTH TALLEST WORLDWIDE.





PROJECTS



CHINA ZUN, BEIJING

For a building of superlatives an outstanding product: 7,000 m³ of ArmaFlex[®] were utilised to insulate the chilled water pipes and air ducts of the HVAC systems in China Zun. As a high-quality, closed-cell insulation product that is dust- and fibre-free, ArmaFlex[®] is trusted to provide reliable, long-term condensation control, even without any external water vapour barrier.

7,000 m³

of ArmaFlex[®] with an insulation thickness of 45–50 mm



AS AN INTEGRAL PART OF
TRANSPORT SOLUTIONS,
OUR PRODUCTS ARE
INCREASING THE PACE
OF PROGRESS.

FLYING HIGH, ISTANBUL

Selected for fulfilling all the regulatory requirements, Armacell products have been installed as insulation for the heating, cooling and water pipes in the terminal buildings of Istanbul's new airport, one of the world's largest with six independent runways, 280 intelligent passenger bridges and the capacity to handle 500 aircraft and an annual total of 200 million passengers. An iconic project.

140x

more energy saved in an ArmaFlex® product
lifetime than required to manufacture it



HIGH-SPEED RAIL, CHINA

The CRH3A bullet train connects the cities of Chengdu and Xi'an in Western China, travelling the 700 km in less than four hours and transporting passengers at speeds of up to 250 km/h. ArmaForm® was selected as a lightweight structural core material for the train's nose as a result of its thermo-formability, fatigue resistance and process versatility. The success of the CRH3A has put an end to flights between the two cities, reducing the carbon footprint on this route.

33%

less CO₂ emissions by manufacturing
ArmaForm® with recycled PET flakes



AUTO LIGHTWEIGHTING, USA

In the USA alone, Component Foams products from the EnsoLite® and Monarch® lines are on the approved source lists of Ford, General Motors, Fiat Chrysler and Toyota. Lightweight materials such as Armacell's high-performance foams are supporting the greening of the automotive industry where lightweighting is forecast to lower CO₂ emissions by up to 40% by 2050.

40%

less emissions using lightweight
materials in cars



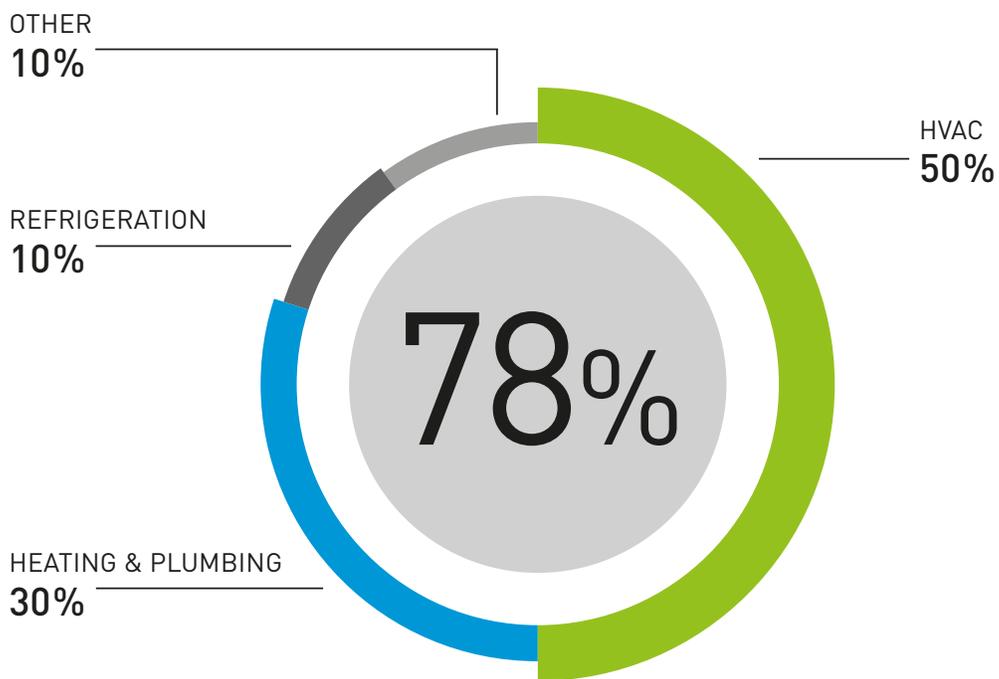
More information about
our projects on our website
www.armacell.com

2018 PRODUCT PORTFOLIO

EQUIPMENT VERTICALS

ADVANCED INSULATION (AI)

Advanced Insulation products meet the demand for insulating equipment in markets where energy distribution matters



END MARKETS

COMMERCIAL
EQUIPMENT



40 – 50%

RESIDENTIAL
EQUIPMENT



15 – 20%

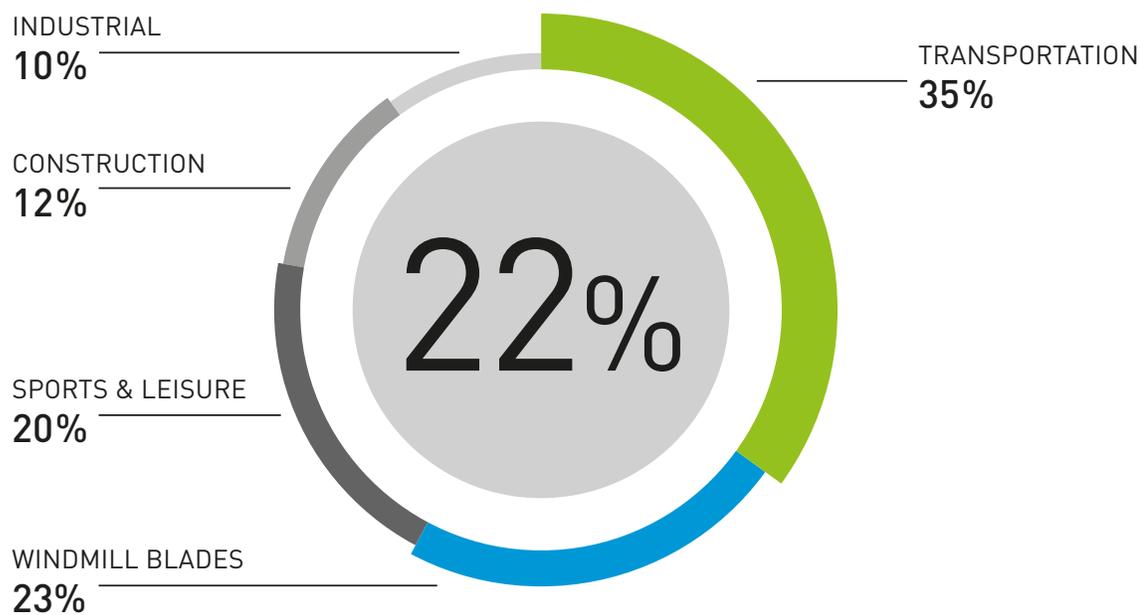
ENERGY



<10%

ENGINEERED FOAMS (EF)

Engineered Foams: semi-finished and finished non-insulation products for a broad range of applications across multiple end markets



INDUSTRIAL



<10%

LIGHT INDUSTRIAL



<10%

SPORTS & LEISURE



<5%

TRANSPORTATION



<10%

HIGH-PERFORMANCE PRODUCTS

ARMAFLEX® – HERITAGE PURE

The world's first flexible insulation foam, ArmaFlex®, has been going strong since 1954. Now in its seventh product generation, this high-tech material with its insulating closed-cell structure ensures low thermal conductivity with a built-in vapour barrier. Manufactured worldwide, the standard ArmaFlex® product is customised to meet local requirements and often combined with other products to create added-value hybrid solutions.

// ArmaFlex® Ultima

The first flexible technical insulation material to achieve a Euroclass B_L-s1,d0 fire classification.

// ArmaFlex® LS

The benchmark in low-smoke-density pipe insulation that reduces smoke development and hazardous emissions to facilitate evacuation in the event of fire.

// ArmaFlex® Rail

The first flexible foam insulation material to meet the highest standards for passenger safety in rail vehicles.

// NH/ArmaFlex®

The world's first halogen-free flexible foam insulation material.

// ArmaFlex® DuoSolar

The pre-covered dual-pipe system for quick and reliable installation on solar thermal systems.

// ArmaFlex® Protect

The highly flexible fire protection barrier for thermal insulation and condensation control of almost every type of pipe.

// ArmaFlex® Shield

The tough, moisture- and UV-resistant insulation with a durable protective jacket specially designed for indoor and outdoor applications.





ArmaShape is the first mouldable particle foam based on PET.



COMPONENT FOAMS

As a proven leader and innovator in expanded foams, Armacell designs and produces elastomeric and polyolefin materials in bun, sheet and roll form as well as extruded tubes and profiles. These innovative products are supplied to customers in the aerospace, automotive, construction, industrial, medical and sport & leisure markets. Our elastomeric component foam products (e.g. **ArmaSport**[®], **EnsoLite**[®] and **Monarch**[®]) are custom-engineered with optimised cell structures and densities for specific physical properties. Our polyolefin component foams (e.g. **OleCell**[®] and **OleTex**[®]) are made of either cross-linked polyethylene or recyclable, non-cross-linked polypropylene that is extruded into customisable profile shapes and used in thermoforming applications.

rPET PRODUCTS

Armacell utilises 100% recycled PET (rPET) material to manufacture closed-cell, fully recyclable structural core materials for composite sandwich constructions, and as eco-friendly lightweight material for structural core and insulation applications. **ArmaForm**[®] combines the benefits of high- and low-density foam cores by incorporating multiple densities in a single foam core. This 100% recyclable material is the sustainable alternative

to legacy materials such as balsa wood and PVC foams among others. The latest product innovation, **ArmaShape**, is the first mouldable particle foam based on PET. It is designed to be used in large-scale production of ready-to-use 3D shaped foam cores for composite sandwich structures. This is Armacell's solution for cost-effective serial production of structural composite parts offering the highest design flexibility and sustainable responsibility.

ACOUSTIC COMFORT AND VIBRATION CONTROL

Noise is increasingly impacting urban life. Armacell's acoustic comfort and vibration control solutions enhance the quality of life for urban residents and commuters. Specially designed for waste- and rainwater pipes, **ArmaComfort**[®] achieves superior noise reduction despite thinner wall thicknesses. **ArmaSound**[®] combines sound absorption with vibration damping and decoupling properties, while **ArmaSound**[®] Industrial Systems provides all-in-one thermal insulation and noise reduction solutions for industrial, marine and offshore environments. The **Tubolit**[®] range of thermal, acoustic and insulation products for heating, domestic hot and cold water and drainage pipe systems reduces energy losses, protects pipes in cavity walls and floor screeds, and improves acoustic comfort.

