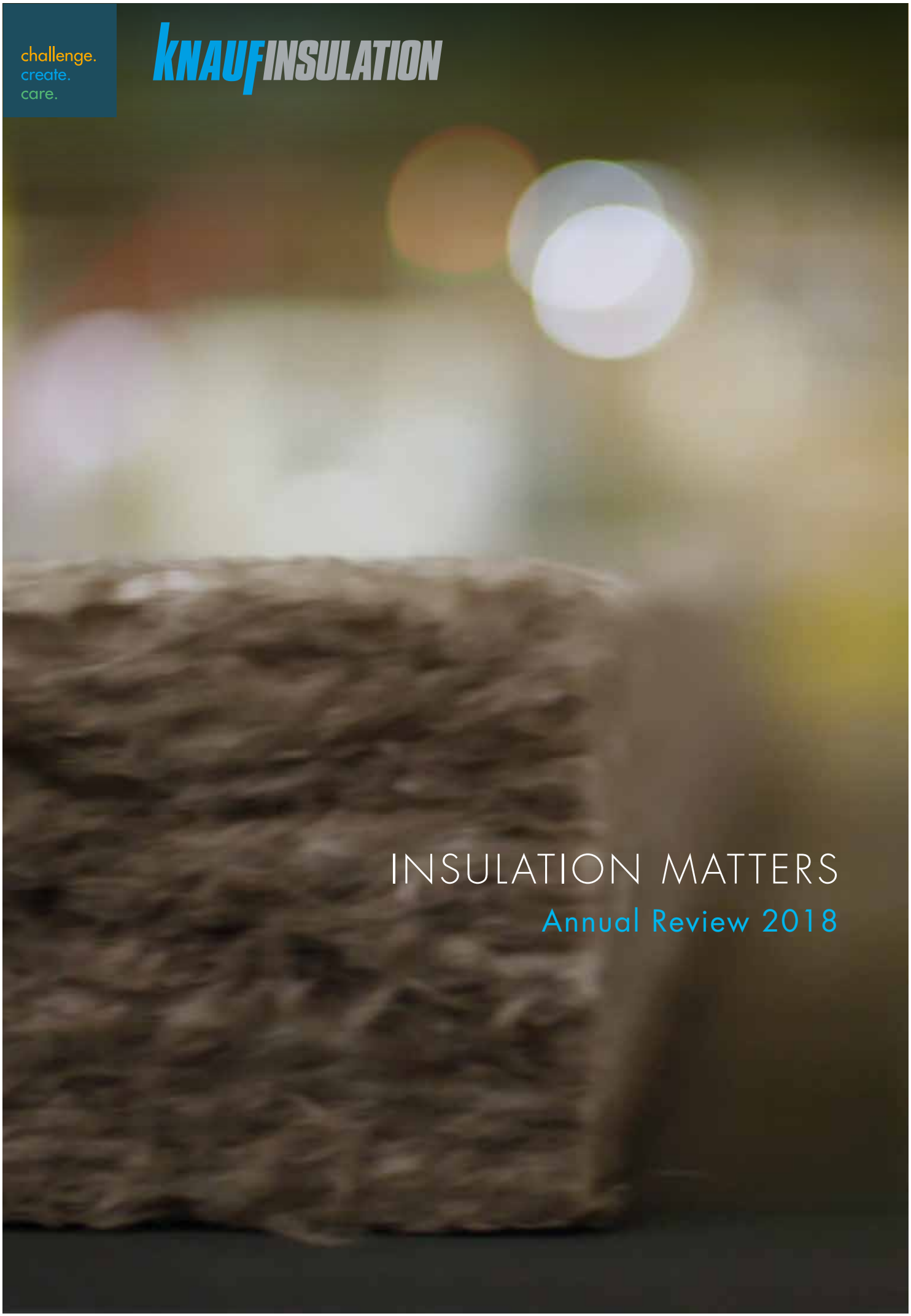
challenge.
create.
care.

KNAUF INSULATION



# INSULATION MATTERS

## Annual Review 2018

# GREAT EXPECTATIONS

In 2018 Knauf Insulation was voted the Global Insulation Company of the year. It is an award we are incredibly proud of. But it is not enough for us to be a leading player in the global insulation market or provide the best solutions at the best price. This is simply being good at what we do.

## WE AIM TO BE GREAT.

And being great means continuously finding new ways to improve.

That is why our brand identity is based on three words – Challenge. Create. Care.

Being great means continuously creating new solutions that will make a difference to the challenges facing our environment, our colleagues, our customers and to the sustainability of our company. When we say we care, we do something about it.

This year's *Insulation Matters* brings into sharp focus how we are translating those values into action.

For instance, to help develop future sustainable buildings, we are supporting the Level(s) European Commission project through research provided by our new Knauf Insulation Experience Center.

To meet the challenges of urban flooding and climate change we are working with specifiers to install our Urbanscape® Green Roof solutions.

## ABOUT KNAUF INSULATION

Knauf Insulation has more than 40 years of experience in the insulation industry. Today the company employs over 5,500 people across 35 countries and has 38 manufacturing sites in 16 countries.

Knauf Insulation is part of the Knauf Group which has more than 27,400 employees worldwide with 220 factories in over 80 countries. The Knauf Group was founded in 1932 and remains an independent family-owned company driven by the values of partnership, commitment, entrepreneurship and menschlichkeit (humanity).

For more information visit **www.knaufinsulation.com**

## OUR MISSION

Our mission is to challenge conventional thinking and create innovative insulation solutions that shape the way we live and build in the future, with care for the people who make them, the people who use them and the world we all depend on.

## OUR VISION

We lead the change in smarter insulation solutions for a better world.

challenge. create. care.

In the light of the alarming findings of the 2018 report by the UN Intergovernmental Panel on Climate Change which states "far-reaching and unprecedented changes in society" are required to limit global warming to 1.5°C, clearly we need solutions such as these more than ever.

As Green Building Rating Systems are revised to focus more on building comfort and indoor air quality as well as full building Life Cycle Assessments, we are providing the expertise and solutions that really deliver.

Within our company, we are innovating to make the circular economy a reality, we have streamlined our OEM, Building Science and Technical Solutions into one customer-focused Systems Division and started the process to convert our Rock Mineral Wool to our ground-breaking bio-based ECOSE binder.

Health and safety remains paramount at Knauf Insulation. Although I'm pleased Lost Time Accidents (LTA) have decreased by 21.8% from 2016 to 2017, we still have significant progress to make. This is an area that I oversee personally through our Safety First initiative to ensure we are never complacent and never stop looking for ways to improve.

When it comes to our environmental performance we continue to make improvements across the board, maintaining the energy-saving success that saw us achieve our 20% reduction targets four years before our deadline despite running at full capacity and, as of 2017, sees us sending 64.9% less waste to landfill than we did in 2010.

Finally, I'm delighted to announce that our new €110 million Rock Mineral Wool plant in France is scheduled for completion in 2019 and our new €120 million plant in Malaysia will open a year later.

Of course, it goes without saying, these plants will be the best in the world. It's what we do.

Knauf Insulation is a family business with unique values that inform the way we do everything. Ask anyone who comes to our company from another and they will tell you that it is different. And when I see customers they always tell me we are different in the way that we support business.

It is not enough for us to be a leading player in the global insulation market or provide the best solutions at the best price. It is a total value proposition driven by our relationship with people and our pioneering approach.

Our latest edition of *Insulation Matters* brings these qualities into sharp focus. And one thing I can say is that our people at Knauf Insulation are great.

Jean-Claude Carlin
CEO, Knauf Insulation EMEA

Christopher Griffin and his team have been putting people first – our colleagues and customers – since he took over as CEO of Knauf Insulation North America in 2016. Today he says there has never been a more exciting time to be part of the company.

# THE FAMILY YOU CAN TRUST

### WHAT HAS BEEN ACHIEVED IN THE PAST TWO YEARS?

The company is now a hugely positive place to be. And positivity breeds positivity. People want to be on the winning team. Now we are on our journey to become the family you can trust.

### WHAT DOES THAT MEAN?

The family you can trust means customers can trust us, because we manufacture the highest quality products and we deliver on our commitments. Our colleagues can trust us because at Knauf Insulation their careers can flourish and shareholders can trust us because we are the people they can invest in and rely on to deliver.

### HOW WILL THIS BE ACHIEVED?

By being ready to listen and challenge the status quo in everything we do. By creating and implementing solutions across the business that are meaningful to our customers and by working every day in a way that shows we care about our people, our communities, our customers and our planet.

### AND WHAT DEFINES SUCCESS?

When we all win. When our business leads and grows, our colleagues will be rewarded and fulfilled and we'll help our customers be more competitive and successful. And Knauf has a sustainable future and growth.

### THE FAMILY YOU CAN TRUST RESONATES STRONGLY IN NORTH AMERICA, WHY?

Knauf Insulation was started in America by Thies Knauf (see story right) in 1978 when the Knauf family bought our Shelbyville plant. On the 40th anniversary this year, that sense of being part of a family continues to resonate strongly across the company. During my first hundred days as CEO I met our top 50 customers and many of them remember Thies and how he helped them build their businesses. The company was small, but it was a family that was trusted.

### WHERE IS KINA NOW?

Right now, we've earned the right to do something bold – to put our customers at the centre of everything we do. It is an exciting time to be with Knauf Insulation in North America.

## HOW TO CREATE EMPOWERMENT

How do you empower colleagues, give them a sense of purpose and show appreciation?

You don't just talk, you walk the walk – not only in the senior team but across the business.

The top priority is always safety. It is not enough to say the right thing, we must always DO the right thing, says Knauf Insulation North America CEO Christopher Griffin.

Knauf Insulation North America is also delivering on employee growth and training through academy development, e-learning and tuition assistance.

Flexible working, encouraging community service, succession planning and performance reviews are additional priorities on a foundation of improved communication.

## FAMILY VALUES

What makes Knauf Insulation different to other companies? After 40 years since he launched the company in North America, Thies Knauf is ideally placed to answer that question.

"People make the difference. We choose people to lead our business who also live our values. For example, we give our plant managers the autonomy to run their businesses in a way they see is best in their local context. We have to have total trust in them so we choose the best," he says.

And being a member of the Knauf family comes with one cast iron certainty. "It's an advantage being born a Knauf but you have to earn your place in the business. You have to work hard and you have to start on the shop floor."

*David 'Teddy' Kincaid working at our Shelbyville plant in North America*

## CARE FOR COLLEAGUES

*"When you work for Knauf you actually feel like you work for people. And that does make a difference."*

Joe Rogers,
Chief Financial Officer

*"There is a renewed focus about where we want this business to go. It's about engagement. It's about all being on the same team."*

Christopher Brown,
Director Training Academy

*"Knauf has become more than just a job. It's become more like a home away from home."*

Drew Little,
Manager Talent Acquisition

Health and safety is everyone's responsibility – we need to show we care.

# EMPOWERING

Every day we must ask ourselves, "What have I done to make where I work safer?"

"What will be my legacy?"

"How will people judge what I have done in the future?"

These are critical questions that must be at the heart of everything we do at Knauf Insulation, says our Group HSE Director Dag Peiffer.

Everyone has the right to work in a safe place, he says, and it is vital that everyone is empowered to take time out to think about health and safety and take action to stop any actions that threaten safety.

"Every accident at Knauf Insulation is one too many. We have to always keep in mind that health and safety doesn't stop at the plant gate. Every accident has an impact on that person's family, friends and community and on that person's hopes and dreams," Dag says.

## GENERATE AWARENESS

"Around 80% of accidents are behaviour related. And that behaviour must change. Sometimes people may be unaware that their behaviour is unsafe – that is why we must foster on-going highly visible communication to ensure safety is kept in the mind of everyone. And everyone is empowered to stop anything unsafe."

Standardising awareness across regions and technologies to reduce incidences is a priority of HSE and Dag believes tackling any culture of non-conformity is the responsibility of everyone – not just leaders or operators.

It is this dynamic that drives our Life Saving Rules – which has significant consequences for violations including disciplinary action – our 'Stop! Safety First' cards (see story below) and our global support for World Day for Safety and Health at Work – an international annual event designed to generate awareness about reducing work-related injuries.

## GREAT OPPORTUNITY

"This is an annual day that gives us time to stop and think about what safety means for us," says Dag. "It was the first time Knauf Insulation had supported this event and was a great opportunity to celebrate safety. And that's what all our plants did."

At all plants Stop and Safety Check cards were distributed, safety talks held and a video presentation was given by our CEO Jean-Claude Carlin but there were great individual plant initiatives such as:

In the UK at **Cwmbran**, plant checks were carried out, safety gifts distributed and there was a presentation on healthy eating. A health and safety 'surgery' was held at **Queensferry** to raise issues and discuss solutions, special safety prize quizzes and children's drawing competitions were also organised. At **St Helens** a prize hazard-spotting quiz was held in addition to talks about first aid and emergency scenarios.

Imaginative Life Saving Rules videos were created by our colleagues at **Lannemezan** in France demonstrating 'what to do versus what not to do'. In **Visé**, Belgium, videos produced in the plant were also screened to highlight dangerous behaviour. There was even a workshop to show the impact of alcohol or phone use on driving performance.

## PRODUCTION STOPPED

In Slovenia at **Ajdovščina**, production was stopped for an hour to discuss safety issues, T-shirts were distributed and activities organised, while at **Skofja Loka** a safety time out featured talks and incident overviews. At **Bernburg**, **St Egidien** and **Simbach** in Germany, 'Safety shirts' and Stop and Check cards were distributed and safety rules displayed on roll-up panels.

In Russia, at **Stupino** a practice evacuation was organised as well as a presentation by the Civil Defence and at **Tyumen** there were children's drawing competitions and flashmob photo opportunities.

## CARD POWER

To empower our colleagues to take action in potentially unsafe situations Stop cards have been distributed across all plants. The cards state: "You have the responsibility and the authority to stop unsafe actions and conditions." Advice has also been provided for employees who may be approached in such a situation and for those who step in to stop risky actions.

# SAFETY


## 22%
**THE REDUCTION IN OUR LOST TIME ACCIDENT FREQUENCY RATE (LTAFR) FROM 2016 TO 2017**

**NEW SAFETY AMBITION FOR 2020**

Lost Time Accident Frequency Rate (LTAFR) reports the number of lost time injuries per million hours worked. In 2017 we recorded a LTAFR of 5.21 – just 0.21 short of our 2020 target of five. As a result we have set our ambition higher and are now determined to achieve a LTAFR of two by 2020. In addition, we are increasingly using Total Recordable Incident Rate or TRIR to assess our safety performance. TRIR measures the rate of recordable workplace injuries regarding the hours worked and is a standard that enables easy comparison between companies. Our TRIR target for 2020 is five.

## SAFE IN THE USA

Safety Stops, the appointment of a new Sales Safety Ambassador and a hotline for reporting sensitive work issues have been introduced at our North America plants.

During recent Safety Stops – when plant work is temporarily halted – colleagues took part in a video to share photos of their families, partners, children and even pets to emotionally reinforce the importance of why they should stay safe at work.

New safety vests were also distributed with a pocket card featuring our Life Saving Rules, a card for safety suggestions and a placeholder for a photo of the reasons why individual colleagues work safe.

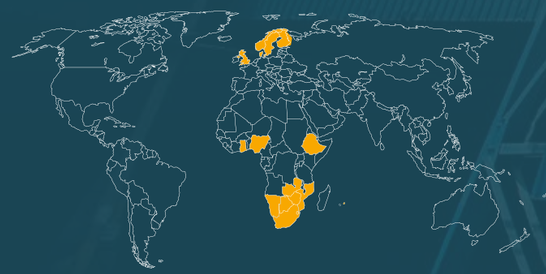
A new Sales Safety Ambassador has also been appointed to generate safety awareness and establish KPIs for our 60 colleagues who drive more than 1.6 million kilometres every year.

KnaufListens, meanwhile, is a confidential and anonymous hotline that has been introduced for colleagues to call if they are concerned about any issues that cannot be resolved locally and may impact emotional safety. The number is free and also available online.

Spotlight on Northern Europe

# NORTH STAR

With UK plants in St Helens, Queensferry and Cwmbran, Knauf Insulation Northern Europe creates solutions for some of the biggest insulation markets in the world and is the only British manufacturer of both Glass and Rock Mineral Wool. With a fresh focus on Africa, the future looks bright despite the challenges of Brexit.



*Knauf Insulation Northern Europe comprises of the UK and Ireland, the Nordics (Sweden, Norway, Denmark, Finland), and English speaking African countries*

Eight questions for Knauf Insulation Northern Europe.

**1. WHY IS KNAUF INSULATION NORTHERN EUROPE IMPORTANT?**

We access some of the largest markets for insulation in the world. In the UK, we are number two by value and number one by volume. We have a very strong position in Ireland and in the past decade we expanded to Sweden, Norway, Finland and Denmark which represent some of the largest insulation markets on the planet in terms of consumption per head.

**2. WHY IS KNAUF INSULATION NORTHERN EUROPE SO SUCCESSFUL?**

We have a fantastic team of people. They are a great asset. They understand their role in delivering the overall strategy of the business and they are committed. Nothing stops them. If there is a set-back they just keep going and deliver.

**3. WHAT SETS KNAUF INSULATION APART FROM THE COMPETITION?**

The company is privately owned which means we can respond fast to changing market conditions. Decisions are made quickly and there is a lot of major investment.

**4. WHAT ARE THE MAIN AREAS OF BUSINESS?**

A fresh focus for us has been on new build in the UK. We also have a growing business in South Africa where we are aiming to grow market share. We are also looking at the African East coast and Nigeria.

**5. WHAT ABOUT NEW PRODUCTS OR INNOVATIONS?**

A growing area of focus is real performance. We know how our products perform, but when they are added to other components and installed in buildings, we don't know how they perform in real life. We have some interesting work going on in this space.

**6. WHAT WILL BE THE IMPACT OF THE UK LEAVING THE EUROPEAN UNION?**

Today [2018], we do not really know. At Knauf Insulation, we are focused on managing the things we can manage and we are taking the necessary steps, in conjunction with our supply chain, with the aim of ensuring continuity of supply under various Brexit scenarios.

**7. HOW HAS THE GRENFELL FIRE CHANGED THE INDUSTRY?**

There are understandably deep public concerns about combustibility in buildings and this will have a far-reaching impact on construction. For example, there is discussion around product tracking from manufacture to distribution to installation. Government will, at some stage, legislate on future changes, but it will take time and investment.

**8. WHAT ABOUT THE CLEAN GROWTH CHALLENGE IN THE UK?**

In 2018, the government launched 'Four Grand Challenges'. One of these is Clean Growth – halving energy use of new buildings by 2030. We hope there will be the confidence to invest in this goal and put in place the regulatory network to make it happen.

## RECYCLING BREAKTHROUGH

More than 60,000 tonnes of recycled glass are being transformed into energy-saving insulation every year following the opening of a new recycling facility next door to our St Helens plant in the UK.

The €12 million facility is a joint project between Knauf Insulation and the resource management company Veolia; it is saving the equivalent of 350 million bottles being wasted while maximising our use of recycled glass rather than virgin materials. The new plant has also created 18 new jobs and saves an estimated 375,000 miles in material transportation.

We have been using recycled glass in our manufacturing process for some time, but the consistent quality that we get from the new facility is enabling us to increase further the percentage of glass cullet we use.

## EMISSIONS SUCCESS

We are aiming to reduce our $CO_2$ emissions in the UK by over 5,000 tonnes per year – or the equivalent of the energy use of 800 homes – by building on the success of a partnership with Siemens.

Using intelligent technologies, we have been working with Siemens since 2015 to improve energy efficiency at our St Helens plant. The partnership is now focusing on improvements at our Cwmbran site in Wales.

Once the energy saving initiatives have been fully implemented across both plants, we expect to achieve the 5,000 tonnes saving in $CO_2$ emissions.

## CONTINUOUS IMPROVEMENT

Our St Helens plant was the pioneer of Continuous Improvement (CI) – an initiative that is now being rolled out globally across the company.

CI focuses on harnessing employees' ideas – it is a bottom up approach as opposed to a top down one where management comes up with the big ideas. The CI process begins with workshops where employees work together to identify the issues and come up with the solutions to improve their working processes and environment.

We see a more engaged workforce who actively want to improve the processes and activities they carry out every day. CI gives them ownership. It has been a massive cultural shift within our plants and this is why we are now rolling it out within our non-plant environment.

## COMMUNITY CARE

Knauf Insulation Northern Europe has a strong reputation for community support. During our recent furnace rebuild at Cwmbran, for example, 576 hours in total were given over to supporting four local causes, including two hospices, a resource centre for people with learning disabilities, and an animal rescue facility. In June, two teams took part in the Three Peaks Challenge to raise charity funds and one of our engineers rode across India in a rickshaw to raise money for Alzheimer's Research. To read more about our UK community programmes, see page 54.

# 2 CONTINENTS, NEW SITES,
## ONE AMBITIOUS GLOBAL VISION

New plants in France and Malaysia will power our market expansion to create the solutions customers need in Europe and Asia.



In 2017 we announced the construction of two new plants – one in Malaysia the other in France.

The multi-million-dollar investments will create 360 jobs and pave the way for our continued expansion across Europe and Asia to meet increasing demand for our quality solutions.

### MEETING THE CHALLENGE OF DEMAND IN EUROPE

Our new Rock Mineral Wool plant in the Moselle region of France, is scheduled for completion in 2019 at a cost of €110 million and will create 120 new jobs. Using our latest technology and ECOSE bio-based binder, the plant will annually produce 110,000 tonnes of Rock Mineral Wool; enough insulation to renovate about 25,000 homes.

Demand is soaring for our Mineral Wool solutions as they have excellent thermal, acoustic and fire performance. For example, the French government aims to carry out energy efficient renovations on 500,000 buildings every year to tackle fuel poverty and reduce the country's carbon footprint.

However, our ambition extends beyond France. "We aim to be the leading player in Western Europe," says our Group Chief Operating Officer, David Ducarme. "To date, we have a small market share in this region due to the limits of our existing manufacturing footprint. The Illange plant will make us more competitive in most West European markets."

Our quality renovation solutions, OEM products, external insulation for new builds and sandwich panels are all in high demand as European and national regulations insist on tougher safety and thermal performance standards for insulation.

"Additionally, we will be continuing to invest in our existing footprint where we have been renovating production lines at the rate of one a year," says David.

### CREATING 240 NEW JOBS IN ASIA

Meanwhile our new Malaysia plant, located in Johor Bahru in the southern part of the country, will have a capacity of 75,000 tonnes a year. The plant is scheduled to be completed in early 2020 and will create 180 jobs in Malaysia as well as a further 60 new positions across the region.

### COMPELLING BUSINESS CASE

"In Glass Mineral Wool we already have a mature footprint from Siberia in Russia to St Helens in the UK that's why we are looking at new geographies outside of Europe," says David. "In recent years, following the success of our operation in Asia Pacific we now have the critical mass to build our local capacity."

What makes a difference in Asia compared to previous investments is that logistics play an even bigger role. "There are a lot of small markets and in the south of Malaysia, close to Singapore, we have access to many ports," says David. "Quality and scale are also important. Local players have small sites and can't reach our quality level. That's why Malaysia is a very compelling business case."

# WINNING THE RENOVATION RACE

Demand for renovation is growing, European Union directives are inspiring new energy efficiency measures and climate change is being pushed to the top of political agendas. Now more than ever, this is a golden opportunity to renovate Europe's buildings and energy efficient buildings are a key pillar to tackle climate change.

The increasing demand is in line with the EU's revision of the Energy Performance of Buildings Directive and the revision of the Energy Efficiency Directive which sets an EU target of saving 32.5% by 2030.

Both directives will reduce carbon emissions, cut energy use and alleviate fuel poverty as well as create jobs, but critically national energy efficient building renovation strategies are essential to hit the targets. So, where do we start?

As this is a marathon not a sprint, national governments need to start with the three Ps.

**Planning, planning, planning.**

## SHOW WHY WE MUST CARE

In the European Union, buildings are responsible for 40% of all energy use and 36% of all emissions. Renovating buildings to be energy efficient will cut these figures, reduce reliance on foreign energy supplies, help alleviate fuel poverty and create new jobs. People need to know this. They also need to be reminded of how renovation will reduce their energy bills, make their buildings more comfortable and improve health and well-being.

## DELIVER REAL PERFORMANCE

Our Knauf Insulation Building Science team has been piloting digital technology that we believe will be ground-breaking for the industry. By combining real performance metrics with an integrated approach to energy efficiency renovations, the team will support our customers to deliver better energy efficiency outcomes. Governments must make real performance the priority of any renovation strategy.

## MANDATE TRIGGER POINTS

It is not enough to promise to renovate buildings; you have to install trigger points to make it happen. In France, a 'passport' for buildings is under discussion to incentivise energy efficient renovations over a period of time. Like a document that charts the service history of a car, the passport is handed from one building owner to the next so it is clear what energy efficient renovation has taken place. This reveals the payback of energy efficiency showing that managing energy use is about managing the value of a building.

## CREATE MARKET CONFIDENCE

Owners of energy-efficient homes are 32% less likely to default on mortgages so they are a better risk for loans. In Europe, 37 banks launched a pilot green mortgage scheme in June 2018 to explore the potential of low rate loans for 'near zero-energy' new builds and for renovated properties that cut energy use by 30% (backed by a new Energy Performance Certificate). Could this inspire a renovation revolution? We hope so. At Knauf Insulation we have been supporting this initiative since it was first discussed two years ago.

## BE CREATIVE ABOUT POLICIES

In Spain, for example, there are 23 million homes of which 10 million were built before codes required any energy saving solutions. At a European Alliance of Companies for Energy Efficiency in Buildings workshop, representatives (including Knauf Insulation), signed the Madrid Declaration calling for greater political ambition for the energy efficient renovation of buildings. This call was mirrored in Italy where we were a main sponsor of the 2018 Energy Festival. We stressed the importance of setting ambitious national policies to support the energy efficiency market.

## PROVIDE EUROPEAN FUNDING

The next European Union budget is for 2021-7. At the time of going to press 25% of funding had been allocated to tackle climate change. The European Parliament wants this figure to increase to 30%. Whatever happens, ambitious levels of funding must be allocated to energy efficient buildings. This is vitally important in Central and Eastern European countries where development funds can make the biggest impact.

## NEVER FORGET SAFETY

Fire risk should be designed out of any renovation initiative from the beginning. There are numerous risk factors to consider from ineffective installation to products that are not fire safe or a careless drill hole during a later building modification. For peace of mind fire safety must always come first.

# FRENCH RENOVATION REVOLUTION

France plans to make 500,000 homes energy efficient every year.

"Regardless of political colour, every French government – and every French person – has seen energy management as a state priority and policy makers have worked accordingly over many years," says Federico Gil de la Puente, our Managing Director for France.

"Being energy autonomous in the 21st century in France means being efficient and ensuring that those who cannot pay to heat their homes are warm in winter."