ARMAGEL: NEXT-GENERATION AEROGEL TECHNOLOGY

Aerogel is a remarkable material. Although it is the world's lightest solid material, it is strong enough to stop a bullet in its tracks, and NASA used it to bring home a piece of a comet. Armacell for its part is utilising aerogel technology to produce its ArmaGel blanket product range.



// High-performance properties

Launched in February 2018, ArmaGel HT offers an outstanding thermal and acoustic performance, greater flexibility than conventional aerogel insulation materials and is up to 80% thinner than competing insulation products. Hydrophobic and breathable, it keeps equipment drier for longer and thus offers improved protection against corrosion under insulation. The "HT" abbreviates "high temperature" and raises Armacell's temperate capabilities to +650° C. The 2019 launch of our cryogenic ArmaGel LT blanket (low temperature) will take the temperature range down to -200° C.

// High-tech manufacturing

The joint venture Armacell Jios Aerogels (AJA) develops and manufactures ArmaGel blankets at our plant in Cheonan, South Korea. The patented manufacturing process takes two hours, whereas conventional aerogel blankets typically require 72 hours. The simple and efficient two-step process offers improved scalability and superior thickness possibilities. Our thickest ArmaGel blanket of 20 mm delivers more insulation coverage per man-hour than traditional aerogel insulation. As ArmaGel is easy to remove, downtime is reduced and there is no requirement for replacement insulation during regular maintenance work.

Since
2018



ARMACELL ACCESSORIES: ADDED VALUE FOR CUSTOMERS

To complement its leading-edge equipment insulation products, Armacell supplies its customers with a wide range of added-value accessories offering practical benefits in multiple applications.



// Pipe supports

Insugard® pipe saddles and shields are easy to install and protect piping and its insulation from damage. The innovative design allows for pipe movement within the support system, thus minimising maintenance or repairs and reducing energy loss. Adaptable to all types and sizes of pipe suspension systems, Insugard® solutions are ideal for plumbing, HVAC and refrigeration applications. Insugard® was added to the Armacell portfolio through the acquisition of TB Concept Inc. in April 2018.

// Cladding systems

Cladding protects insulation material against mechanical damage and prevents moisture, oil, chemicals and other substances from penetrating and impairing the material's functionality. On outdoor installations, it provides protection against UV radiation, the weather and the increased risk of corrosion. Cladding also facilitates cleaning, which is particularly important in applications where hygiene is paramount. Armacell manufactures cladding systems at its Friesenhofen plant in Germany. The acquisition of Danmat Iso Systems in 2017 extended Armacell's range of PVC cladding systems to make Armacell a market leader in this field.



// Application tools

Great insulation results are achieved when components fit together harmoniously and are installed professionally. At Armacell, we provide a whole range of accessories and tools, such as jacketing systems, pins, rivets and self-adhesive tapes, which have been specially developed for a variety of cladding systems. These accessories help to increase the reliability, efficiency and service life of technical installations.

PERFORMANCE

24 PLANTS IN
16 COUNTRIES

GLOBAL FOOTPRINT
PAIRED WITH LOCAL
STRENGTH

3,054
EMPLOYEES



70
NATIONALITIES





ENABLING ENERGY
EFFICIENCY FOR
EQUIPMENT

€479 m

TOTAL NET SALES **ADVANCED INSULATION**

€131 m

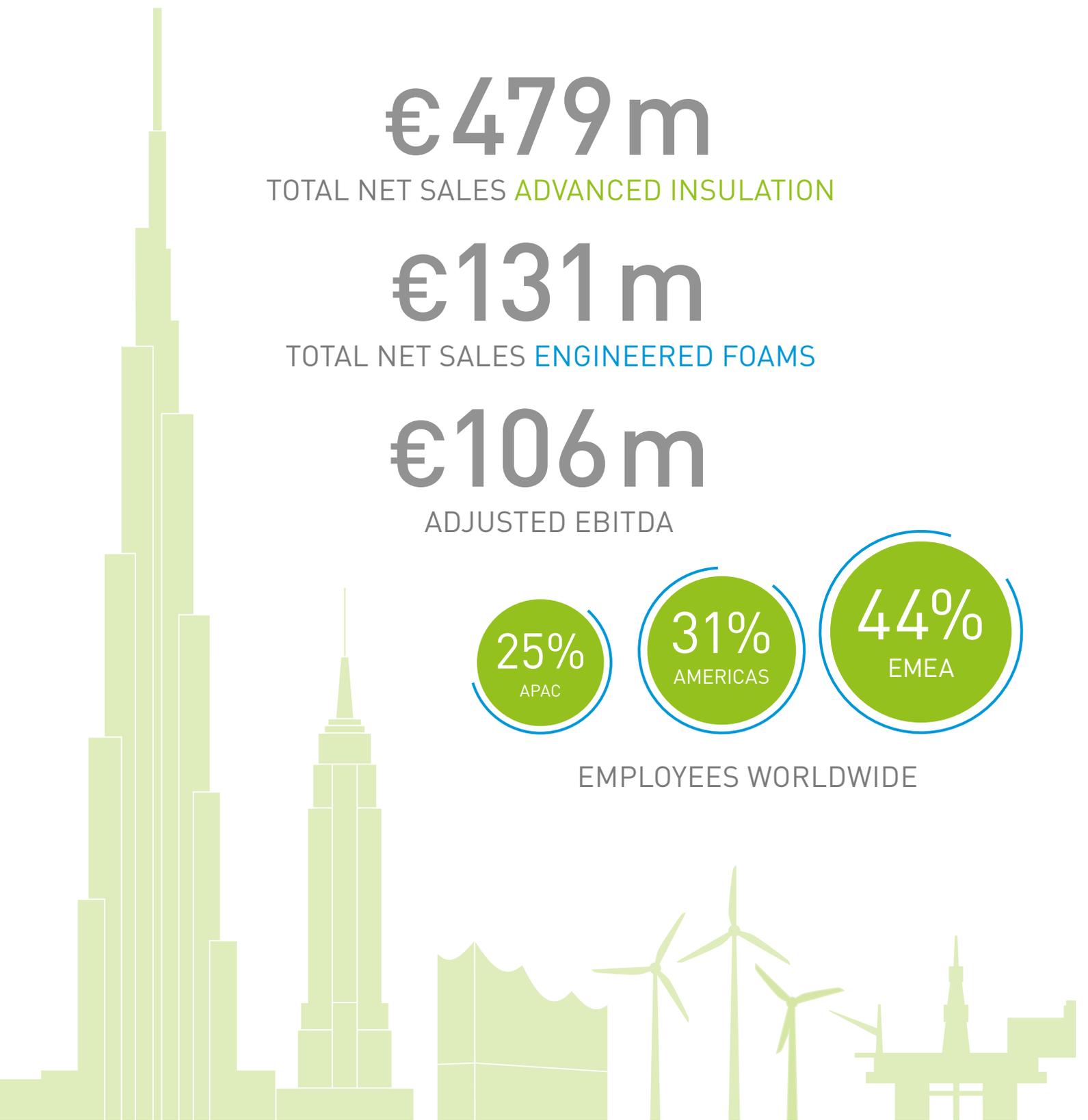
TOTAL NET SALES **ENGINEERED FOAMS**

€106 m

ADJUSTED EBITDA



EMPLOYEES WORLDWIDE



LETTER FROM THE CEO



DEAR FRIENDS OF THE COMPANY,

OPENING NEW HORIZONS is the theme of our annual report and a good reflection of our achievements in 2018. As a global, multi-material and multi-solution company in a constantly evolving world, we have extended our global leadership in the equipment insulation market and as a leading provider of engineered foams. 2018 was a year of significant investments and innovations – together opening new horizons – that have strengthened and are continuing to strengthen our business. I am confident that our resilient, capital-efficient and customer-focused business model will continue to deliver sustainable growth in 2019 as it did in the year under review.

Positive performance

In the financial year ending 31 December 2018, we increased our net sales to €610.3 million from €600.3 million in 2017. Year-on-year, our adjusted EBITDA rose from €103.8 million to €106.0 million. This positive performance was achieved in the face of strong translational headwinds from a weakening US dollar, which over the year equated to around 4% of the top line, and of significantly inflated raw materials and transportation costs. Our business units performed well: Advanced Insulation EMEA recorded net sales of €210.4 million, Advanced Insulation AMERICAS of €157.8 million, Advanced Insulation APAC of €110.6 million and Engineered Foams of €131.5 million.

Strategic investments

In 2018, we continued to significantly invest in the expansion of our production capacities and technologies, both in our Advanced Insulation and in our Engineered Foams businesses. A new continuous elastomeric production line was set up at our Florianópolis facility in Brazil as an industry first in South America. A third elastomeric production line was launched in Pune, India, and our elastomeric capacity in APAC expanded through a new production line in China (De Xu). In the USA, we implemented enhanced technology investments at our plants in Yukon, Oklahoma, and Spencer, West Virginia. These investments support our growth in all market segments, and we expect to see a significant payback from these investments as early as 2019.

As part of a consistent evolutionary process, our expansion-oriented investments were accompanied by market consolidation strategies in the AMERICAS. We consolidated our Brazilian production facilities and relocated our assets from Pindamonhangaba to Florianópolis. Similarly, we transferred our production assets from our US plant in South Holland, Illinois, into our plants in Yukon and Spencer, and our Saudi assets from Dammam to Bahrain. This allowed for a distinct and re-focused production, operating dedicated plants for Advanced Insulation and Engineered Foams respectively.

Innovative solutions

In 2018, we made innovative additions to our insulation solutions portfolio. ArmaGel, our next-generation aerogel blanket technology, extends the range of insulation solutions to cover applications from -200° to up to $+650^{\circ}$ C. The market response was overwhelming. ArmaGel HT, for example, received the Innovative Product of the Year Award in Mumbai, India. The launch of ArmaFlex LS set a new benchmark in flexible elastomeric pipe insulation for low-smoke emissions. This product's performance properties improve both the visibility and respiration for safer evacuation from buildings in the event of a fire. In Engineered Foams, the PET team launched ArmaShape, a ready-to-use 3D PET foam core made from 100% recycled PET, with its primary applications in the industrial sector. We are proud of the efforts that have fostered these innovations and of the financial contribution they are already making to our business.

On behalf of the Executive Management Team and Management Board, I would like to express our gratitude to our customers worldwide for the confidence they have continued to place in Armacell and its solutions. I also thank all our employees for their commitment to and passion for "making a difference around the world". Finally, I would like to extend our special thanks to our majority shareholders, Blackstone and KIRKBI, and the members of the Supervisory Board for their valuable support and guidance throughout the year.