Of course, like other European Union countries in line with the Energy Performance of Buildings Directive (EPBD), France must create a long-term renovation strategy to decarbonise all its buildings by 2050.

France has already stated that by that year all its new buildings will be brought up to BBC energy class (*Bâtiment Basse Consommation*, meaning low energy building, energy class A-B) which is a national norm for construction and a label for renovation. It has consistently demonstrated how regulation can be a critical driver of energy efficient renovation.

So what is France doing right? Here are six key concepts.

## PRIORITISE ENERGY EFFICIENCY

France has made energy efficiency a national priority and aims to coordinate all the different aspects of renovation – such as tax incentives, regional schemes, public building plans and social homes – and simplify all projects under one energy efficiency initiative. The country has long recognised that regulation is the key to change.

## MAINSTREAM RENOVATION

France aims to 'massify' change by industrialising energy efficient renovation processes and giving priority to households suffering from fuel poverty. Tradable White Certificates are an example of this. These certificates are issued to energy suppliers who achieve energy saving goals for customers (for instance, through the installation of our Blowing Wool loft insulation). For this industrialisation to take place, the benefits and savings need to be more transparent to unlock finance for renovation. That is why an 'energy passport' that records energy efficient improvements over time is under discussion by French policy makers.

## ACCELERATE NON-RESIDENTIAL RENOVATION

There is a lot of investment focused on accelerating the energy efficient renovation of non-residential buildings, especially public buildings such as schools and hospitals, with a priority on health and comfort. Today France has some of Europe's most stringent regulations related to indoor air quality – an area where Knauf Insulation products excel.

## ENSURE REAL PERFORMANCE AND INNOVATION

Although mandatory energy efficiency certification already exists, France wants to place even more emphasis on the work of installers to ensure the highest possible standards of energy efficient building renovation. Money is earmarked for improved training certification and building work controls to ensure that the work – and the real performance – is actually delivered. There is also pressure on insulation companies to produce improved innovative solutions for the market.

## UNLOCK SUFFICIENT FINANCE

Policy makers are discussing a multi-billion-euro package – made up of public funds and money from energy providers – to drive energy efficient renovation. Political choices still have to be made, but France is determined to be an exemplary adopter of the EPBD and Energy Efficiency Directive (EED) while remaining in line with EU public deficit conditions.

## CELEBRATE GAINS

Making 500,000 buildings energy efficient every year will have a far-reaching impact for generations to come, according to economists. Around 126,000 new jobs will be created by 2025, health spending will be cut by €750 million every year for those who suffer economic hardship and more than 2.5 million households will be taken out of fuel poverty. Annual household bills will be reduced by a minimum of €512 while France's $CO_2$ emissions would be reduced by six million tonnes every year. No wonder France is inspired to mass renovate.

## HOW OUR FRENCH PLANTS WILL HELP

Our new €110 million Rock Mineral Wool plant in Illange, is scheduled for completion in 2019 and will complement our Glass Mineral Wool production at Lannemezan. The French plants will provide the country with complete energy efficient building solutions – Glass Mineral Wool solutions for inside walls and roofs, and Rock Mineral Wool solutions for the building envelope.

# RETHINKING OUR CITIES IN EXTREME CLIMATES

Intense heat or storm-water floods can cause urban chaos. We need to install more green roofs to create climate – resilient cities.

Flooded streets, half-sunken cars and emergency services forced to row boats to rescue people – we have all seen the misery that flooding can cause in cities.

We have also seen the impact of the opposite climatic extreme – heat-baked cities where rain fails to fall for up six months in a year with a devastating impact on water supplies.

The problem is that our passion for urban living is making a difficult situation worse. Fast-growing city populations are putting sewer systems and water supplies under more pressure than ever before.

Extreme weather caused by climate change complicates this situation even more. In the 2018 report by the UN Intergovernmental Panel on Climate Change, scientists called for "rapid, far-reaching and unprecedented changes" to all aspects of society to limit global warming to 1.5°C.

So, how do we tackle these challenges? "We need to see more cities installing more green roofs," says our Urbanscape® Business Development Director Jure Sumi. "Green roofs have the capacity to absorb a huge amount of rainfall which can take pressure off city drainage systems."

Green roofs are already increasingly common around the world as storm-water controls. In Singapore, for example, there are laws to ensure that any land area swallowed up by construction is compensated for with an equivalent area of city vegetation in the form of green infrastructure such as green roofs.

In Copenhagen green roofs have been mandated in local plans since 2010. "Due to the growing challenges of cloud bursts as well as flooding, green roofs are a growing trend worldwide," says the city's Chief Architect Tina Saaby Madsen.

"In Copenhagen the main idea is to combine practical use when heavy rain hits with the possibility of more nature in a big city. Furthermore, it has a great effect on cooling buildings and that helps in our goal of becoming the world's first $CO_2$ neutral capital in 2025."

In water-deprived areas such as the Middle East where irrigation water is a precious resource, the potential for green roofs is enormous, says Jure.

"For the past five years we have been carrying out research in Kuwait City, Abu Dhabi and Dubai, and we are proud to report that despite the harsh weather conditions we have recorded savings of up to 50% in irrigation water, even in summer," he says.

This research has led to some extraordinary projects including a lush green 3,300m² park facing the 2,000-seat Dubai Opera House and the 'greening' of a 19-hectare residential development known as Mudon also in Dubai.

"Normal irrigation for the green roof next to Dubai Opera should use almost 43,000 litres of irrigation water a day, but we have reduced that to 26,000," says Jure.

**AN URBANSCAPE GREEN ROOF SYSTEM WITH A SIX TO EIGHT CENTIMETRE THICK GROWING MEDIA CAN HOLD BETWEEN 27 AND 45 LITRES OF WATER PER SQUARE METRE**

> *"Green roofs have the capacity to capture and absorb a huge amount of rainfall which can take an enormous amount of pressure off city drainage systems."*
>
> Jure Sumi, Urbanscape® Business Development Director

# URBANSCAPE ADVANTAGES FOR CLIMATE CONSCIOUS PLANNERS

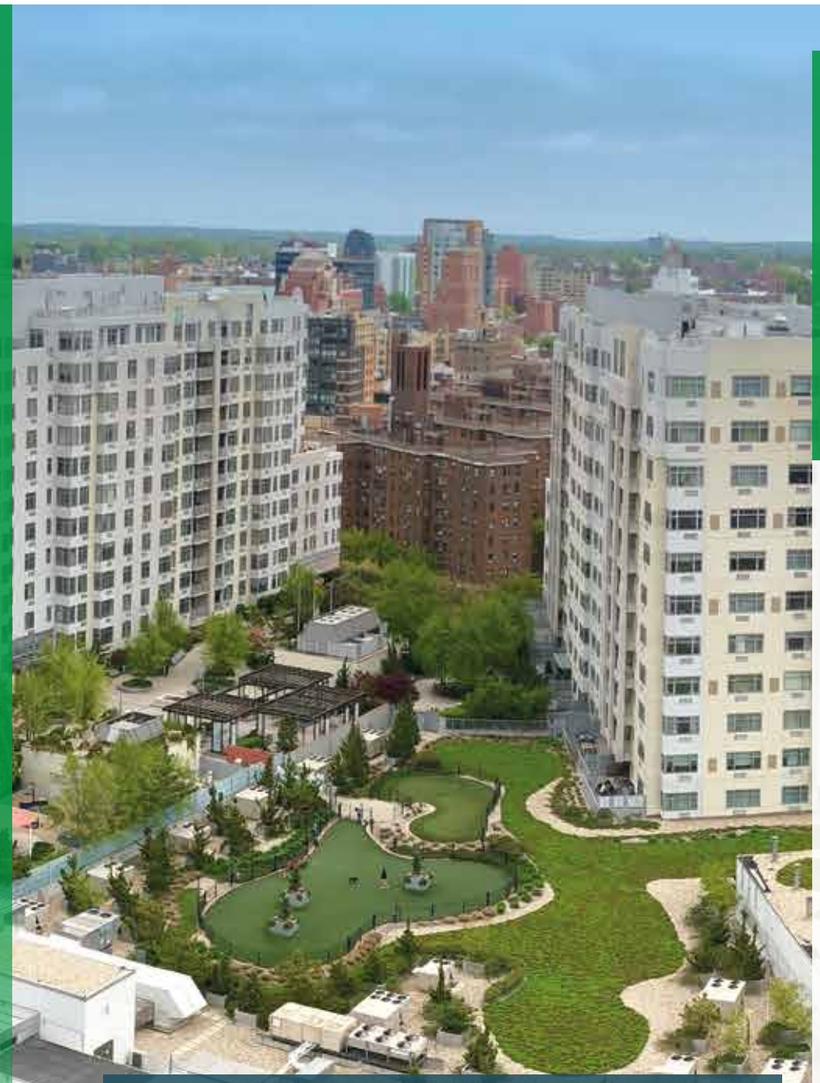
- An Urbanscape® Green Roof System with a six to eight-centimetre-thick growing media can hold between 27 and 45 litres of water per square metre. The weight of Urbanscape is up to four times lower than traditional grass and soil roofs even when filled with water.
- Knauf Insulation is the only company to provide a detailed Green Roof Performance Report through its Performance Evaluation Tool (PET) that uses data from hundreds of cities to calculate the water retention potential of any specific building anywhere in the world using Urbanscape.
- Our PET reports can also reveal the extent to which Urbanscape can reduce energy bills in winter and summer – another important consideration for any city planner.
- Urbanscape absorbs up to 15kg of $CO_2$ for every square metre over its lifetime and has a positive impact on 'heat island effect' by cooling hot air around buildings.
- Green roofs such as Urbanscape can filter out smog and heavy metals as well as particularly harmful airborne particles known as PM10 and PM2.5 – a major concern for clean-air conscious cities.

For more information visit the Urbanscape blog: **www.urbanscape-architecture.com**

## CHALLENGE OF RAINFALL ZONES

Across North America there are four 'rainfall distribution zones' each with distinctive 'rain events'. To test how our solutions work in each environment we have supported Moerings USA in the building of a storm water laboratory that can simulate the impact of extreme storms in each zone. Our aim is create custom-designed versions of green roof solutions for cities in each US rain zone.

*Sky View park in New York was vegetated by Sempergreen sedum mat on top of Urbanscape growing media for optimum performance.*
*Photo credit: Dick Bernauer – Moerings Sempergreen*



**OUR URBANSCAPE PREMIUM (PURPLE ROOF CONCEPT) PROVIDED**

**5,000m²**

OF GREEN SPACE

**FOR**

**SKY VIEW PARK – NEW YORK**

## CORPORATE BUILDING SPAIN

Urbanscape Green Roof Solutions totalling 6,800m² have been installed on a major corporate building in Idiazabal, Spain. Due to weight restrictions of the metal building, our lightweight Urbanscape Premium High Green Roof system provided the perfect solution capable of capturing 45 litres of water/m² despite only weighing 70 kg/m².

*"In California from May to October there is not a single drop of water. Wherever possible we integrate storm water, grey water and black water into our designs. Urbanscape's 40% water retention is very attractive."*

Marta Kephart of Rana Creek, our Urbanscape partner for North America's West Coast region

Building fire safety challenges should be eliminated from the start.

# DESIGNING FIRE RISK OUT OF BUILDINGS

"There is no reason why anyone involved in a building project should have to assume responsibility for any potential fire risk when materials exist to mitigate that risk."

Siân Hughes, Director of External Affairs

Buildings and fire safety continue to make headlines around the world. And after every blaze, with depressing regularity, the same questions are raised. Why was the building at risk? Were fire tests sufficient? Was workmanship to blame? And, how can we stop this happening again?

The lessons learnt from previous experiences encourage us to consider fire risk at the earliest stages of any building design. The use of non-combustible materials firstly reduces the possibilities of a fire occuring and secondly prevents fire spreading, keeping fire risk at a minimum.

Take the issue of workmanship, for example. What guarantees are there that a project will not be undermined by careless installation or a lack of experience resulting in a fire?

And what about work after building completion? Facades do not stay pristine, they are constantly altered and a stray drill hole could spark a serious problem.

Then there is the challenge of tests. Recently, questions have been raised about how laboratory tests can truly reflect the safety of materials in real world situations, where the installation is not always carried out by an expert.

There are already enough safety issues around the way contemporary buildings are designed without adding extra fire risk. Taller constructions, lighter cheaper materials, more underground facilities and wider internal spaces have all contributed to the speed at which a blaze and smoke travels through a building compared to a traditional construction many years ago. Fire safety must be designed into buildings from the start.

## CREATING SOLUTIONS THAT HELP – INSIDE AND OUT

### BUILDING FACADES

For the outside building envelope our range of non-combustible Mineral Wool solutions can be tailored to the individual needs of any application. In Europe, particularly, we are seeing more and more stakeholders choosing non-combustible solutions from the start to ensure peace of mind.

### FLAT ROOFS

Flat roof fire regulations vary from country to country. They may fail to cover fire resistance from the inside out and only focus on external sources in some countries, while others demand non-combustible materials in flat roofs of public buildings, such as schools. Fire risk in ceiling voids should be designed out from the start using non-combustible solutions such as our Mineral Wool.

### SAFETY DOORS

Schools, hospitals, hotels and any public building must have safety designed in. Our DRS Fire Board is ideal for fire-resistant doors because its insulation core features high-density Rock Mineral Wool which is A1 non-combustible and delivers supreme fire-resistance performance in the range from 30 to 120 minutes. The board is ideal for components that require high temperature tolerances such as fire screen doors.