In 2019, we will continue to deliver on our global growth strategy through a mix of organic and external growth. Our growth plan stands firmly on multiple pillars and is driven by global megatrends, continuous innovation, demand generation, substitution of legacy materials as well as by the addition of external growth opportunities. We are growing our markets, growing our volume and value proposition in the markets we operate in and driving the adoption rates for intelligent energy-preserving solutions. The savings generated, and the additional safety Armacell solutions provide to customers allow us to make a difference around the world, every day and for all of us.

Yours sincerely,



Patrick Mathieu
President and CEO
Armacell Group

2019 EXECUTIVE MANAGEMENT TEAM



Ciro Ahumada
Vice President AMERICAS

Energises the synergies from multiple acquisitions in North and South America to deliver profitable, high-quality product solutions.



Roberto Mengoli
Chief Technology Officer

Ensures and monitors the highest possible quality and safety standards by systematically optimising structures and processes throughout Armacell.



Sophie Ancelin
Chief Human Resources Officer

Fosters the talents of 3,000+ employees in 16 countries to enable Armacell's global growth and leads all training, talent acquisition and career development activities.



Dr Max Padberg*
Chief Financial Officer

Develops Armacell's strategic choices through capital structure optimisation, management of financial resources, taxation and risk, and efficient capital utilisation; also responsible for controlling, accounting, legal and IT.



Patrick Mathieu*
Chief Executive Officer

Sets and executes Armacell's strategy in making the company a global leader in energy efficiency around the world.

* Member of the Management Board



Norman Rafael
Chief Corporate Development &
Investor Relations Officer

Develops and implements Armacell's external growth strategy, positions the company with possible takeover candidates and international investors, and heads corporate and marketing communications.



Guillerme Huguen
Vice President EMEA

Leverages his industry, raw material and pricing know-how to build customer relationships where Armacell is appreciated as a trusted and reliable partner.



Bart Janssen
Vice President
Engineered Foams

Drives and implements the strategic development of the PET and Component Foams business, with a strong focus on nurturing the sustainability of product lifecycles.



Malte Witt
Vice President APAC &
Chief Marketing Officer

Strives to strengthen Armacell's position and increase market shares in the Asia-Pacific region; also responsible for creating a customer-centric culture.

Armacell's executive team is composed of highly experienced managers with a diverse range of skills. Their common purpose is to drive the company's future growth by furthering innovation, encouraging commitment and promoting entrepreneurship.

STRATEGY

At Armacell, we continuously invest in the expansion of our production capacities and focus on creating sustainable value for our highly diversified global customer base. **Our vision is to be the global leader in providing innovative, technical insulation solutions and components to save energy and make a difference around the world.** We have a long track record of growth, superior profitability and cash generation orchestrated by a proven management team who have positioned Armacell as the trusted partner in the energy conservation market.

1 GROWTH

Armacell has become the global leader in flexible foams by enabling energy efficiency for technical equipment. We operate in the equipment insulation market (for hot, cold and ambient temperatures) estimated to be worth €12 billion and provide innovative solutions across a range of proprietary materials. Driven by global megatrends, we pursue a multi-pillar growth strategy and target to grow at approximately 10% p.a. Since 2015, on average about half of this growth target originated from external growth opportunities (M&A). The organic growth rate of our insulation business is approximately 5% p.a. Overall, we grow our markets, increase in both volume and value terms our share of the markets we operate in and drive the adoption rates for intelligent, energy-saving solutions.

2 RESILIENCE

Armacell's strategic development is at the heart of five global megatrends. Our exposure to a broad range of end markets together with our diversification across equipment verticals provides a vast spectrum of growth opportunities and make us resilient through economic cycles. Our asset- and capital-light business model provides us with the flexibility to swiftly adapt to changing economic environments in order to safeguard and maximise shareholder value.

3 MULTI-MATERIAL

Armacell is a multi-material and multi-product company operating a successful track record of expanding into adjacent technical insulation sectors. In recent years, we have continuously extended the temperature range and application horizon of our materials. With the addition of our PET foam core technology based on recycled post-consumer PET and the development of our proprietary next-generation aerogel technology, we have extended our core insulation business and aim to increase our addressable market size from €6 billion today to €12 billion in future.

4 INNOVATION

For more than half a century, our global customers have recognised Armacell as the industry and technology leader. Innovation and entrepreneurship are an integral part of our DNA. We drive industry-leading solutions and aspire to launch new technologies using alternative resources or natural feedstock. Our dedicated teams continuously develop our intellectual property portfolio and have more than doubled the number of patents over the last five years.

5 EXCELLENCE

Our world-class standards in combination with our pioneering technologies protect our market leadership. Armacell provides energy-efficient solutions offering reliable, certified performance and extended lifetime to its global customers. 24 manufacturing facilities in 16 countries and sales offices in many more are governed by the World-class Armacell Mindset (WAM). Through our WAM Manufacturing and WAM Sales & Marketing excellence programs, we have been delivering operating efficiency, customer service and execution excellence since 2012.

6 FINANCIAL STRENGTH

Armacell's financial strategy drives dynamic growth. Our low capital intensity and high cash conversion coupled with flexible financing pillars enable us to deliver best-in-class profitability levels in favourable or challenging market conditions. Armacell's continuous development to achieve world-class standards ensures optimal use of raw materials, natural resources and energy, thereby safeguarding maximum operational efficiency and the lowest possible production costs.

ARMACELL INDEX – OUR GLOBAL ORGANIC GROWTH BENCHMARK

The Armacell Index is the company's organic growth benchmark which we target to outperform year in, year out. This index was launched in 2014 and today approximates Armacell's global application and geographic business mix. Following last year's introduction of the Armacell Index to the reading audience, we will continue to disclose the performance of the Armacell Index on a historic basis.

Since inception, average annual growth of the Armacell Index was 3.6% at group level. Over the same period, the Advanced Insulation (AI) index grew 4.1% and the Engineered Foams (EF) index 2.6%. Within Engineered Foams the Component Foams index increased by 2.2% and the PET index by 3.3%. The higher compound annual growth rates (CAGR) compared to last year are principally driven by a stronger contribution from HVAC in AI and by a globally accelerating PET business in EF.

The Armacell Index chart exhibits the contribution of Advanced Insulation and Engineered Foams to the group growth.

The Armacell Index excludes the substitution effect and is built using trusted, independent, third-party providers of construction, GDP, HVAC, general industrial output, refrigeration, transportation and wind capacity data.

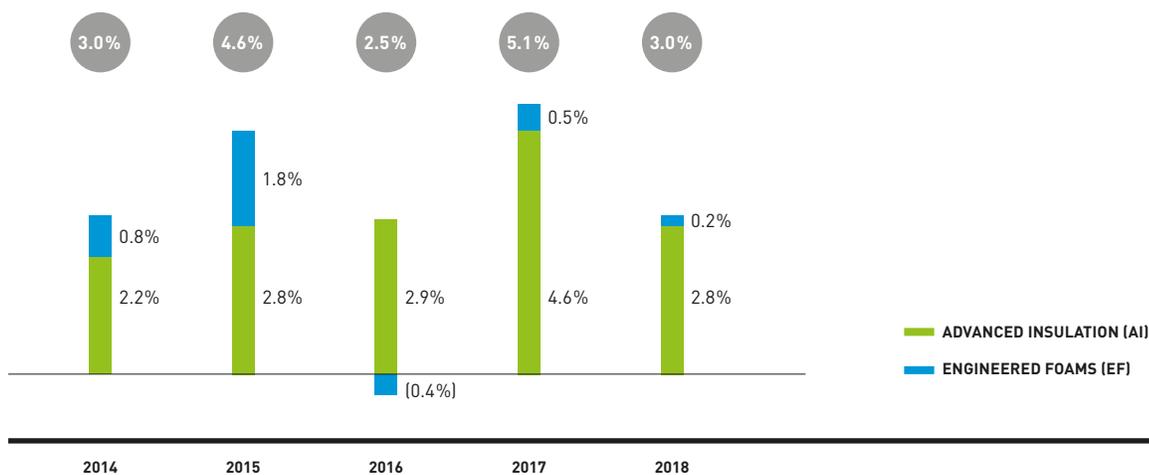
Data

The Advanced Insulation index uses the latest raw data from construction (residential and non-residential), HVAC, and refrigeration at a country-level, while the Engineered Foams index uses the latest raw data from GDP forecasts, wind capacity and transportation.

Weighting

The weighting of each end market application, which varies by geography/country, is based on historical and latest available business mix. The geographical weighting is based on latest available net sales contribution by country.

2018 ARMACELL INDEX



EXPANSION

The three-pillar external growth strategy at the heart of Armacell's mergers and acquisitions (M&A) activities focuses on new geographies, new technologies and supplemental design capabilities. From 2015 to 2018, Armacell acquired eight companies, established one joint venture and entered into one partnership. The acquisitions were of particular strategic significance.

In April 2018, Armacell acquired TB Concept Inc., the Canadian innovator of the revolutionary Insuguard® pipe support solutions. This Montreal-based company pioneered tool-free pipe securing systems that eliminate thermal bridges and protect the pipe and its insulation from damage. This acquisition has strengthened Armacell's global accessories business. In May 2018, Armacell took over De Xu (Guangdong De Xu Insulation Materials Co. Ltd.), a Chinese manufacturer of elastomeric insulation foams. This strengthened Armacell's market position and production capacity in China through the two production lines at De Xu's factory in Yingde, Guangdong, as well as expanding the Group's product portfolio through the Sinoflex brand. In August 2018, Armacell acquired Guarato, an Italian company designing and manufacturing non-flammable thermoplastic products utilised for sound attenuation purposes. This acquisition has reinforced Armacell's leadership in the fast-growing acoustic insulation market.

»We continue to deliver on our external growth strategy. The recent bolt-on acquisitions are strengthening our global product portfolio and manufacturing capacity globally and across both our business divisions, Advanced Insulation and Engineered Foams.«

Norman Rafael, Armacell's Chief Corporate Development & Investor Relations Officer

The strategic partnership announced in February 2018 between Armacell and Köpp, a leading manufacturer and processor of cellular rubber and polyethylene bun foam, enabled Armacell to manufacture foams based on this new technology. Moreover, Armacell's Component Foams customers now enjoy worldwide access to a broader range of high-tech products. In the course of the year under review, production also began at Armacell's greenfield manufacturing facility in the Kingdom of Bahrain, thus strengthening the Group's presence in the high-growth Gulf Region.



MONTREAL, CANADA

April 2018 – Armacell acquires TB Concept, a Montreal-based company specialised in the manufacturing of patented pipe support solutions, including the leading Insuguard® brand.



YINGDE, CHINA

May 2018 – Armacell acquires De Xu, a Chinese manufacturer of flexible elastomeric foam under the Sinoflex brand, operating from its facility in the province of Guangdong in Southern China.



TURIN, ITALY

August 2018 – Armacell acquires Guarto, an Italian manufacturer of acoustic insulation solutions used in the marine and rail markets as well as in the automotive and construction industry.

10 TRANSACTIONS 2015 – 2018

8

ACQUISITIONS

- 2018 // GUARTO ITALY
- 2018 // DE XU CHINA
- 2018 // TB CONCEPT CANADA
- 2017 // DANMAT DENMARK
- 2017 // NOMACO PE USA
- 2016 // POLIPEX BRAZIL
- 2015 // ITP CANADA
- 2015 // ONEFLEX TURKEY

1

PARTNERSHIP

In 2018, Armacell and Köpp announced the 15-year Partnership For Excellence.

1

JOINT VENTURE

In 2016, Armacell established AJA to develop high-tech silica aerogel blankets.

GLOBAL PRESENCE

1

CORPORATE HEADQUARTERS

3

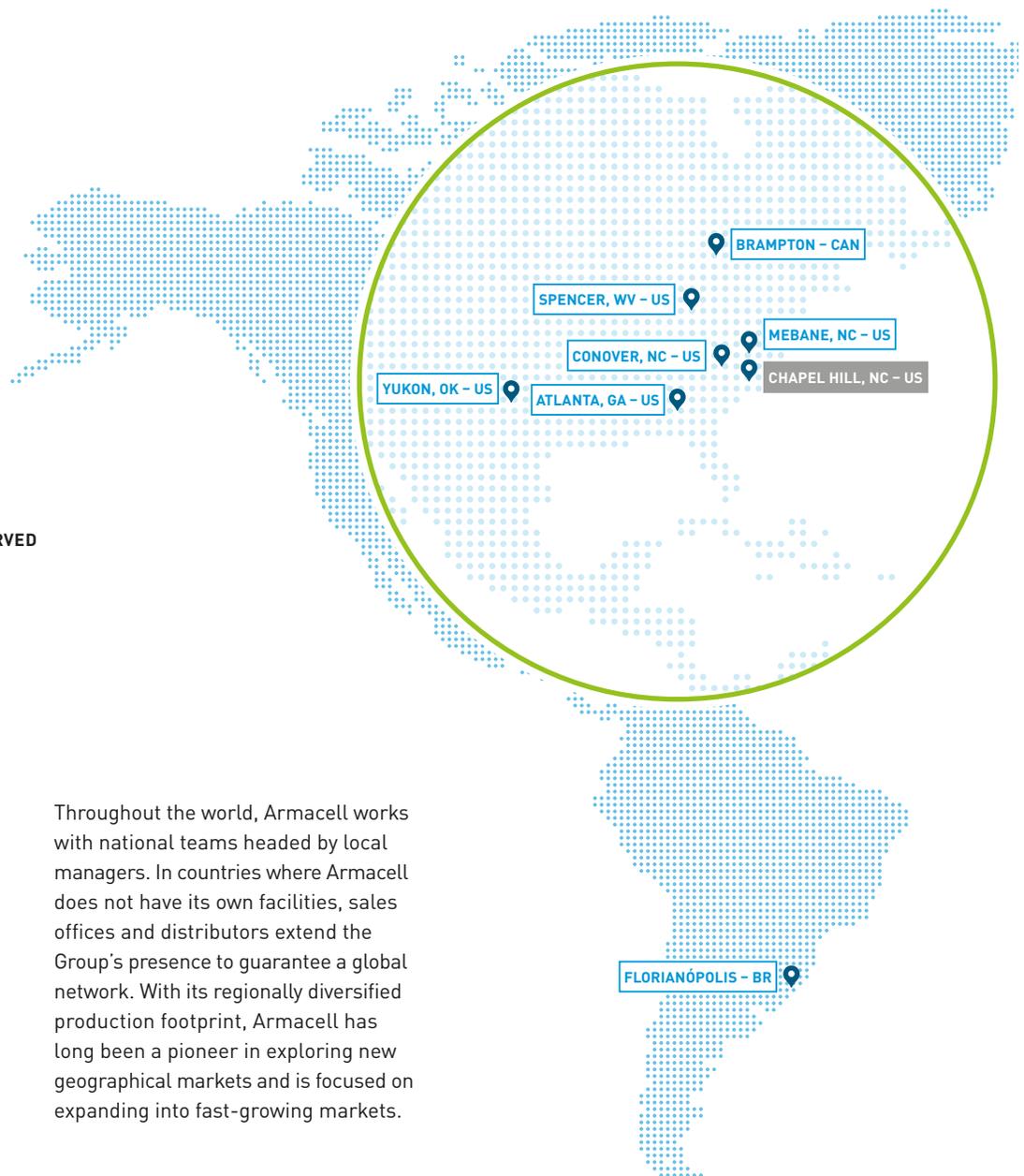
REGIONAL HEAD OFFICES

24

MANUFACTURING FACILITIES

100+

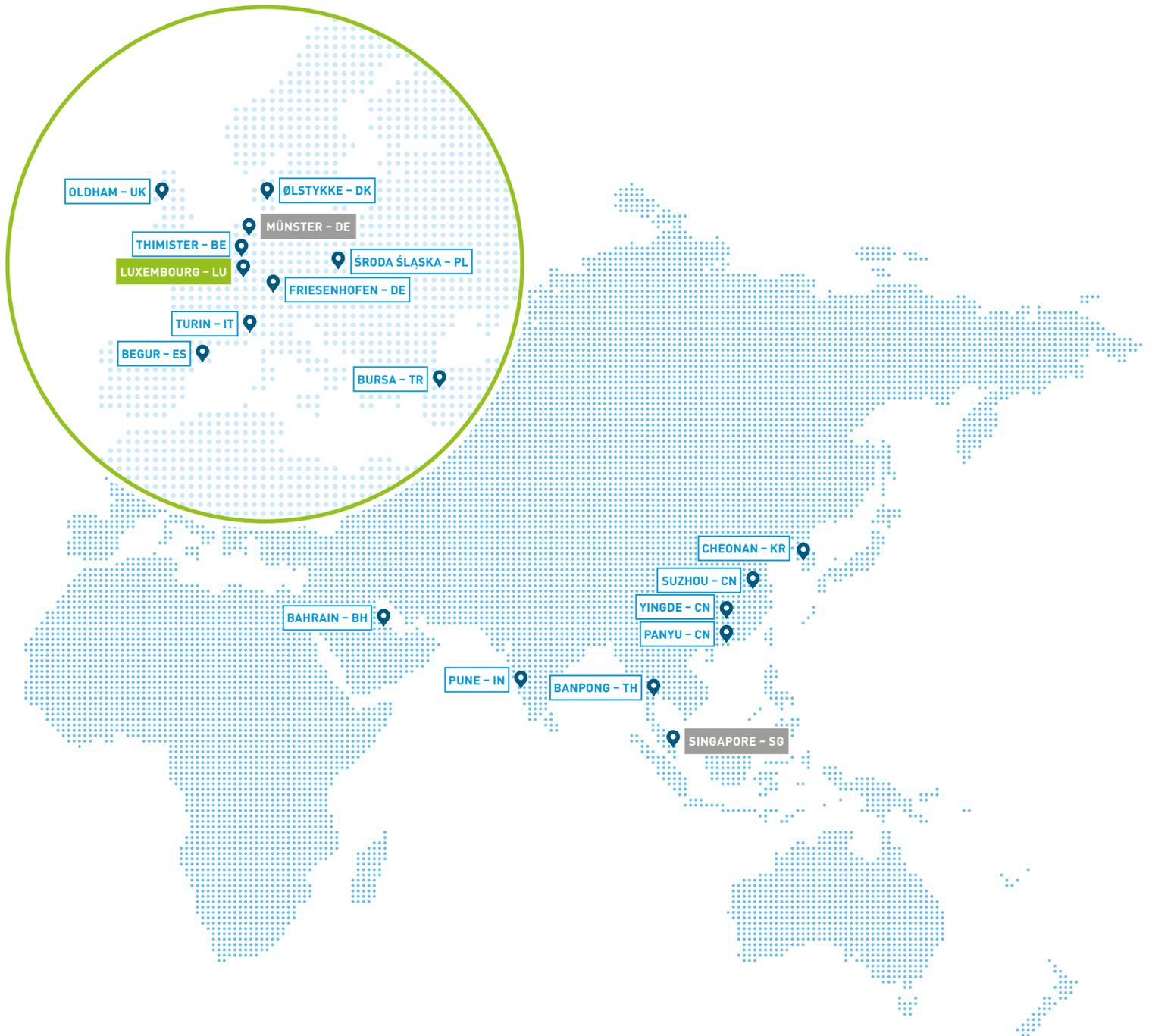
COUNTRIES WHERE CUSTOMERS ARE SERVED



Global presence, local focus

Armacell is a truly global company managed from its corporate headquarters in Luxembourg and regional head offices in Germany, the USA and Singapore. Four product innovation centres spread around the world ensure a steady supply of pioneering innovations to meet customer and market requirements. To ensure a customer-centric product portfolio, Armacell customises its products locally at 24 manufacturing plants in 16 countries.

Throughout the world, Armacell works with national teams headed by local managers. In countries where Armacell does not have its own facilities, sales offices and distributors extend the Group's presence to guarantee a global network. With its regionally diversified production footprint, Armacell has long been a pioneer in exploring new geographical markets and is focused on expanding into fast-growing markets.



CORPORATE RESPONSIBILITY

COMMITMENT

WE SUPPORT



Ethical and responsible conduct is fundamental to the way we do business. Our global initiatives and alliances testify to our accountability and our commitment to a better and cleaner future. This commitment stretches back as far as 2006 when Armacell joined the UN Global Compact initiative. Our Code of Conduct addresses the responsibilities of all Armacell employees to the company, to each other, and to all our stakeholders.

INITIATIVES AND ALLIANCES

Armacell is a member of multiple initiatives and alliances that promote sustainability and the more efficient use of energy in buildings:

- // European Alliance of Companies for Energy Efficiency in Buildings (EuroACE): Working with European institutions to move Europe forward in energy efficiency.
- // Renovate Europe Campaign (REC): A EuroACE initiative and the only EU-wide campaign focusing solely on the renovation of building stock in the EU.
- // European FEF and PEF Interest Group (CEFEP): A syndicate for technical insulation providers and a mouthpiece for the industry in communicating the products' benefits.
- // European Industrial Insulation Foundation (EiiF): A neutral non-profit organisation that promotes insulation as a top-of-mind method to enhance sustainability and profitability.
- // U.S. Green Building Council (USGBC): An initiative committed to transforming the way buildings are designed, constructed and operated through LEED® (Leadership in Energy and Environmental Design).

CODE OF CONDUCT

By outlining employee responsibilities, the Armacell Code of Conduct lays down the framework for a positive, customer-focused culture where customers value the Armacell experience and establish continuous business relationships. First and foremost, the Code of Conduct expresses our compliance with the laws and regulations applicable in every country where we do business. Secondly, the Code of Conduct builds on our values of Customer, Commitment, Empowerment, Integrity and Sustainability. Thirdly, it defines the rules for our daily work, both internally and externally, and outlines how they are to be implemented.