### GARAGES AND BASEMENTS

In 2018, a blaze in a UK multi-storey car park destroyed 1,400 vehicles – demonstrating how garages and basements are vulnerable to fire. Our Heraklith Wood Wool offers EN1365-2 A2 class reaction to fire. When combined with our Mineral Wool, it provides a protective fire shield that does not produce burning droplets during a blaze and an attractive appearance that is robust enough to absorb the impact of carelessly opened car doors.

### SANDWICH PANELS

The use of prefabricated sandwich panels in non-residential buildings – such as data centres, logistic bases or warehouses – is increasing. Our OEM division provides customised Rock Mineral Wool PBE insulation cores for sandwich panels that meet the highest possible A1 fire classification and provide excellent fire resistance in the range from 60 to 120 minutes. Tailor-made solutions are available for facades, roof elements and partition walls.

### HVAC SYSTEMS

Heating, ventilation and air-conditioning (HVAC) systems in public buildings must offer the highest fire resistance to prevent a blaze spreading room to room. Certified in line with EN 1366-1 standards and approved by the Association of Swiss Cantonal Fire Insurance Companies, our Fire-teK® insulation solutions have been created specifically for HVAC systems.

# SAFETY AT SEA

Ship owners and specifiers have to juggle countless challenges whether they are building a motorboat, yacht, ferry or cruise ship, but one issue overrides all others – safety at sea. And the most critical issue of all is fire safety.

We have launched a Marine Management Commercial Section and a new range of Sea-teK® solutions designed to provide outstanding thermal performance, contribute to cabin comfort and offer exceptional fire protection.

“Fire safety is a key component of any vessel’s design – especially in the passenger segment – whether it is a small yacht or a massive 6,000-passenger cruise liner,” says Pavol Harmaňoš our Sales & Market Manager Marine.

Our specially developed Sea-teK® range is non-combustible with products certified to A-15, A-30 and A-60 fire resistant classes according to rules and regulations of the International Maritime Organisation.

> *“Fire safety is a key component of any vessel's design – especially in the passenger segment – whether it is a small yacht or a massive 6,000-passenger cruise liner.”*
>
> Pavol Harmaňoš our Sales & Market Manager Marine

# BOOST WELL-BEING WITH BETTER INDOOR AIR

## Good air quality in buildings is vital to health and well-being.

"From the year 1800 to 2000 we've moved from 90% of people working outside to less than 20%."

Russel Foster, Nuffield Laboratory, Oxford University

Itchy eyes, sneezing, fatigue, throat irritation, headaches, coughing, allergies, respiratory diseases and even heart disease. The impact of poor air quality in our homes, schools and workspaces has become a major concern worldwide, known as Sick Building Syndrome.

"Concentrations of some pollutants indoors are often two to five times higher than typical outdoor concentrations," says the Environmental Protection Agency (EPA) in North America.

### AIR POLLUTION CHALLENGES

The EPA says that the very young, elderly and vulnerable people with cardiovascular or respiratory diseases are particularly sensitive to air pollution because they spend more time indoors.

The report by data agency YouGov and Velux® states that the average adult breathes in around 15,000 litres of air every day and that often includes Volatile Organic Compounds (VOCs). "Indoor pollutants have increased in recent decades due to factors such as the increased use of synthetic building materials," says the EPA.

The impact is considerable. A report by the initiative Buildings 2030 says exposure to poor indoor air quality has been leading to lower levels of work productivity and absenteeism through sickness as well as lower attention spans in classrooms. More alarmingly, the World Health Organisation has released figures revealing that 3.8 million people a year die prematurely from illnesses attributable to household air pollution.

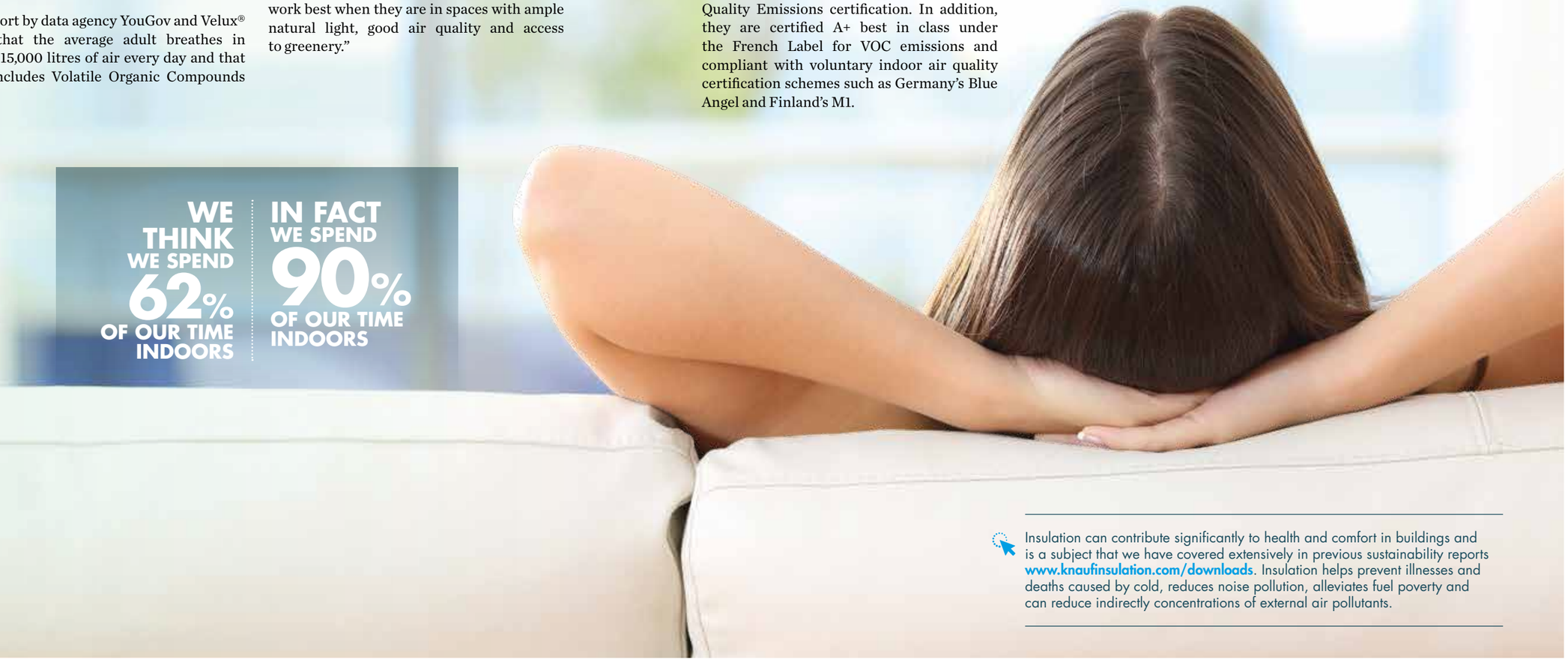
A new World Green Building Council report Doing Right By Planet and People released in April 2018 states: "Employees prefer and work best when they are in spaces with ample natural light, good air quality and access to greenery."

Many countries such as Germany, France, Italy and Belgium are introducing stricter VOC regulatory requirements, while Green Building Rating Systems – including BREEAM, LEED, WELL, DGNB and HQE – are placing more emphasis than ever on indoor air quality.

At Knauf Insulation we have always aimed to contribute to the comfort and health of buildings and their residents through our solutions. In 2009 we launched the first range of Glass Mineral Wool to feature our bio-based binder ECOSE Technology.

### ECOSE SOLUTIONS CERTIFIED 'OUTSTANDING'

Our ECOSE solutions are certified by Eurofins Indoor Air Comfort Gold as an "outstanding material" according to VOC and Indoor Air Quality Emissions certification. In addition, they are certified A+ best in class under the French Label for VOC emissions and compliant with voluntary indoor air quality certification schemes such as Germany's Blue Angel and Finland's M1.




## ECOSE, EUROFINS AND DGNB SUCCESS

Knauf Insulation was the first company to have its Mineral Wool with ECOSE Technology and no added formaldehyde certified Indoor Air Comfort Gold by Eurofins.

Now the Eurofins standard has been recognised by DGNB – the German Sustainability Building Assessment System – the only certification of its kind to be accepted by this system.

Indoor Air Comfort Gold is regarded as Europe's most comprehensive certification for verifying low emitting products of volatile organic compounds (VOCs). The Eurofins certification combines the most stringent criteria for VOC emissions laid down in national regulations, a large number of voluntary labels on VOC emissions and VOC requirements for LEED, WELL, BREEAM, DGNB and HQE.

Insulation can contribute significantly to health and comfort in buildings and is a subject that we have covered extensively in previous sustainability reports **www.knaufinsulation.com/downloads**. Insulation helps prevent illnesses and deaths caused by cold, reduces noise pollution, alleviates fuel poverty and can reduce indirectly concentrations of external air pollutants.

# FUTURE VISION

Our new Knauf Insulation Systems Division combines technological expertise, innovative experience and digital insight to create the bespoke solutions customers will need to face the challenges of tomorrow.

Working in partnership with customers to create innovative future-proof solutions is the driving force behind our new Knauf Insulation Systems Division.

The Division, launched in 2018, brings together cutting-edge technology, innovative research, digital expertise and creative processes from our OEM, Technical Solutions, Urbanscape® Green Solutions and Knauf Insulation Building Science business units to provide a streamlined customer approach to develop the disruptive solutions of tomorrow.

## FOCUSED NEW DIVISION

The new Division is a focused platform of highly experienced specialists in research and development providing the latest digital technology from 3D modelling and printing to fibre-injection moulding and robotic technology.

For our customers technological know-how and digital expertise seamlessly combine to create the innovations they require, but what makes a major difference is the depth of the partnership with Knauf Insulation.

“We listen. We explore and we test options. If necessary we leverage our global knowledge base to find the best solutions,” explains Saša Bavec, the Managing Director for Knauf Insulation Systems Division.

“We are exceptionally proud of our expertise, but for our customers that knowledge is a given. What they want is something that is meaningful and successful for them. That is why we focus on innovative partnerships with our customers to develop the optimal products they need.”

## GROUND-BREAKING TECHNOLOGY

For example, our Knauf Insulation Building Science team has been piloting digital technology that we believe will be ground-breaking for the industry.

By combining real performance metrics with an integrated approach to energy efficiency renovations, the Division will support our customers to deliver better energy efficiency outcomes.

Through a combination of innovation, digital development and continuous customer partnerships, the Division will ensure Knauf Insulation is the number one provider of fire, acoustics and thermal real performance solutions for industry, ships, vehicles, oil rigs, domestic appliances, the green building envelope and any business requiring customised insulation solutions, says Saša.

## CREATING CUSTOMER IDEAS

An important focus of the new Division is also the continuous development of the potential of Mineral Wool to provide sustainable materials for insulation products.

Working directly with customers will always play a crucial role in the new Division. “Bringing customers to experience our expertise and visiting them to really understand their needs is the only way to generate the creative ideas that anticipate future trends,” says Saša.

*“The new Division will focus on innovative non-construction insulation and enable us to create further partnerships with our customers to develop the cost-effective and optimal products they need.”*

Saša Bavec, Managing Director, Knauf Insulation Systems Division

*Mojca Šubic working in Research & Development at Knauf Insulation Slovenia*

Knauf Insulation is exploring creative new ways to tackle the challenge of expensive energy leaks in buildings.

# THE DEVIL IN THE DETAIL

Our Knauf Insulation Building Science team is developing new ways to stop energy draining out of leaky renovated homes. Difficult to insulate areas in buildings which have not been retrofitted properly, known as thermal bridges, can increase both heat loss and the risk of fabric damage with a significant impact on energy use and savings.

Neglected areas in buildings which have not been insulated properly during renovation can create weaknesses, known as thermal bridges, leaking heat out in winter with a negative impact on energy use, money savings and the building fabric itself.

"For anyone who wants a reliable building envelope that saves energy, money, and improves interior comfort over the long term it is essential that major thermal bridges are insulated effectively during renovations," says Ross Holleron, Head of Building Research at Knauf Insulation. "If they are forgotten or ignored their impact on energy use adds up over the years and can cause condensation, damage to the fabric and unhealthy mould growth."

## SOLUTIONS FOR THOUSANDS OF HOMES

To solve this problem, the team has been experimenting with a wide range of solutions at our Visé laboratory in Belgium and on homes in the country's Flemish region.

The results are encouraging. Although there is still more research to do, one local social housing company managing around a thousand homes is already examining the possibility of rolling out our solution across its property portfolio. The potential is enormous and could obviously be scaled up to improve thousands of similarly constructed buildings.

So what did the team achieve in Belgium? As part of a wide ranging review of the social housing company's stock, they narrowed their focus on one of the most common thermal bridges in this era of 1950s Belgium low-rise housing – the awkward, often poorly insulated 'junction' space where a pitched roof meets the top of a ceiling in an attic.

## COMPUTER MODELLED SOLUTIONS

"We took sketches, created computer models and then mapped the flow of heat and the changing temperatures of the thermal bridge," says Ross. "We found a high level of heat loss with an unacceptable temperature factor of 0.25. Anything below 0.7 means there is a higher risk that mould can grow and we found a lot of black mould in the existing trial house even before it had been renovated."

The team built a full scale replica of the thermal bridge in the laboratory and used the findings of the computer modelling to trial a variety of insulation combinations to see which was most effective.

"The social housing company were aware this area was already causing problems," says Ross. "But they had concerns that insulating the surrounding attic floor and external walls, without dealing with this thermal bridge, could make the problem even worse. By developing a practical solution, we aimed to help them unlock the rest of the house for energy improvements."

## UNLOCKING ENERGY EFFICIENCY

After settling on a system that showed the most promise and using Knauf Insulation membranes, tapes, insulation slabs, among other components, it was time to test the system on site.

"This was an exercise in delivering real performance, so we documented carefully everything we did to create a training manual of processes that can be adapted to most building types with this sort of thermal bridge," says Ross. "The process was very encouraging and now we are monitoring the results. Our aim is to now scale up the initiative, to tackle other traditionally ignored hard-to-improve junctions, and ultimately unlock the energy efficiency of as many buildings as possible."

# OUR ECOSE COMMITMENT TO CUSTOMERS

We are building on the success of our bio-based binder with a worldwide roll-out of the revolutionary technology across our Rock Mineral Wool plants.

Our Novi Marof plant in Croatia has been fully converted to ECOSE Technology – an historic moment for our company and a major breakthrough for customers who appreciate the benefits of our ground-breaking bio-based binder with no added formaldehyde.

Novi Marof is the first Knauf Insulation Rock Mineral Wool plant to be completely converted to our pioneering ECOSE binder and follows the conversion of our Technical Solutions range to ECOSE earlier this year and the announcement of our new Rock Mineral Wool plant in France scheduled for 2019.

As well as offering customers in Italy, Croatia, Bosnia and Slovenia the benefits of ECOSE solutions on their doorstep, the conversion marks a significant step forward in a global commitment to customers.

Plans are now well underway to roll out the technology across all our Rock Mineral Wool plants.

This ambitious move builds on the ground-breaking success of our Glass Mineral Wool with ECOSE, which has been revolutionising construction since it was first introduced in 2009.

## ENVIRONMENTAL CARE

Our Mineral Wool with ECOSE Technology contains no added formaldehyde, has no acrylic or artificial dyes and the binder is mainly derived from rapidly renewable materials. It is also certified A+ best in class under the French Label for Volatile Organic Compounds (VOC) emissions.

## EXCEPTIONAL PERFORMANCE

Our Mineral Wool with ECOSE has the highest A1 non-combustible fire classification rating; provides Class A standards for noise control and acoustics and offers exceptional thermal performance.

## INDOOR AIR QUALITY

Our Mineral Wool with ECOSE Technology is certified by Eurofins Indoor Air Comfort Gold as an “outstanding material” according to VOC and Indoor Air Quality emissions certification.

## HANDLING AND INSTALLATION

From colleagues who manufacture our ECOSE solutions to those who install them, we are told that our ECOSE solutions are easy to handle and pleasant to work with.

## GREEN BUILDING RATING SYSTEM CREDITS

Our Mineral Wool with ECOSE is made with up to 80% recycled material and most of our solutions come with Environmental Product Declarations – key factors that contribute to the total rating in Green Building Rating Systems — such as BREEAM, LEED, HQE and DGNB by adding points.

## BOOST FOR SUSTAINABLE BUILDINGS

The ECOSE conversion of our Novi Marof plant is another significant step forward in our mission to make buildings more sustainable. Our Mineral Wool with ECOSE has lower embodied energy than our traditional Mineral Wool.

# THE SKY'S THE LIMIT

## New lightweight affordable rooftop homes offer a creative solution to the challenge of Austria's city housing crisis.

Our Knauf Insulation colleagues in Austria are on a mission to tackle the housing crisis in the country's increasingly overcrowded cities.

In a series of nationwide high-level discussions featuring leading building specialists, architects, construction experts and policy-makers, our Managing Director for Austria, Udo Klamminger, has called for major roof-top development as an innovative long-term solution to urbanisation.

"Urban growth is accelerating at an incredible rate and to accommodate demand for more homes in our cities we are calling for the development of 10,000 rooftops to create 150,000 residential units," he explained.

"Such an ambitious project – using lightweight well-insulated prefabricated modules – would save around 15 million square metres of urban space, maximise the existing building infrastructure and help provide tens of thousands of affordable homes."

Cities are certainly feeling the pressure. The United Nations Population Division expects the percentage of Austrians living in urban areas to increase by over 10% to more than 70% of the population by 2050.

Intense urbanisation is a challenge facing many countries and in Germany proposals to build 1.5 million homes across 100,000 building rooftops have also been the focus of Knauf and Knauf Insulation round-table discussions involving policy makers and the construction industry.

"Unfortunately, like Germany, city space is at a premium in Austria because much of the land is not suitable for major development and what is available is very expensive. Developing residential units on rooftops that are affordable to buy and build will benefit everyone. Our message is to save ground and build higher," said Udo.

This message has been at the heart of the 'Lighter, higher, faster' meetings in the cities of Graz, Linz and Innsbruck organised by Knauf Insulation and Knauf Gypsum which have focused on issues of urban planning, modular construction and densification.

More than a hundred developers, architects, planners and contractors attended the first Austrian event in Graz including director of city planning Bernhard Inninger, leading architects Johann Traupmann and Werner Rebernig as well as managing director of KMH GmbH Otto Ordelt and real estate and asset trustee Gerald Gollenz.

## INSPIRATION FOR HOME-MAKERS

Austria's Mineral Wool Industry Association (FMI) has relaunched its website with a new focus on inspiration for home-makers.

"Through expert advice, technical information and first-person testimonials, the site focuses on how Mineral Wool can contribute to better interior comfort, fire safety and improved indoor air quality as well as saving energy," said FMI chairman and Managing Director of Knauf Insulation Austria, Udo Klamminger.

## RECORD ORDER IN SWITZERLAND

Knauf Insulation in Switzerland has just completed its biggest order ever – 974m³ of insulation for the façade of a new hospital.

Scheduled for completion in 2019 at a cost of CHF240 million, the four-storey Hospital Riviera-Chablais will have a total floor area of 67,000m² and accommodate up to 360 acute care beds.

Urs Maron, our Managing Director for Switzerland, said: "In addition to meeting strict national standards, there were three key reasons why our solutions were chosen.

"Firstly, the outstanding thermal performance of our solutions was highly competitive. Secondly, the client was very appreciative of our sustainability credentials and bio-based ECOSE Technology. And finally, we were able to offer exceptional logistical support."

Requiring more than 50,000m³ of concrete, 6,000 tonnes of steel, 500 tons of air ducts, 70km of distribution networks and 500km of power cables to construct the hospital, the highly regulated building site required precise time slots for deliveries.

"This project is a great tribute to the hard work of our customer service team and sales representative Sebastien Réchal as well as a wonderful reference showcase for Knauf Insulation in Switzerland. Following its success, we are already receiving enquiries for other key developments across the country," added Urs.

# LISTEN AND LEARN

After listening to the challenges facing Russian installers we created the solutions they needed.

**As a result, we increased sales by 20%.**

In Russia our insulation solutions are Youtube superstars. In one video a slab of insulation is attacked by a flamethrower. The insulation fails to ignite. In another clip, a car is driven over a slab. Followed by a forklift truck. The slab springs back into shape.

Another video shows a giant hunting knife slicing effortlessly through thick Mineral Wool. In another, an installer laughs while he squeezes dozens of our rolls into a normal size saloon car.

The videos are entertaining, but have a serious point. We have been listening to the challenges that installers face and have created the solutions they need.

## EXCESSIVE SUMMER DUST

"In Russia the insulation market is driven by installers and they want a working life that is straightforward and comfortable," explains Artem Burtsev, our Marketing Director in Russia.

"They want a rigid product that fits quickly, easily and effectively. They don't want products that fall apart. They want something that is easy to cut, light and easy to transport and is pleasant to install. For example, in summer it can be very hot in Russia and excessive dust during installation is a problem that installers want to avoid."

In Russia we listened to the feedback from tens of thousands of installers and created the specific solutions they needed. We also met them in person.

## DEEPER LEVELS OF CUSTOMER RESPECT

"Russian installers are not interested in PowerPoint sales presentations. If they want information about products they talk to other installers," says Artem. "So, over the past two years we have been visiting thousands of installers and showing them how our solutions can help. We engage with them by jumping on our products or slicing insulation to pieces for installers - not just the technical benefits."

The results have been striking. Our 2017 Russian sales are up by 20% year on year. A team of Installer Ambassadors is providing advice to the installer community and the Knauf brand is gaining deeper levels of respect as a customer-centric company that listens and cares.

"We often use the example of a car. In Russia if you sell a car with a heated steering wheel as standard, you think, 'Yes, winters in Russia are cold, but do I really need this?' And then you get used to it and it's not a luxury or 'added value'. It's what you expect. With insulation it has been the same. We discovered the specific pain-points of installers and gave them the products that made their lives better."

*Listening to our customers in Russia*

# BUILT FOR SPEED

Prefabricated buildings are growing in popularity because they save time, labour and money. SUPAFIL® Max Frame is helping create a new construction revolution.

Imagine an entire home designed and delivered in a few days. An extension fitted to a house in an afternoon or a complete hotel, hospital or a residential tower offering affordable housing finished in just a few months.

Using less labour, taking less time and costing less than traditional construction without compromising quality, modular buildings are becoming a new industry reality, say the companies that build them.

And it is not hard to find striking examples. In North America, Marriott International has said it wants 13% of its new hotels to be modular to cut construction times in half. In the UK, the government is considering increasing the number of modular homes from 15,000 to 100,000 by 2020 to tackle the housing crisis and make homes more affordable and in China a 57-storey prefabricated tower was built in a staggering 19 days.

Knauf Insulation is now actively working with companies that produce modular – or prefabricated – buildings to help shape this exciting new future.

## HIGH QUALITY ACOUSTIC AND THERMAL PERFORMANCE

In Belgium, for example, we are providing Blowing Wool technology and 100 tonnes of SUPAFIL MAX Frame every year to a company called ModuleHome which produces customised prefabricated buildings for commercial and residential customers.

"Interest in this type of building has grown because the modules are high quality in terms of acoustics and thermal performance," says ModuleHome's Boris Heylen. "They can be built quickly using digital cutting technology and transported efficiently. Installation by crane is straightforward and there is no annoyance caused by building works."

## CREATING AN ENTIRE APARTMENT IN THREE DAYS

"We are now investing significantly in increased production capacity because we have plans for a thousand prefabricated apartments in the Belgian region of Wallonia, which means the creation of an entire apartment every three days."

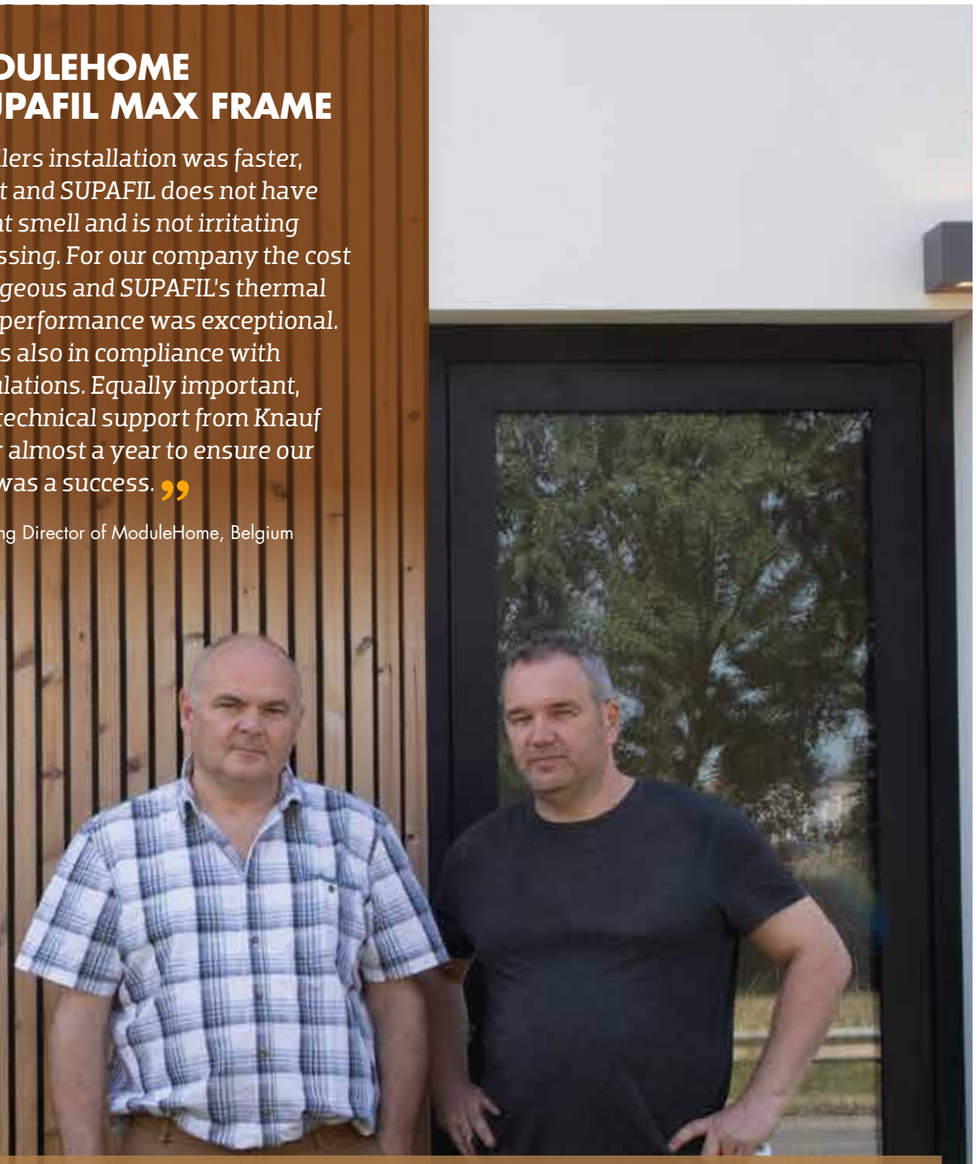
SUPAFIL Max Frame is perfect for ModuleHome's high-speed production because – depending on the level of system automation required – up to 60 to 80m³ per day of insulation can be injection-installed. As only 35kg/m³ is required to achieve a lambda of 0.034W/mK up to one or two bales of SUPAFIL MAX Frame can be processed every hour.