World-class demand
generation training
in China.



OUR PEOPLE

Dedicated, highly qualified and professionally minded employees are our most valuable resource. We motivate them, develop their talents and further their skills through training opportunities. As a global company, we strive to create and maintain a positive, healthy and safe working environment. Our employees, for their part, are encouraged to cultivate a performance-oriented climate of mutual respect, trust and reliability.



Armacell employees during safety training.

LIFELONG LEARNING

Armacell values its vocational trainees and apprentices. At our Münster plant, for example, their importance for the company future is highlighted by the fact that a fifth of the workforce completed their initial vocational training there. Münster made the news when the German magazines Focus and Focus Money granted Armacell their Top Career Opportunities Award. Around 17,500 German-based companies in more than 120 industries were evaluated, and Armacell scored 100 points on a 0-100 scale. Our focus on training was exemplified by our Suzhou plant, where further training courses were held on WAM tools, safety and shopfloor behaviour, while at the Panyu plant courses were offered in subjects as varied as demand generation, leadership skills, strategic selling and dealer training. In 2018, our Demand Generation training was completed by more than 300 employees worldwide.

Average tenure

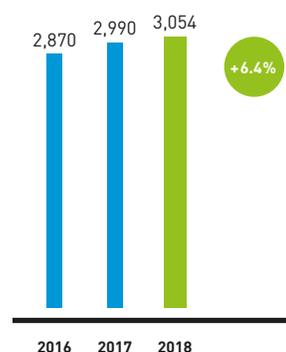
7.25

years

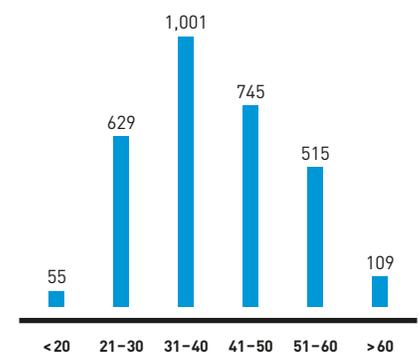
GENDER DIVERSITY



EMPLOYEES on 31.12.



AGE BREAKDOWN



Środa Śląska achieved the Bronze WAM Award in June 2018.



WAM: delivering operating efficiency and execution excellence since 2013.



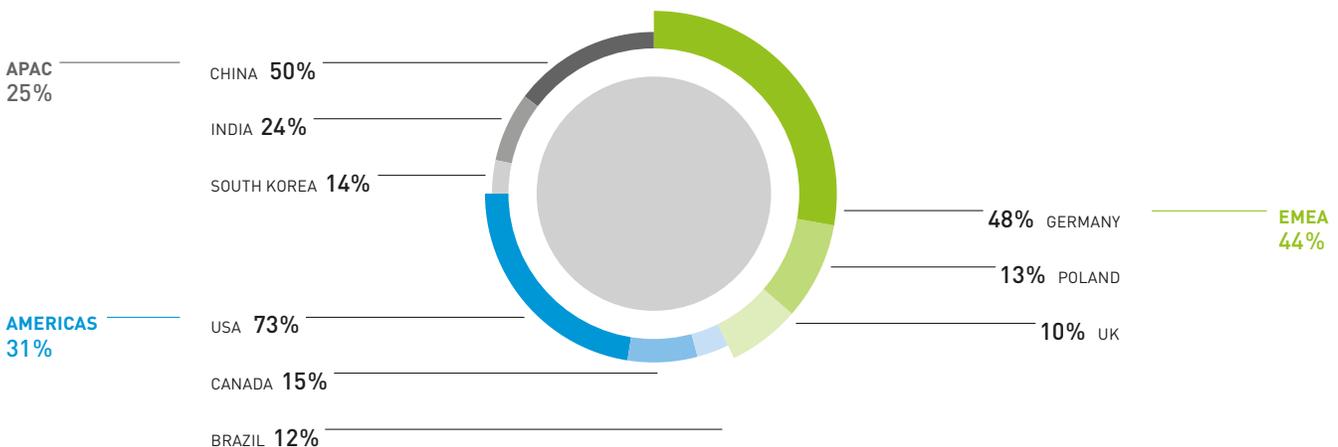
GLOBAL EMPLOYEE SURVEY

Throughout 2018, work groups were developing and implementing local action plans based on the feedback obtained from our bi-annual Global Employee Survey. Of the 400-plus activities defined globally, 78% were completed in 2018. A wide range of projects covering topics such as training, collaboration and improving teamwork have been established. Job rotation routines, round tables and meeting routines were also enhanced. At our Florianópolis plant in Brazil, a well-equipped room was constructed for lunch breaks and other recreational purposes. In India, a Spot Awards program was introduced to strengthen the reward and recognition culture by instantly demonstrating to employees how much the company appreciates their good work.

WORLD-CLASS ARMACELL MINDSET (WAM)

Across its WAM program, Armacell aims to improve its performance daily through continuous, structured and objective analysis. Two main areas, WAM Manufacturing and WAM Sales & Marketing, have been established. WAM Sales & Marketing aims to create a world-class customer experience globally, while WAM Manufacturing has the prime objective of improving operational efficiency, health and safety by setting benchmark manufacturing standards. By year-end 2018, four plants had gained WAM Bronze Awards through successfully implementing world-class manufacturing practices and standards: Pune in India, Oldham in the UK, Środa Śląska in Poland, and Münster in Germany.

TOP 3 COUNTRIES BY REGION employees in %



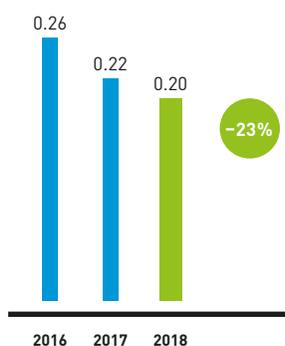
HEALTH, SAFETY AND OUR ENVIRONMENT

At Armacell, the health and safety of our employees comes first. We promote a zero accident mindset. In line with our corporate value of Commitment, we do all we can to ensure our people go home to their family and friends as fit and well as they arrive at work. To this end, we strive for adherence to all applicable occupational health and safety standards in the countries we do business in. Another key aspect of our corporate philosophy and business strategy is our commitment to environmental protection, which ties in with our corporate value Sustainability. In all this, we measure our success by the added value our innovative solutions deliver to a wide range of industries – benefits of societal and ecological significance.

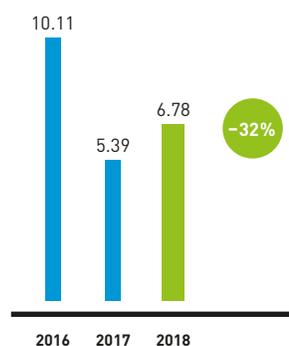
SAFETY AT WORK

The health and safety of our employees is paramount across Armacell. The generally positive trends in occupational safety statistics from 2016 to 2018 highlight this.

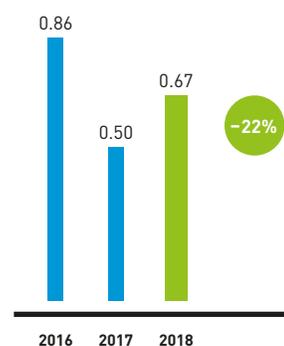
FREQUENCY INDEX OF LOST-TIME ACCIDENTS (>1 DAY)



GRAVITY INDEX OF LOST-TIME ACCIDENTS



FREQUENCY INDEX OF PROFESSIONAL MEDICAL TREATMENT*



* Accidents of ≤1 day

»In 2018, nine of our manufacturing facilities recorded more than 1,000 days without lost-time accidents.«

Roberto Mengoli, Chief Technology Officer, Armacell Group



Armacell promotes a zero accident vision.

in Madrid, where the participants were trained in how to react in situations such as slippery road conditions, dangerous curves or unexpected obstacles. In Guangzhou, many of the Armacell employees ride to work on motorbikes. Hence, we presented them with helmets to make their journey to and from the plant safer.

HEALTH AND SAFETY IN PRACTICE

By year-end 2018, a third of our plants had recorded more than 1,000 days without lost-time accidents (LTA). Safety was the main theme of the Global Armacell Day in Canada with several safety events organised and colleagues participating in mock accidents to train their first-aid skills. Members of Armacell Iberia's sales team, who spend many hours on the road, were given a safe-driving course at a professional institute

As part of its WAM Manufacturing program, Armacell staged in-plant training courses for employees in a variety of areas. These health and safety sessions covered topics such as reporting and analysis of safety-related situations, risk assessment, risk prediction, safety checks and near-miss analyses. In its efforts to promote a zero accident mindset, Armacell organised 53 standardised safety-related tool training courses in 2018.

ENVIRONMENT

Improving the energy efficiency of technical equipment is an important step to meet the growing demand for energy and protect our planet for future generations. To achieve this goal, insulation is key. Armacell thus has a vital role to play through its best-in-class equipment insulation solutions. In millions of applications worldwide these solutions save energy by protecting technical equipment against energy losses. In the lifetime of ArmaFlex®, 140 times more energy is saved than is required to manufacture it. ArmaGel has a five times better thermal performance than competing insulation products.

To use resources as efficiently as possible, we are always searching for ways to reduce raw material use, energy consumption and waste. We are recycling more and more of our scrap and intelligent systems have been developed to utilise production waste. At our Thimister plant, for example, we reprocessed 9,353 metric tons of recycled PET material in 2018. In ecological terms that meant over 13 metric tons of CO₂ equivalents were saved.

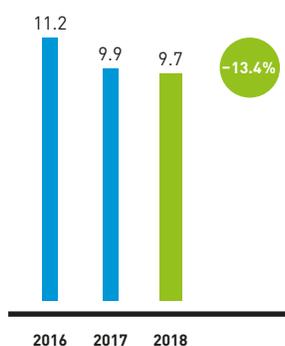
CERTIFICATIONS

As part of our efforts to maintain the highest ecological standards, our environmental and energy management systems are subjected to regular auditing by external authorities. As a result, 15 of our plants are environmentally certified to ISO 14001:2015, and the energy management systems at our facilities in Münster and Friesenhofen are certified to ISO 50001:2011. In line with Armacell's effort to promote a zero accident vision, Thimister, Belgium is the first manufacturing facility globally to receive the ISO 45001:2018 safety certification. Five of our plants in the USA have fulfilled the requirements of the Safety and Health Achievement Recognition Program (SHARP). Guangzhou has achieved OHSAS 18001 certification, a British standard for occupational health and safety management systems.

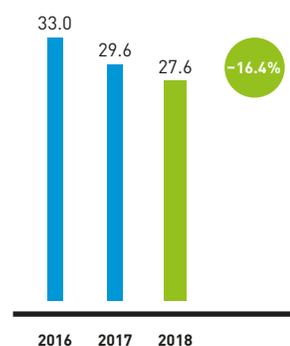
ENVIRONMENTAL FACTS & FIGURES

Increasing resource scarcity is one of the greatest challenges humankind faces. At Armacell, we are consciously acting to address this challenge. Measured against a set of KPIs, our environmental performance exhibits a positive trend in the period 2016–2018. To enhance our environmental performance and awareness, we are constantly improving data accuracy and collection consistency.

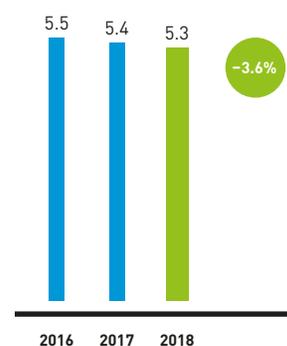
WATER CONSUMPTION* in l



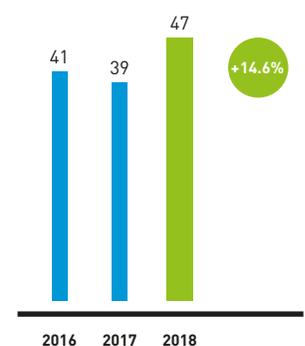
ENERGY CONSUMPTION* in MJ



CO₂ EMISSIONS* in kg



RECYCLED WASTE in %



* per metric ton of finished goods

SOCIAL ACTIVITIES

At Armacell, we are much aware of our social responsibility to the local communities of more than a hundred countries we do business in. Through a wide variety of corporate volunteering projects, our employees are making a difference around the world.

HELPING CHILDREN

Employees from our plant in Münster supported the Wunschstern (Star Wishes) campaign by buying Christmas presents for children living in homes. Armacell Canada participated in a local food drive, raising food and money for community families and children in need. On Global Armacell Day, the team in South Korea visited



A key focus of Armacell's social activities is on needy children in local communities.

a nursery where they worked all day to create a small garden for the children to play in. Their colleagues in Singapore spent the Global Armacell Day at a local charity creating gift bags for needy children, which included reusable straws to encourage the reduced use of plastic ones. Vice President Bart Janssen took up the theme of plastics recycling when he visited a school in Belgium to explain the importance of avoiding waste and how Armacell is recycling PET to granules for its products. With their focus on children, these and other volunteering projects undertaken by employees around the world mirrored the responsibility Armacell assumes for the wellbeing and welfare of future generations.



Team Brampton (soccer) and team Luxembourg (tennis) participated at the World Games in Abu Dhabi.

CARING FOR PEOPLE

Another focal point of Armacell's activities as a responsible corporate citizen is the support given to adults with special needs. The Special Olympics movement promotes sports as a way of helping people with intellectual disabilities to flourish and improve their integration and inclusion in society. During 2018, Armacell donated money to Special Olympics Luxembourg to support the team it is sending to the 2019 Summer Special Olympic World Games in Abu Dhabi. In Canada, Armacell provided financial support to the Brampton Special Olympics soccer team, which went on to win gold at the National Summer Games and will be representing Canada at the Special Olympics in Abu Dhabi.

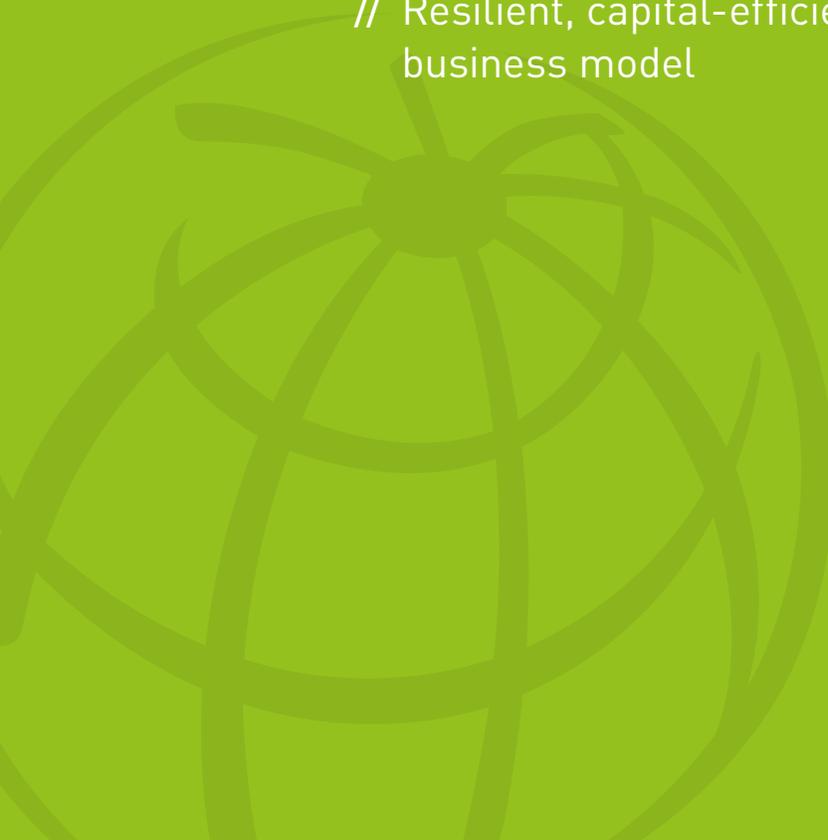
Armacell volunteers also devoted time and energy to helping cancer patients. Employees from the regional head office in Chapel Hill, North Carolina, celebrated Global Armacell Day by supporting the local branch of the American Cancer Society. They packed welcome kits for cancer patients arriving at Hope Lodge, where they were housed and fed, and the Armacell team also cooked and served meals for the residents and caregivers. Armacell Iberia sponsors another cancer initiative (Fundació Oncolliga Girona) and our employees participated in the Oncotrail to raise funds to improve cancer patients' quality of life.



»These initiatives to support adults with special needs are perfectly aligned with Armacell's values. We are delighted to make a difference around the world through these partnerships.«

Patrick Mathieu, President & CEO

FINANCIAL RESULTS

- // Net sales and adjusted EBITDA at all time high
 - // Adjusted EBITDA margin of 17.4%
 - // Significant strategic investments made to fuel future growth and profitability
 - // Expansion of the Group's market position across all regions, confirming position as technology leader
 - // Diversified global presence as a multi-material and multi-product company
 - // Resilient, capital-efficient and customer-focused business model
- 

KEY FINANCIAL FIGURES

| in € million | 2014 | 2015 | 2016 | 2017 ⁶ | 2018 |
|--|-------|-------|---------|-------------------|---------|
| Income statement¹ | | | | | |
| Net sales | 452.2 | 540.2 | 558.6 | 600.3 | 610.3 |
| Adjusted EBITDA ² | 71.2 | 95.5 | 100.4 | 103.8 | 106.0 |
| Adjusted EBITDA margin | 15.7% | 17.7% | 18.0% | 17.3% | 17.4% |
| Adjusted EBITA ³ | 56.1 | 78.8 | 82.4 | 84.8 | 86.4 |
| Adjusted EBITA margin | 12.4% | 14.6% | 14.8% | 14.1% | 14.2% |
| Non-recurring items | 12.5 | 12.4 | 11.9 | 5.8 | 19.6 |
| EBIT | 21.7 | 40.7 | 37.4 | 43.8 | 28.6 |
| Cash flow¹ | | | | | |
| Adjusted cash flow from operating activities ⁴ | 56.3 | 73.1 | 83.7 | 83.9 | 94.3 |
| Investments (excluding acquisitions and license agreement) | 20.6 | 28.4 | 25.7 | 41.0 | 46.0 |
| Adjusted free cash flow | 33.2 | 45.5 | 58.0 | 43.4 | 48.9 |
| Balance sheet¹ | | | | | |
| Current assets | 159.1 | 187.6 | 191.0 | 210.5 | 252.8 |
| Non-current assets | 514.4 | 564.8 | 981.3 | 966.0 | 978.9 |
| Current liabilities | 118.3 | 106.4 | 145.8 | 132.4 | 184.6 |
| Non-current liabilities and equity | 555.1 | 646.0 | 1,026.5 | 1,044.1 | 1,047.1 |
| Net debt – excluding shareholder loans¹ | | | | | |
| Economic equity ⁵ | 93.1 | 96.7 | 306.5 | 276.4 | 253.4 |
| Net debt | 321.5 | 391.6 | 552.6 | 603.5 | 623.3 |

NOTES

¹ With the sale of Armacell to funds managed by Blackstone and KIRKBI in February 2016, consolidated financial statements were prepared for Armacell Holdco and included ten months of Armacell Group activities in 2016. To provide comparable numbers, the income statement and cash flow relate to Armacell International S.A. while the balance sheet is based on consolidated Armacell Holdco financials to reflect the full financing at Group level (see page 48).

² Adjusted EBITDA is the result before amortisation, depreciation, interest and taxes adjusted by non-recurring items.

³ Adjusted EBITA is the result before amortisation, interest and taxes adjusted by non-recurring items and asset impairments.

⁴ Cash flow from operating activities adjusted for non-recurring items.

⁵ Economic equity includes shareholder loans.

⁶ 2017 is adjusted for discontinued operations.



CORPORATE RATINGS

REPORTING STRUCTURE



More information about our business on our website www.armacell.com

On 29 February 2016, Armacell International S.A. was acquired by funds managed by Blackstone and KIRKBI via Armacell Bidco Luxembourg S.à r.l, which is a subsidiary of Armacell Holdco Luxembourg S.à r.l.

The financial figures for the full fiscal year under review include 12 months of all the operating activities of the (former) Armacell International S.A. Group (Armacell) for the time period 2014 – 2017.

Armacell operates two main businesses, Advanced Insulation and Engineered Foams.

ADVANCED INSULATION

The Advanced Insulation (AI) division provides flexible foam insulation solutions for insulating technical equipment utilised for the transport of energy in commercial and residential construction, industrial applications and the oil & gas industry. Typical applications include heating, ventilation and air conditioning (HVAC), heating and plumbing (H&P), refrigeration as well as accessories and acoustics.

The division is managed across three regions: Europe, the Middle East and Africa (EMEA), North and South America (AMERICAS), and Asia Pacific (APAC).

ENGINEERED FOAMS

The Engineered Foams (EF) division develops and produces custom-made high-performance foams used across a broad range of end markets, including wind energy, industrial, transportation and sports and leisure.

Consisting of environmentally friendly structural PET foam cores and component foam solutions, i.e. engineered elastomeric and polyethylene foams as well as cross-linked polyolefin foams, this division addresses the requirements of specific markets and applications where weight as well as mechanical performance and tensile strength are paramount.