The Blowing Wool can save time in other ways as well. ModuleHome uses our giant 174kg compressed bales which reduces both refill times and truck loads while saving storage space.

## WHY MODULEHOME CHOSE SUPAFIL MAX FRAME

*"For our installers installation was faster, more efficient and SUPAFIL does not have an unpleasant smell and is not irritating during processing. For our company the cost was advantageous and SUPAFIL's thermal and acoustic performance was exceptional. The product is also in compliance with national regulations. Equally important, we received technical support from Knauf Insulation for almost a year to ensure our partnership was a success."*

Boris Heylen, Managing Director of ModuleHome, Belgium



*Module Home: Eddy Mespreuve, CEO of Carbomat, and Boris Heylen, Managing Director of ModuleHome, Belgium*

## SUPAFIL ADVANTAGE FOR 8,000M² RETAIL PROJECT

In 2018 building company Louis de Waele began to work on a 12,000m² multi-purpose commercial space in the Belgian town of Waterloo.

As new pre-fabricated building made up 8,000m² of the project the company turned to Knauf Insulation.

"This was the first time that Louis de Waele used SUPAFIL® Blowing Wool," says François Goffaux, the structural manager of the project for Louis De Waele. "It offered good cost advantages, responded very well in our thermal tests and the end result was A1 fire safe as well as aesthetically pleasing."

Our solution also contributed to the speedy conclusion of the project. For one of the largest retail outlets, which required 30 tonnes of SUPAFIL – or 800m³ – it was possible for SUPAFIL to be installed at a rate of up to 60m³ every day with major wall spaces filled within hours.

For the installers as well, SUPAFIL provided important benefits. "SUPAFIL is quick, easy and safe to install. It is lightweight, fire safe, pleasant to handle, highly flexible and there is no waste," says Pascal Vanhamel, our SUPAFIL installer, from ECO COMFORT.

# GREEN BUILDING RATING SYSTEMS ARE CHANGING, ARE YOU?

2018 proved to be a busy year in the world of sustainable building with new rating systems gaining momentum and more established Green Building Rating Systems (GBRS) enjoying major updates. Here is what's new.

**BREEAM's** UK New Construction Scheme went live in 2018 with an emphasis on the life cycle impact of the entire building and indicators such as transport access and ecology issues.

**DGNB** updated in 2018 with changes including a focus on the circular economy, contributions to UN Sustainable Development Goals, recognition of the Eurofins standard for indoor air quality and integration of most of the European Level(s) framework requirements.

**Fitwel** created in 2017 describes itself as a "low-cost, high-impact" certification to optimise buildings to support the health of people who use them.

**HQE** launched a new version in 2018. There were updates to indoor air quality and hydrothermal comfort sections and the addition of life cycle environmental impact indicators in line with national labelling that shows the positive energy contribution of buildings with a low carbon footprint.

**LEED** is working on v4.1 and launched a beta version to deliver "new methodologies for measuring building performance". The ARC platform allows the performance of LEED certified buildings to be compared.

**Level(s)** framework is a pilot European Commission initiative designed to 'mainstream' the assessment of building sustainability by examining indicators such as full life cycle of buildings, resource efficiency, acoustics and indoor air quality.

**Living Building Challenge** (LBC) emphasises the use of healthy construction materials with a positive environmental impact. The new European Living Future Institute announced in 2018 it was pursuing European market alignment for the LBC tool. Knauf Insulation is a founding sponsor.

**OsmoZ** was launched in France in 2018 and focuses on environmental health such as acoustic health and indoor air quality.

**TOTEM** is a Building Life Cycle Assessment Tool for Belgium and was launched in 2018 using a new Belgian Environmental Product Declaration (EPD) database.

**WELL** version 2 was launched in 2018 with a focus on "advancing health and well-being in buildings".

*Bulgaria's green-build ambition is epitomised by major developments such as the BREEAM-certified Capital Fort business centre, the highest building in the capital of Sofia at 126 metres with 80,000m² of floor space. The building was voted the Best Commercial High-Rise Architecture at the European Property Awards 2017 and features Knauf Insulation products in the façade, partition walls, suspended ceilings and underground garages.*

*The architect Angel Zahariev from A&A Architects, the creative force behind the centre, says easily accessible expertise such as that offered by Knauf Insulation is vital to the industry. "Certainly, information and advice from manufacturers of construction products and systems is very useful in the design and certification process. It is also important that this information is easily available so it can be used effectively."*

## NINE WAYS WE CAN HELP

**1. Mineral Wool's point potential**
Mineral Wool contributes to eight key GBRS areas: maximum points for energy and climate, thermal comfort, acoustics, air quality, life-cycle costing, life cycle impact, construction waste and responsible sourcing.

**2. Our Red List free products**
Our products from the US are Red List free. Third-party verified details can be accessed via sustainableminds.com.

**3. Life Cycle Assessments matter**
DGNB, LEED, BREEAM and Level(s) reward LCAs while new regulation in countries like France will make them mandatory. We have LCAs and Environmental Performance Declarations for the majority of our products.

**4. More focus on indoor air**
Indoor air quality is a focus of many new GBRS and established schemes such as DGNB. Its 2018 version recognises Eurofins indoor air quality standards. Our Mineral Wool is certified to Eurofins Indoor Air Comfort Gold standard.

**5. Acoustic health**
Our Mineral Wool and Heraklith Wood Wool offer exceptional acoustic performance demanded by many GBRS. Our Systems Division as well as our Wood Wool range can provide customised solutions.

**6. Better water use**
Our Urbanscape® Green Roof solution can hold up to 45 litres of water per square metre which helps manage stormwater in heavy rain locations and reduce use in places where irrigated water is precious.

**7. Updated information**
Sustainableminds.com shows how our solutions provide credits in LEED, Living Building Challenge, WELL among others in North America. While the sustainable building section of Knaufinsulation.com shows how our products provide points in LEED, BREEAM, DGNB and WELL. The sites are constantly updated.

**8. Resource use**
The circular economy is a vital factor in most of the Green Building Rating Systems. It's important to us too. Our Glass Mineral Wool with ECOSE uses up to 80% recycled glass.

**9. Team support**
At Knauf Insulation our team of technical specialists can provide expertise for WELL, LBC, DGNB, BREEAM, LEED, HQE and Level(s) among many others.

# SPAIN'S BUILDING AMBITION

New icons such as the world's tallest Passivhaus building are redefining sustainable construction in Spain.

We are providing cutting edge solutions for some of the most prestigious building projects in Spain including the tallest Passivhaus tower in the world.

After years of recession, the country's construction industry is regaining its confidence demonstrated by flagship projects such as Bilbao's 88-metre Bolueta – the tallest Passivhaus on earth – and the 11,000m² Soto de Lezkairu, the first Passivhaus multi-family building in Spain.

## OUTSTANDING PERFORMANCE

Other projects that have generated headlines include the new 4,000-employee Economic Campus for the Government of Catalonia, a 100-room boutique EDITION hotel in Barcelona and a new 6,800m² headquarters for a major international company in the Basque region.

Oscar Del Rio, our General Manager for Knauf Insulation Iberia, says: "We are proud to say that our solutions have been installed in every one of these projects."

"Each building has demanded high standards of acoustic performance, exceptional air quality and outstanding energy saving performance – and we have delivered."

## VALUABLE CREDITS

"Furthermore, our solutions have met the demanding certification standards of LEED, BREEAM, WELL and Passivhaus required by each of these buildings and our use of Life Cycle Assessments, Environmental Product Declarations and recycled material has helped specifiers achieve valuable credits."

These prestigious landmarks also symbolise a growing trend in Spain for the use of Green Building Rating Systems. In 2017, for example, there were 587 buildings in Spain that had been registered with LEED. The country's Green Building Council now estimates that Spain will exceed 650 LEED registered buildings by the end of 2018.

*Escola Massana, Barcelona*
*Architect: Estudio Carme Pinós*
*Ventilated façade with Knauf Insulation's Ultravent Black and Aquapanel*

## 'SUSTAINABILITY IS NOW PART OF EVERYDAY CONVERSATION'

Emmanuel Pauwels is an expert in LEED, WELL and Living Building Challenge. He works for Green Living Projects and Green Living Education in Spain. At present he is working on the new Campus for the Government of Catalonia. This project is aiming for both LEED Platinum and WELL certification.

**What trends are you seeing?**
Sustainability and green building certification have become part of everyday conversation and the number of projects that require certification is increasing. Building well-being and comfort are also increasingly important and there is a clear path towards zero energy.

**How does Knauf Insulation help?**
Insulation is essential to achieve low energy buildings. What Knauf Insulation is offering in addition are products with no added formaldehyde binder technology. Knauf Insulation also has a clear website section providing information about how their products contribute to different green building systems.

# TAKING SUSTAINABLE BUILDING TO NEW LEVEL(S)

Our new Knauf Insulation Experience Center in Slovenia was designed from the beginning to demonstrate our creative approach to the challenges of sustainable building.

Using our company's most innovative solutions – from Urbanscape® Green Roof to Heraklith Wood Wool, Knauf Gypsum, Knauf AMF products and other partner solutions – we challenged ourselves to create the first new built green building in Slovenia to be fully certified by DGNB.

At the same time we took up the unmissable opportunity to contribute research to the European Commission's ground-breaking Level(s) sustainable buildings assessement framework – an initiative that many, including Knauf Insulation, hope will pave the way for future Europe-wide building legislation.

This initiative from the European Commission, Level(s), aims to 'mainstream' building sustainability by unlocking the data needed to understand the environmental, social and economic impact of buildings across their entire life cycle and provide that information in a universally accessible form.

At present only 1% of buildings in Europe are sustainability assessed and those involved in the Level(s) project want this process to become an integral part of the mass market.

Why is this important? In Europe buildings produce 36% of $CO_2$, consume half of all extracted materials, use 40% of Europe's energy and generate a third of all waste. Level(s) could inspire national minimum requirements for sustainable buildings. We believe it is vital to contribute to this initiative and share what we have learned.

In 2018 we held a high-level workshop in Slovenia and invited building experts and members from the European Commission, Green Building Council Slovenia, ERN World Green Building Council, the DNGB Green Building Rating System, Slovenian policy makers and specialists working on the centre.

## WHAT WE HAVE LEARNED FROM OUR LEVEL(S) PILOT

- It is a great teacher: detailed sustainability documentation is required for all products, safety procedures have to be followed meticulously, installer processes have to be best practice and everything must be photographed. There is a lot to learn.
- It is a great showcase: to achieve great results, you need great products that is why we incorporated the best of our solutions – from Urbanscape® to Heraklith – into the building. There are even QR codes on walls revealing the products installed.
- It is a great design challenge: the centre has been a wonderful opportunity to deepen our Building Information expertise using the latest software. To avoid design errors we used virtual glasses to assess interior dimensions.
- It is great to count the cost: Life Cycle Costing is a growing trend as it becomes more important to demonstrate long-term return on sustainable investment. Our knowledge has deepened.

Our new Knauf Insulation Experience Center is playing a key role in a new era of green buildings in Europe.

### OUR PIONEERING APPROACH

*"From the beginning Knauf Insulation has supported our Level(s) work and has been extremely thorough. The center is significant because it is one of the first to contribute to Level(s) and being the first always sends a stronger signal than being the 150th – you are showing others the way."*

**Josefina Lindblom,** European Commission's DG Environment, Unit Eco-Innovation and Circular Economy

### POTENTIAL FOR NEW NATIONAL REGULATION

*"The Knauf Insulation pilot project represents a reality check for the application of new sustainability requirements in our country."*

**Saša Galonia,** Head of Construction Division Spatial Planning, Construction and Housing Directorate at the Slovenian Ministry of the Environment and Spatial Planning

# SUSTAINABILITY DATA IS JUST A TAP AWAY IN NORTH AMERICA

Collecting reliable, independent data about the environmental impact of building materials can be a major challenge for specifiers – especially when they need vital information about a range of solutions from different manufacturers to gain points in Green Building Rating Systems.

Now thanks to an innovative partnership in North America, all that crucial data for our solutions – third-party verified – is available for the first time in one place in easy-to-understand formats.

At sustainableminds.com, specifiers can access all the information they need to make informed decisions about the sustainability of our products as well as use our unique online Project Builder & Library to visualise project requirements – including all relevant environmental data – before editing, saving and sharing that information with colleagues.

## CREATIVE ONE-STOP SUPPORT

We are the first insulation manufacturer in the States to partner with Sustainable Minds and the collaboration marks a major breakthrough for the company.

"Material ingredient and life cycle data can be tough to navigate, especially when trying to align with Green Building Rating Systems," says Scott Miller, our Director of Sustainability at Knauf Insulation North America. "The partnership with Sustainable Minds simplifies this process. You can find everything about Knauf products in one place."

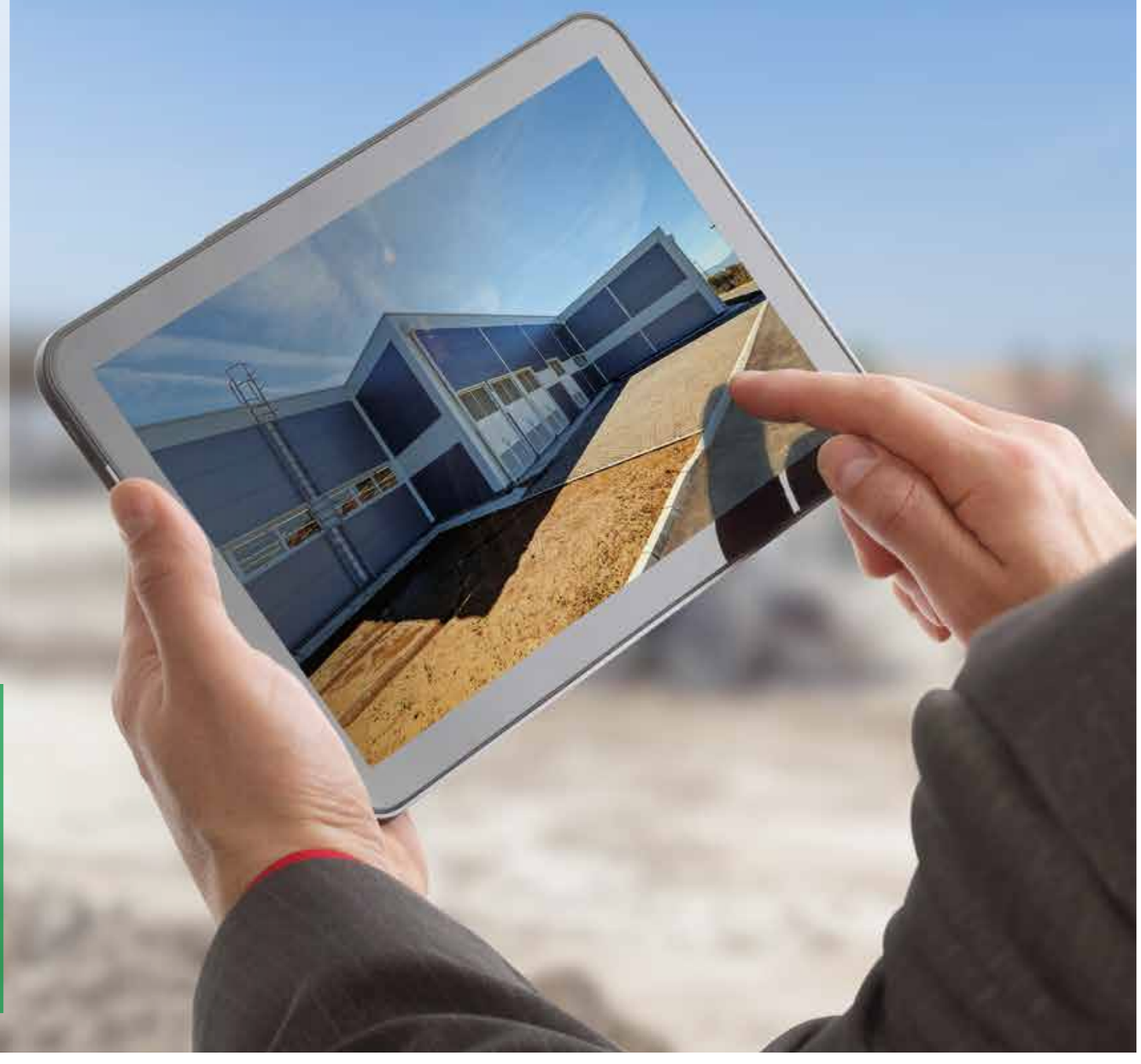
## ALL YOU NEED AT YOUR FINGERTIPS

- All the technical performance information about each of our solutions as well as the advantages of each product, the materials used and all relevant certification are easily accessible.
- The environmental impact of each of our products at every stage of their life cycle – essential for Environmental Product Declarations (EPD) – their material composition and how we are making every stage more sustainable. These Sustainable Minds Transparency Reports are all third-party verified by independent auditors NSF International.
- The impact of our products on health and their Red List status. The Red List is a list of chemicals not allowed in Living Building Challenge certified buildings – our products are Red List free.
- Crucially, sustainableminds.com highlights how each of our solutions can provide valuable credits in LEED Collaborative for High Performance Schools, Green Globes, Living Building Challenge and WELL Green Building Rating Systems.

Visit **www.transparencycatalog.com/company/knauf-insulation** for more details.

*"We remain committed to staying at the forefront of sustainable building practices. We are committed to creating product transparency disclosures for all our solutions to demonstrate our passion for manufacturing sustainable products that make a difference."*

Christopher Griffin, CEO of Knauf Insulation in North America



*"The amount of information Knauf Insulation provides to make Life Cycle Assessment (LCA) results understandable and meaningful is unparalleled."*

Terry Swack CEO Sustainable Minds

## INDUSTRY PIONEER

Offering specifiers clear environmental data about our products in one place in an easy-to-understand format marks yet another sustainability breakthrough for Knauf Insulation.

When we launched ECOSE Technology, our revolutionary formaldehyde-free binder, it was a major step-change for the industry. Since then we have become the first Mineral Wool company to disclose all ingredients through the Living Institute's Declare list.

# THE RISE AND RISE OF BUILDING LIFE CYCLE ASSESSMENTS

Whole building Life Cycle Assessments (LCAs) will transform the industry. We are here to help.

New national regulation, Green Building Rating Systems and European Commission initiatives are now taking a life cycle approach to entire buildings from the sourcing, manufacture and use of every building component to their ultimate disposal.

At Knauf Insulation we have used Life Cycle Assessments (LCAs) for our solutions for many years and we produce Environmental Product Declarations (EPDs) that document their environmental impact at every stage. So, when it comes to understanding information for full building LCAs, we can help.

## LCAs FOR ENERGY USE AND $CO_2$ IN FRANCE

Full LCAs of a building's energy consumption and $CO_2$ will be mandatory for the country's 2020 Building Code and EPDs are compulsory for products that claim to be environmentally responsible. These details *Fiches de Données Environnementales et Sanitaires* or FDES are stored in INIES and BDR online databases where all FDES are available .

**How we can help:** Updated FDES for Knauf Insulation solutions are available on the INIES database and can be already utilised during the pilot phase of E+/C- labelling (*énergie positive/réduction carbone*).

## MANDATORY BUILDING LCAs IN GERMANY

LCAs for federal public buildings are mandatory using the *Okobaudat* LCA indicators database and the BNB Assessment Scheme. The database is also used by DGNB the German Sustainable Building Council (*Deutsche Gesellschaft für Nachhaltiges Bauen*).

**How we can help:** Our EPDs are created by the IBU organisation which has a direct link with Okobaudat enabling information to be easily accessed.

## CALCULATING ENVIRONMENTAL IMPACT IN THE NETHERLANDS

Full LCAs are mandatory to assess a building's environmental impact in order to get a building permit in The Netherlands. Since 2018 maximum thresholds of environmental impact – per square metre – have also been published.

**How we can help:** Our Environmental Product Declarations are available on the Dutch national environmental database (NMD) offering instant insight into the impact of our solutions.

## 2025 DEADLINE IN FINLAND

The country has promised mandatory building LCAs by 2025 at the latest.

**How we can help:** Our green teams can provide EPDs for our products as well as building LCA expertise.

## SUBSIDIES FOR BUILDING LCAs IN AUSTRIA

Subsidies are allowed if an LCA is carried out for buildings and a reference target is achieved. LCA data is available via the *Baubook* database.

**How we can help:** Information about our Wood Wool Heraklith products, for example, is available on *Baubook*.

## NEW LCA TOOL LAUNCHED IN BELGIUM

TOTEM was launched in Belgium as a tool to calculate the environmental impact of construction elements and entire buildings across their life cycle.

**How we can help:** Our EPDs will be linked to the new Belgian EPD database.

## PROJECT FOR EUROPEAN CHANGE

The Level(s) pilot project to assess the sustainability of buildings across their entire life cycles was launched by the European Commission in 2017.

**How we can help:** We are contributing research to the project through our new Knauf Insulation Experience Center in Slovenia.

## BUILDING LCAs & GREEN SCHEMES

For some criteria, DGNB requests the life cycle environmental impact of an analysed building to be compared with similar buildings with reference values. Points are awarded for improved performance. HQE rewards the use of building LCA tools such as Elodie that makes it easier to perform a building LCA, while LEED and BREEAM ask for LCA building criteria to be compared with a baseline building. Need help to understand what this means for your project? Contact our green teams at **www.knaufinsulation.com/addresses**.

# CIRCULAR ECONOMY IN ACTION

The building and construction industry uses half of all new resources and generates more than a third of all waste in the European Union. The building chain has an imperative to stop and reverse this unsustainable trend. At Knauf Insulation we are focusing on better resource use through reduction, reuse and recycling.

## RAW MATERIALS AND SECONDARY MATERIALS

**Sustainable wood:** Heraklith Wood Wool materials are sourced from mostly Forest Stewardship Council (FSC) woods which are managed sustainably.

**Saving trees:** In the UK we've trimmed the weight of our wood pallets by around **2kg** per pallet – saving approximately **5,000 trees** a year.

**Great suppliers:** We work with our suppliers to ensure the best quality materials from sustainable sources and ISO 14001 standards.

**Recycled glass:** Our Glass Mineral Wool is made up of **80% recycled glass**.

**New glass plant:** A new recycling facility next to our UK St Helens site annually recycles **350 million household bottles** into insulation. The Knauf Insulation/Veolia venture will also save **375,000 miles** in transportation.

**25% recycled rock:** At our Nova Bana plant in Slovakia a quarter of the raw materials used are constituted of recycled steel slag.

## CONSTRUCTION PRODUCTS MANUFACTURING

**Reduced energy:** In 2017 our energy use was down by 20.6% and $CO_2$ emissions were reduced by 20.7% compared to 2010.

**Zero waste:** We aim to reduce waste to landfill to zero across our company by 2020. Since 2010 we have cut our landfilled waste by **64.9%**.

**Less packaging:** Since 2014 we have used thinner film, reducing consumer waste by **27%**.

**Sustainable standards:** International Management Standards at production sites: ISO 9001 (Quality Management), ISO 14001 (Environmental Management), ISO 50001 (Energy Management) and OHSAS (Health and Safety Management).

## MANUFACTURING WASTE

**Recycled board:** When multi-layer boards are damaged, we cut out and recycle the different elements.

## TRANSPORT

**Reduced distance:** We cut transportation distances. For example at our Tyumen plant in Russia we sourced suppliers just 30km from the plant and increased our storage to reduce deliveries.

**Train gain:** In the Czech Republic, we switched from road to rail and saved **424 tonnes** equivalent of $CO_2$ in the first 15 months.

## VALORISATION/BY-PRODUCTS

**Ceiling tiles:** In just three years we **doubled** the amount of end-of-line secondary material from our Glass Mineral Wool plants that is being re-used by our sister company Knauf AMF to make ceiling tiles.

**Wonder Wool:** Thermo 046 Blowing Wool produced at our Lannemezan site is created from recycled end-of-life ECOSE Mineral Wool.

## CONSTRUCTION AND DEMOLITION

**Going Dutch:** We support De Groot Vroomshoop, a Dutch prefabricated building company, reusing waste insulation off-cuts. Material is compressed, valorised and 'downcycled' into secondary insulation for bricks.

**Recycling support:** Using online guides, we work with the European Insulation Manufacturers Association to promote the recycling of Mineral Wool from buildings to be deconstructed.

**Insulation reuse:** In New Zealand, we supported a project to insulate homes using off-cuts from demolition sites.

**Sandwich success:** A new wall system, ECO-SANDWICH in Croatia, uses our Mineral Wool with ECOSE in addition to recycled demolition waste.

**Trim back:** At our Skofja Loka site in Slovenia, the plant reuses up to **7%** of Rock Mineral Wool trim returned from customers.

## RECYCLED SUCCESS

Three key figures highlight how innovative resource use is helping us drive our circular economy success:

**85%** of the materials used to create our bio-based ECOSE binder is derived from rapidly renewable materials

Up to **80%** of recycled glass is used in our Glass Mineral Wool with ECOSE Technology

Since 2010 we have reduced our waste to landfill by **64.9%**

## SAVING FUTURE ENERGY

Today a unit of energy used to manufacture a typical Glass Mineral Wool product **saves 570 units** **in its 50-year use phase. In 2008 one unit saved 489 units – that's 16% more today compared to 10 years ago.**

## LIFE CYCLE ASSESSMENTS

*"We are seeing growing awareness of what actually makes a sustainable building. Schemes are placing more emphasis on the whole life cycle of buildings — and the products they use — and more importance on issues such as circular economy, well-being, life cycle costing, water use, comfort and indoor air quality. Until recently, the focus was on the use phase of a building with, for example, data about water and energy use. Now data about the environmental impact of construction products during their production, installation and future removal is absolutely essential."*

Jean-Pierre Pigeolet, our Products and Buildings Sustainability Manager.

# LESSONS IN SUSTAINABILITY

Our Group HSE Manager for Performance, Environment & Sustainability Philippe Coune has overseen our sustainability progress since we first set our 2020 targets in 2010. We asked him to provide an honest assessment of our journey so far.

*Philippe Coune, Group HSE Manager for Performance, Environment & Sustainability*

### WHAT HAVE WE LEARNED SINCE 2010?

Sustainability is a process of continuous improvement and requires everybody's expertise and involvement. We have to constantly find new ways to drive change and keep sustainability at the heart of everything we do. Setting targets is just the start – maintaining continuous momentum is the key to success.

### IN WHAT WAY?

For example in 2016 we achieved our target of reducing energy use by 20% – four years before our 2020 deadline. We have gone far beyond the easier 'low-hanging fruit' consumption reductions by investing in new machinery, techniques and processes.