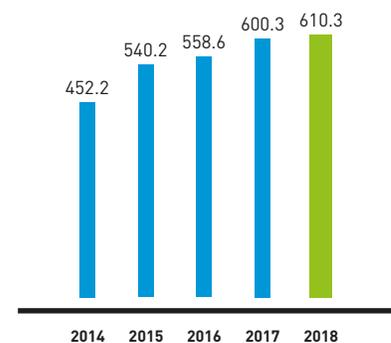
NET SALES BY BUSINESS DIVISION



NET SALES BY REGION



NET SALES in € million



OUTLOOK

The IMF World Economic Outlook predicts the global economy to grow by 3.5% in 2019 and 3.6% in 2020 following growth of 3.7% in 2018. Whereas major advanced economies are expected to slow down, growth in Asia's emerging and developing markets is forecast to equate to 6.3% in 2019 and to 6.4% in 2020.

OUTLOOK GDP growth in %

| | 2018 | 2019 | 2020 |
|----------------------------|------|------|------|
| Global Economy | 3.7 | 3.5 | 3.6 |
| Brazil | 1.3 | 2.5 | 2.2 |
| Canada | 2.1 | 1.9 | 1.9 |
| China | 6.6 | 6.2 | 6.2 |
| Euro Area | 1.8 | 1.6 | 1.7 |
| India | 7.3 | 7.5 | 7.7 |
| Russia | 1.7 | 1.6 | 1.7 |
| USA | 2.9 | 2.5 | 1.8 |
| Middle East & North Africa | 2.4 | 2.4 | 3.0 |

Source: IMF World Economic Outlook, January 2019

This outlook may be affected by a weakening of financial markets, the influence of US-Chinese trade tariffs on the global economy, potentially disruptive effects of Brexit on the European economy, and a softer US dollar, which would affect Armacell in the translation of local accounts into the euro-denominated Group accounts.

Growth opportunities in OECD countries and some emerging markets are driven by a stronger public awareness of climate change and the desire for enhanced energy efficiency. Additional growth potential is identified in specific industries, such as wind energy, and in the construction and transportation sectors. Stricter fuel efficiency standards and the trend towards e-mobility are motivating carmakers to reduce vehicle weight –

the lighter a vehicle, the greater its fuel economy and range. These two automotive trends are likely to increase the future demand for our Component Foams products.

In 2017 and 2018, our cost of sales were affected by rising raw material prices and in 2018 to a lesser extent by rising freight costs in the North American market. From mid-2017 onwards, Armacell introduced specific regional measures to offset these developments. These included both raw material surcharges as well as recurring sales price increases. Armacell continues to actively monitor such cost developments to balance potential volatility with the appropriate strategies.

The productivity action plans in place across the Group will further enhance manufacturing performance. Following the implementation of marketing and sales excellence programs (WAM SME), Armacell targets to outperform overall market growth by leveraging base market growth, substituting legacy material, and entering new geographies, new markets and product applications, both organically and through external growth (M&A).

// CONSTRUCTION

In Europe, demand for construction remains strong. Civil engineering construction is expected to become the engine of European construction growth for years to come. For the first time since 2014, renovation activity will see stronger growth than new-build activity into 2020. In the USA, non-residential construction in 2018 was weaker than expected with a recovery foreseen in 2019 and 2020. This positive development will be mainly driven by investments in civil engineering, community and government projects.

// TRANSPORTATION

Global automotive vehicle sales are predicted to grow, driven by increased replacement demand in the USA and Western Europe supported by government incentives for electric vehicles. Sales of electric vehicles, plug-in hybrid electric vehicles, and hybrid vehicles are set to accelerate towards 2030. In the medium term, the transportation industry expects the current trends towards lightweighting, electrification and sound attenuation to accelerate.

// WIND

In 2018, total installed wind capacity reached 591 GW, an increase of 9.6% compared to 2017. Latin America, Southeast Asia and Africa generated 10% of new onshore installations. The global offshore market grew by 0.5%. For the first time, China installed more offshore capacity than any other market (1.8 GW), followed by the United Kingdom and Germany. New installations are projected to reach more than 55 GW per annum prior to 2023. Significant growth will come from developing markets in Southeast Asia and the global offshore market.

Driven by our Innovation team, Armacell strives to strengthen its position as the technology leader and identify cross-regional opportunities for innovative solutions and technologies. New product recipes allow replacement of raw materials and should reduce price dependencies significantly. From a manufacturing standpoint, these efforts are supported by a reinforcement of the best cost supplier position. Armacell will pursue higher efficiency by reducing complexity and leveraging the current fixed cost base.

Armacell expects net sales and adjusted EBITDA to increase further in 2019. Growth will be driven by the global megatrends outlined, organically by our innovation and investment programs and supported by selective external growth opportunities in an environment of relatively stable currencies.

Sources: IMF World Economic Outlook, 86th Euroconstruct Conference Summary Report, Global Wind Energy Council, Bureau of Economic Analysis (US Department of Commerce), Moody's Global Credit Research, Cushman & Wakefield Asia Pacific Outlook, Construct Connect, Focus2move Global Auto Database

GROUP PERFORMANCE

NET SALES AND PROFIT

In 2018, Armacell increased **net sales** to €610.3 million (2017: €600.3 million). This positive performance was achieved despite strong translational headwinds from a weakening US dollar, which equated to around 4% of the top line in 2018. Net sales of €210.4 million were generated by Advanced Insulation EMEA (2017: €205.0 million), €157.8 million by Advanced Insulation AMERICAS (2017: €151.2 million), €110.6 million by Advanced Insulation APAC (2017: €117.4 million) and €131.5 million by Engineered Foams (2017: €126.7 million).

EBITDA excluding unusual items grew to €106.0 million (2017: €103.8 million) with an EBITDA margin excluding unusual items of 17.4% (2017: 17.3%). Reported EBITDA including unusual items amounted to €86.4 million (2017: €98.0 million). Unusual items equating to €19.6 million (2017: €5.8 million) mainly consisted of non-recurring expenses relating to acquisitions, geographical footprint extensions and restructuring expenses. Adjusted **EBITA** was €86.4 million (2017: €84.8 million) with an EBITA margin of 14.2% (2017: 14.1%).

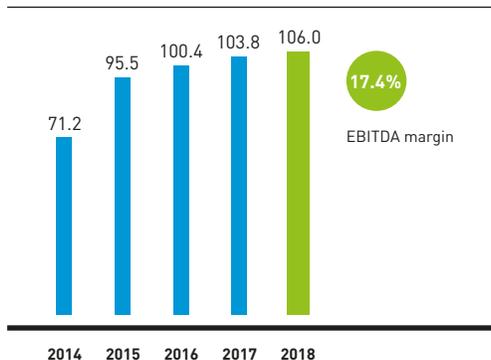
INVESTMENTS AND CASH FLOW

In 2018, Armacell continued to generate strong adjusted operational cash flow and at year-end maintained a **cash balance** of €57.9 million (2017: €50.5 million). Besides the cash on hand and cash flow, the most important source of liquidity is the revolving credit facility with a total volume of €100 million. This facility was drawn by €26.6 million (2017: €3.9 million) at year-end 2018.

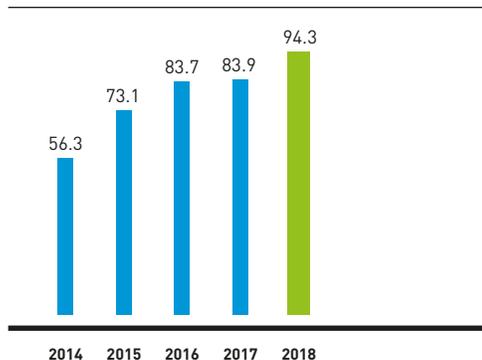
In the reporting period the adjusted **cash flow** from operating activities amounted to €94.3 million (2017: €83.9 million). Cash outflows over the past two years were primarily related to significant investments into our properties, plants and equipment, and to our acquisitions of TB Concept Inc., Guangdong De Xu Insulation Materials Co. Ltd (De Xu) and Guarto Guarnizioni Torino S.r.l. (Guarto) in 2018.

All our investments, being of organic nature or by way of acquisition or partnership, support our growth trajectory across all operating markets and we are confident to see a significant payback as early as 2019.

ADJUSTED EBITDA in € million



ADJUSTED OPERATING CASH FLOW in € million



BALANCE SHEET

As of 31 December 2018, total **assets** were €1,231.7 million (2017: €1,176.5 million). Non-current assets equated to €979.0 million (2017: €966.0 million), which included intangible assets of €282.7 million (2017: €304.0 million), property, plant and equipment of €215.4 (2017: €198.5 million) and goodwill of €470.5 million (2017: €454.1 million). Other intangible assets mainly consisted of customers' lists, know-how, patents, trademarks and brands. Additional non-current assets were derivatives assets, deferred tax assets and other non-current financial assets. Current assets amounted to €252.7 million (2017: €210.5 million) and mainly consisted of trade receivables of €93.3 million (2017: €86.1 million), inventories including finished goods of €75.4 million (2017: €59.1 million) and cash equivalents of €57.9 million (2017: €50.5 million).

As of 31 December 2018, non-current **liabilities**, excluding liabilities due to shareholders, amounted to €793.7 million (2017: €767.7 million). These primarily consisted of non-current borrowings of €628.6 million (2017: €620.3 million) and provisions for pensions and similar obligations of €83.8 million (2017: €84.4 million). Current liabilities of €184.6 million (2017: €132.4 million) included current borrowings of €46.0 million (2017: €23.7 million). At year-end 2018, Armacell's net debt excluding liabilities due to shareholders was €623.3 million (2017: €603.5 million).

As of 31 December 2018, economic **equity capital**, including the preferred equity certificates of Armacell shareholders, amounted to €253.4 million (2017: €276.4 million). The share capital was €17.9 million, unchanged from year-end 2017. The subscription of 321,982,359 preferred equity certificates, each with a par value of €1, was utilised to finance the acquisition of Armacell Group. The yield on these preferred equity certificates is 10.5% p.a. The economic equity ratio is 20.5% (2017: 23.4%).

In total, €6.2 million of our first lien term loan were repaid in 2018.

BUSINESS PERFORMANCE

ADVANCED INSULATION

Armacell's Advanced Insulation (AI) division increased its net sales from €473.6 million in 2017 to €478.8 million in 2018. AI generated 78% of Armacell's total net sales in the year under review.

ADVANCED INSULATION NET SALES BY REGION



Advanced Insulation EMEA

The European economy grew by 2.3% in 2018. Growth in the advanced economies achieved 2.0% in 2018 and in Europe's emerging markets 3.8%. Whereas the major economies were well below 2%, growth in Scandinavia slightly exceeded 2%. The biggest growth contributors in Europe were Ireland (4.7%), Slovenia (4.5%) and Poland (4.4%).

Despite the challenging market situation with a foreign exchange headwind of €3.6 million due to the weakening pound sterling and the strong decline of the Turkish lira against the euro, Advanced Insulation net sales in EMEA rose by 2.6% from €205.0 million in 2017 to €210.4 million in 2018. Excluding foreign exchange headwind, the growth rate was 2.9%. Adjusting for the impact from acquisitions, the sale of the personal services business and the adjustment of discontinued activities, organic growth equated to 4.2% well above the region's GDP growth.

Principal growth drivers were the strong development in North and Central Europe as well as in Spain, Italy and Eastern Europe, offsetting lower net sales in Turkey and the Middle East. Besides volume growth, the carry-over effect of the 2017 price increases to offset higher raw material costs contributed to the increased net sales in 2018.

KEY FIGURES - AI EMEA

| in € million | 2016 | 2017 | 2018 |
|--------------|-------|-------|-------|
| Net sales | 200.0 | 205.0 | 210.4 |

Advanced Insulation

478.8

€ million net sales

Advanced Insulation AMERICAS

The US economy grew by 2.9% in 2018. The drivers of growth were a combination of increased personal consumption due to a sound labour market and expanding payrolls, an improved residential housing market, investment in domestic infrastructure and intellectual property and higher government expenditure.

Canada saw its growth at 2.1% in 2018. In some countries of Central and South America, growth rates rose, with Mexico recording 2.1% in 2018 and Brazil 1.3% in 2018. This more than offset the challenging macro environment in Argentina and Venezuela.

Despite a strong foreign exchange headwind of €9.0 million, net sales of Advanced Insulation AMERICAS grew to €157.8 million, an increase of 4.4% over 2017. Adjusted for FX headwind, the region grew by 11% year-on-year thanks to strong volumes in the retail, contractor and distributor channels and the US HVAC market. Sales price increases offset higher transportation and raw material costs. Excluding the acquisition of TB Concept, organic growth in 2018 was 10.2%.

KEY FIGURES – AI AMERICAS

| in € million | 2016 | 2017 | 2018 |
|--------------|-------|-------|-------|
| Net sales | 112.9 | 151.2 | 157.8 |

Advanced Insulation APAC

In 2018, the emerging and developing countries in the Asia-Pacific region grew strongly at 6.5%, whereas in the advanced economies of APAC, the growth rate softened to 2.1%. China's GDP growth rose to 6.6% in 2018 and the ASEAN market recorded GDP growth of 5.2%. In 2018, South Korea's economy grew by 2.8%. The Indian economy recorded strong GDP growth of 7.3%.

Net sales in APAC declined to €110.6 million (2017: €117.4 million). Various factors affected the result: a negative foreign exchange impact of €4.6 million, a decline in the oil & gas-related project business, and lower sales in Australia, South Korea and the ASEAN countries.

In China, Armacell further extended its strong market position with the acquisition of De Xu Insulation Materials Co. Ltd, thus expanding its local footprint and production capacities. The implemented demand generation activities strongly drove our project and acoustic business. In India, Armacell gained market shares despite keen competition and strengthened its local business through a combination of increased project generation and conversions, and by broadening its domestic product offering via a strong distribution network. In both countries, Armacell achieved growth above GDP growth.

KEY FIGURES – AI APAC

| in € million | 2016 | 2017 | 2018 |
|--------------|-------|-------|-------|
| Net sales | 119.2 | 117.4 | 110.6 |

ENGINEERED FOAMS

Net sales in Armacell's Engineered Foams division grew by 3.8% from €126.7 million in 2017 to €131.5 million in 2018. Slightly lower net sales in the Component Foams business resulting from reduced volumes and the decline of the US dollar were offset by higher net sales in the PET business driven by double-digit volume growth in the wind markets in AMERICAS, APAC and EMEA.

KEY FIGURES – EF

| in € million | 2016 | 2017 | 2018 |
|--------------|-------|-------|-------|
| Net sales | 126.5 | 126.7 | 131.5 |

Component Foams

Net sales in Component Foams were affected by lower demand in the automotive sector in the second half of 2018 and the fact that some end-of-life vehicles were not fully offset by new vehicle launches. The program implemented to improve efficiency and increase capacity delivered initial results in Q4 2018, with foreign exchange-adjusted net sales increasing by more than 3%.

PET

In the wind, transportation and general industry markets, the number of applications combining lightweighting and performance continues to grow. The increasing awareness of the benefits PET core foams offer is reflected in the stronger net sales figures for each of these markets in almost every region around the world. Europe leads, with the USA and APAC catching up fast.

Demand in China is growing strongly, mainly in the wind market where China accounts for almost half the wind turbines installed globally. Our share of the wind market has grown our business and is principally driven by specification approvals from the wind majors and global blade manufacturers.

Further diversification has been achieved in other markets through new applications for recreational vehicles and structural building components. Our production capacity for PET core foams in Canada combined with the start of operations in China in 2019 will strengthen Armacell's position as the global leader in this market.

Engineered Foams

131.5

€ million net sales

CORPORATE GOVERNANCE

RISK MANAGEMENT

Armacell is exposed to various risks that are part and parcel of the entrepreneurial nature of its business. The potential sources of risk are continually monitored to identify and mitigate possible risks as early as possible.

Competition

There are significant barriers to entry in the equipment insulation and technical foam markets, particularly in view of the initial investment, know-how and intellectual property required, as well as the necessary penetration of distribution channels. The risk that new competitors may enter these mature high-end markets and gain material market shares is considered to be limited.

// INNOVATION

Armacell strategically invests in innovation to mitigate the risk of margin deterioration due to direct product competition. The Group's technology platform is one of its main competitive advantages and through strong innovation efforts, Armacell expects to drive further sales and profitable growth opportunities. Two factors are driving this growth: advancements in existing products and the launch of new products with characteristics that deliver added value to our customers. Lighter and higher performing, Armacell products – combining thermal and acoustic properties – allow customers to substitute other materials and achieve a lower overall installed cost.

Armacell offers products developed with the latest technologies in high-quality segments and is in a position to continuously optimise its production costs. Nevertheless, Armacell expects on-going price pressure and mitigates this risk through manufacturing cost optimisation and a clear focus on its customers' price, quality, availability and service requirements.

Strategy and business model

Armacell's business depends to a certain degree on the performance of the equipment market in infrastructure and other industries. As Armacell operates in businesses that benefit from more stringent environmental laws, more industry-specific opportunities than risks are expected to emerge. Although stricter environmental protection requirements may necessitate plant modernisation measures in future, these regulations will also drive the demand for equipment insulation products and positively impact the Group's earnings.

Demand in Europe, North America, and Asia plays an important role for Armacell's business. Products sales to the infrastructure and construction industry are sensitive to the general level of economic activity and taxation. Armacell is highly diversified both in geographical and application terms, and there are very limited risks arising from concentration on individual end markets.

Material risks relating to corporate strategy are considered low since Armacell is focused on diversified, stable long-term customer relationships. The top ten customers account for less than 20% of net sales.

To mitigate risks, Armacell has introduced appropriate measures to align production capacity to the expected demand requirements. Armacell is continuously exploring and developing new and promising market opportunities, such as in aerogels, in acoustic systems and solutions, in the PET core foam market for wind turbines and light-weight automotive and transportation applications.

Operating performance

Armacell margins have proved resilient over the last decade. Raw material price volatility has been pro-actively managed by multi-sourcing, recipe optimisation and cost improvement initiatives. Since early 2017, we have increased sales product prices in order to absorb higher raw material costs. Such actions can be put into the market at relatively short notice. Competing products are generally exposed to similar trends in product input pricing. Armacell continuously invests to optimise its performance and improve the Group's long-term competitiveness.

Financials

Armacell faces the typical liquidity risks of private equity financing: high interest charges and comparatively low equity ratios. Besides its partially drawn revolving credit facility of €100 million, the Group can optionally access new financing sources for acquisitions or similar investments. Armacell has implemented strong liquidity monitoring tools, and the financial risks from customer receivables are considered low.

Armacell operates globally, and its trading results are affected by foreign exchange (FX) rate volatility. The reported results are impacted by two separate kinds of FX risk. Transactional risk arises from transactions denominated in currencies other than the functional currency of the subsidiary. In general, Armacell does not hedge its transactional exposure as the business is, to a large extent, naturally hedged as local sourcing and selling activities are usually in the same currency.

Translational risk arises upon consolidation of the Group results and relates to exposure from translating the financial statements of subsidiaries that use currencies other than the euro. Less than 40% of the net sales are generated by entities with the euro as their functional currency, while the US dollar accounts for about a third. Other important foreign currencies within the Group include the CNY, HKD and CAD.

The Group is exposed to interest rate risks from bank loans, mainly through variable interest rates. Our main financing is based on a €615.8 million term loan with an interest rate of Euribor+350bp and a floor of 0%. In addition, Armacell has access to a revolving credit facility of €100 million with an interest rate of Euribor+325bp. The Group hedges the variable interest rate with euro interest rate swaps, which will terminate in June 2020. The euro interest rate swap represents approximately 8% of the euro-denominated debt.

GROUP MANAGEMENT

The decision-making bodies of Armacell International S.A. are comprised of the persons listed below. They set the strategic goals, establish standards, and ensure compliance responsible for the long-term success of the Group.

Supervisory Board

- Ivo Jurek (Chairman)
- Lionel Assant
- Jürgen Pinker
- Natacha Jamar
- Adrian Kalt
- Jean-Carlos Angulo

Audit Committee

- Jürgen Pinker (Chairman)
- Adrian Kalt
- Jean-Carlos Angulo

Nomination and Remuneration Committee

- Lionel Assant (Chairman)
- Adrian Kalt
- Jean-Carlos Angulo

Management Board

- Please refer to pages 30–31

Executive Management Team

- Please refer to pages 30–31

OWNERSHIP STRUCTURE

Since 29 February 2016, equity funds managed by Blackstone have been Armacell's majority shareholder. The remaining shares are held by the holding and investment company KIRKBI and Armacell's senior management team.

About Blackstone

As one of the world's leading investment firms, Blackstone creates positive economic impact and long-term value for its investors, the companies it invests in, and the communities in which it works. Blackstone's global asset management businesses, with over US\$ 470 billion in assets under management, include investment vehicles focused on private equity, real estate, public debt and equity, non-investment grade credit, real assets and secondary funds.

About KIRKBI

KIRKBI is the holding and investment company of the Danish Kirk Kristiansen family. In addition to a broad investment portfolio, the company's strategic activities include the majority shareholding in the LEGO group, a significant shareholding in Merlin Entertainments plc and investments in renewable energy. KIRKBI has a long-term investment profile and is a responsible investor with a high ethical standard.

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