### BUT THERE HAS BEEN A SLIGHT INCREASE IN ENERGY USE FROM 2016-7

There has been a 0.2% increase. However, we have been running at maximum capacity, increasing the quality of our products and we are testing the results of new investment. Energy saving is always a step-by-step process where results plateau and then jump forward. We do a project, learn about it and if it does well we invest in other plants. The fact that we have reduced our emissions without real energy increases shows we are running at a high level of efficiency. So this means we obviously face new challenges in the future.

### WHAT HAVE BEEN THE SUSTAINABILITY HIGHLIGHTS OF 2017?

From 2016 to 2017 we have seen a decrease of 22% in the amount of waste sent to landfill. This represents almost 10,000 tonnes of waste that have been valorised and around 300 fewer truck trips to landfill sites. Now we are sending 64.9% less to landfill than we did in 2010. Still, achieving our target of zero waste will be a challenge. I'm convinced we will need the help of others – companies that can use our waste and support from the authorities as well as regulation – to create the virtuous cycle required to take a major step forward.

### WHERE WERE THE MOST WASTE GAINS ACHIEVED IN 2017?

Across our Rock Mineral Wool plants, waste has fallen by 25% as a result of better recycling techniques for the improved use of production residue. Our team in North America has achieved great success, but recently their waste recycling partner decided to stop using our material. Now our teams are searching for new solutions — which proves that you can never become too comfortable with the success of your waste management.

### THERE HAS ALSO BEEN A HUGE DROP IN SOx AND NOx EMISSIONS. WHY?

Our SOx emissions have been reduced by increasing the efficiency of our abatement system and the improved selection of raw materials. The decrease in NOx has been achieved by improving the efficiency of the melting technology with new equipment, improved settings and better plant maintenance planning.

### WHAT WOULD YOU SAY TO PEOPLE WHO ARE CONCERNED ABOUT EMISSIONS FROM OUR PLANTS?

When we carry out any health study we always use the maximum allowed emission level as a worst case scenario. Our values always fall well below these levels because we believe that better process efficiencies provide the best for our communities and employees.

### KNAUF INSULATION IS ALSO CERTIFIED TO FOUR KEY MANAGEMENT STANDARDS

All our sites are certified to ISO 9001 standard for quality management; ISO 14001 for environmental management; ISO 50001 for energy management and to OHSAS 18001 for health and safety management. The standards are all voluntary but internationally recognised as independently verifying a company's performance claims. In 2010 we became one of the first companies in our sector to achieve all four ISO standards for our organisation and all our plants in Europe, North America, Russia and CIS.

### AND HOW DOES KNAUF INSULATION ENSURE A SUSTAINABLE SUPPLY CHAIN?

We have a supply chain approval and management process to make sure suppliers commit to low environmental impact – ensuring raw materials are extracted in a responsible manner and respect communities. We want to see this process carried out by workers who have fair salaries and support strong anti-pollution and waste management measures. We are now planning to develop this process further.

### HOW WILL KNAUF INSULATION'S NEW PLANTS CONTRIBUTE TO THE COMPANY'S SUSTAINABILITY JOURNEY?

Our new Rock Mineral Wool plant scheduled to open in 2019 will represent the epitome of the cutting-edge technology we have developed over the years to ensure zero waste and outstanding energy efficiency. We are also examining the installation of solar panels as well as our Urbanscape® Green Roof Solution – every small energy saving can add up to a big difference – as well as developing a system that can share extra heat with nearby buildings.

## ENERGY-SAVING MINDSET

*"Forklift drivers, managers, operators... everyone's attention is being focused on saving energy. In recent years, we have made a major difference to energy savings through capital expenditure but now we have audited data that allows us to analyse the areas of our plants where we can make further consumption gains. Through this regression analysis, training, dedicated energy-saving champions in each plant and awareness raising, we are working on changing the mindsets that can make a real difference."*

Berin Onur, Knauf Insulation's Group HSE Manager, Energy

# OUR SUSTAINABILITY **JOURNEY**

## 2017 has been a year of creative sustainability success despite the challenge of our plants working overtime to meet market demand.

Knauf Insulation is riding a huge wave of success with demand for our products at an all-time high.

Positive market conditions, experimental production processes and new innovations to improve product quality have all combined to ensure our sites have been running at maximum capacity.

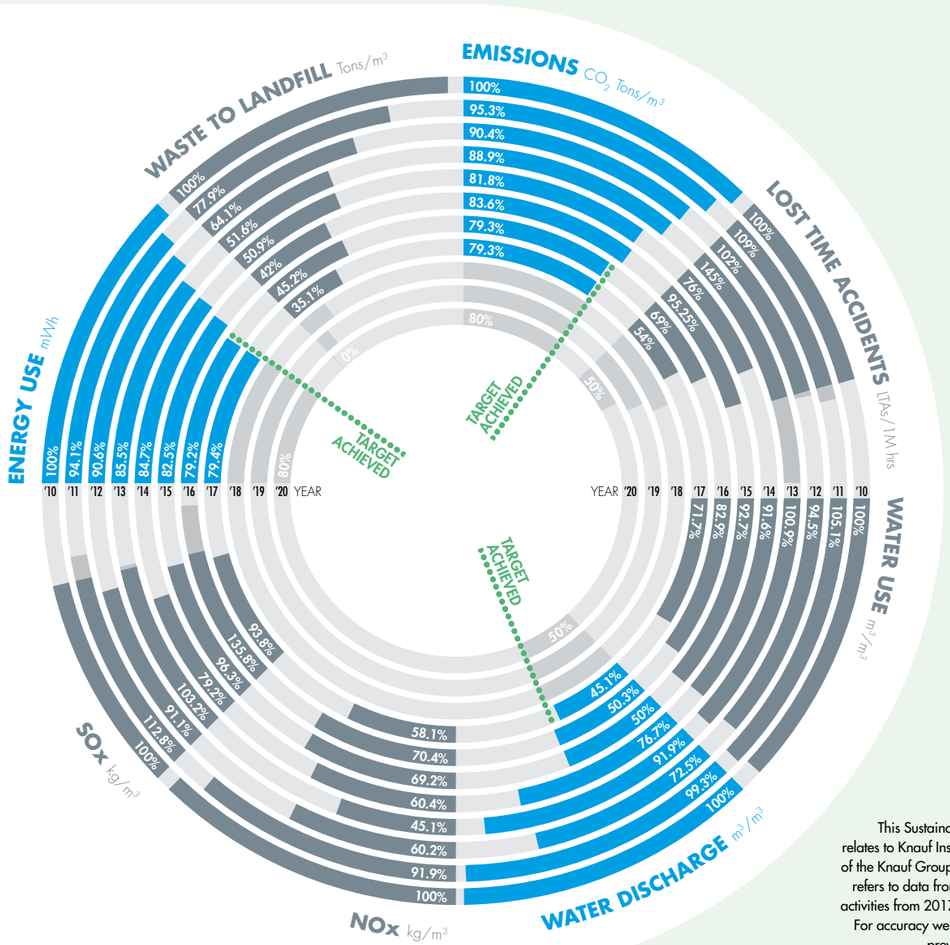
### SO WHAT HAS BEEN THE IMPACT ON OUR SUSTAINABILITY RECORD?

In a word, minimal. Energy use is up 0.2% compared to 2016 and emissions remain static. However, most importantly, both 2017 figures remain within the targets we set ourselves in 2010, which were to cut both $CO_2$ emissions and energy use by 20% by 2020.

Our energy use in 2017 was down by 20.6% and $CO_2$ emissions were reduced by 20.7% compared to 2010.

And despite our plants working overtime, we sent 64.9% less to landfill in 2017 than we did in our baseline year thanks to a 10.1% annual decrease.

Year on year SOx emissions were reduced by 42% and NOx cut by 12.3%, our water use was down 11.2% and our water discharge has been decreased by 5.2%.




This Sustainability Report relates to Knauf Insulation, part of the Knauf Group. This report refers to data from 2017 and activities from 2017 and 2018. For accuracy we may amend previous figures.

# UNITED NATIONS SUSTAINABILITY DEVELOPMENT GOALS AND KNAUF INSULATION


Countries of the United Nations have adopted Sustainability Development Goals which are designed to end poverty, protect the planet and ensure peace and opportunity for all.

At Knauf Insulation we believe that working towards these goals will make the world a better place. Why? Because they provide concrete targets designed to inspire everyone from companies and individuals to public organisations and governments. Having goals sets clear targets and clarifies measurable success. The UN describes the goals as the "world's to-do list". There is a lot to do and we want to help.

### GOOD HEALTH AND WELL-BEING

We create insulation solutions that enhance building comfort and contribute to improved acoustic health and air quality.

### INFRASTRUCTURE INVESTMENT

We campaign for the energy-efficient renovation of existing building stock to be considered as infrastructure investment.

### REDUCED INEQUALITY

Our public affairs team campaigns to reduce the fuel poverty that impacts 11% of Europeans.

### SUSTAINABLE CITIES AND COMMUNITIES

Our solutions improve the sustainability of cities and communities by making buildings more energy efficient.

### RESPONSIBLE CONSUMPTION AND PRODUCTION

We aim to do more with less. Our Glass Mineral Wool, for example, is created from up to 80% recycled material.

### CLIMATE ACTION

Our solutions save energy and curb emissions. We have also reduced our own $CO_2$ emissions by 20.7% since 2010.

### PREVENT DEFORESTATION

Heraklith Wood Wool material is sourced mostly from woods audited by the Forest Stewardship Council.

### ACCOUNTABLE INSTITUTIONS

We are committed to fair competition, ethical and lawful conduct and will not tolerate discrimination, corruption or bribery.

### FORGE PARTNERSHIPS TO ACHIEVE GOALS

We work with policy makers and non-profit organisations to promote the creation of better sustainable buildings.

# JOB SUPPORT FOR REFUGEES

Our Skofja Loka plant in Slovenia has been creating jobs for refugees from Syria and Afghanistan.

Tomaž Lanišek, General Manager OEM Europe & CIS, says the situation is a win-win for everyone. "We provide a regular income and sustainable future opportunities and in return we are able to fill important production positions with diligent, motivated and quick learning people."

Roshan, who fled from Afghanistan to Slovenia seven years ago when he was 16, says: "My colleagues immediately made me feel welcome and appreciated. They didn't realise I was a refugee at first, they thought I came from China or Korea. Now we understand each other very well, we've become friends and sometimes socialise after work."

In addition to Roshan, the 400-employee site also provides work for seven asylum seekers from Syria.

The placements, via a local employment agency, have helped forge better understanding between cultures. "We are all human after all," says Roshan. "We all breathe, we all have hearts and feelings."

Brane Parazaja, manager of the Naton job agency, says: "Nationally there is a critical shortage of people who are willing to work in production. We want to offer those housed at refugee centres the chance to have a better life and better opportunities to integrate."

# PRINCESSES, BEARS AND WITCHES

Once upon a time, in a Knauf Insulation plant far, far, away there was a production Operator called Gareth who liked to dress like a princess and a Warehouse Supervisor called Craig who wanted to be a fairy. Their friends Sarah and Laura dreamed of being wicked fairy godmothers and furry bears.

So, when the Cwmbran colleagues were invited to put on a fairy-tale show for Tŷ Hafan children's hospice, they jumped at the chance. Laura Iwanski, Cwmbran's plant coordinator, said: "The children were eight and under and we had a lot of fun. Some watched from beds and wheelchairs, but we all made it work."

The hospice provides end-of-life care for youngsters and is one of four charities selected as part of the plant's new annual Community Matters initiative set up by the site's 12 Values Ambassadors. In addition to Tŷ Hafan, the plant supports the Hospice of the Valleys which provides adult palliative care, Tŷ Nant Ddu Resource Centre which works with learning disabilities and Hope Rescue, a charity that rehouses stray dogs.

During the 2018 summer shutdown to replace Cwmbran's furnace, colleagues also helped out at charity shops and carried out gardening and painting work for local groups.

In June, two teams took part in the 'Three Peaks Challenge' to climb the highest mountains in Wales to raise funds for Tŷ Hafan and in March, Terry O'Neil, an Engineer at the plant, raced 2,500km across India in a rickshaw for Alzheimer's Research UK and Cool Earth.


# COMMUNITY NEWS

## FAMILY DAY

More than 40 youngsters joined their parents for a Knauf Insulation family day at our Simbach plant in Germany on July 6. In addition to tours of the plant, guests enjoyed face-painting, a bouncy castle, music and a barbecue.



## ECO-EXCITEMENT

Knauf Insulation once again sponsored the Days of the City event at Novi Marof in Croatia in June 2018. Pride of place was given to an ECOSE Technology 'Children's Eco-Corner' where more than a hundred youngsters enjoyed playing with natural building materials during specially organised creative workshops.

## MAORI DIY

Knauf Insulation is supporting a programme to renovate Maori community centres in New Zealand known as Marae. We are supplying ceiling and wall insulation for the renovations which are being featured in the television series Marae DIY.

## LAKESIDE FUN

Colleagues and their families at Knauf Insulation Serbia enjoyed a special summer family day out at Vlasina Lake on September 9 complete with tours of our Surdulica plant, boat trips, archery, football, badminton and even a fish soup cooking competition.

## WASTE RESEARCH

The brick company Heluz is trialling the use of our production waste in its manufacturing process following a collaboration between our Krupka plant and the University of Jan Evangelista Purkyně in the Czech Republic. We are working on research with the university to find ways to reduce, recycle and reuse secondary material from the Krupka site.

## WORLDS APART

The 2017 solar eclipse was the star of a Knauf Insulation family day held at our Silvercote base in Greenville, South Carolina, North America on August 21. The Silvercote office was transformed into a galaxy-themed viewing location complete with Moon Pies and Star Crunch food treats. Special eclipse viewing glasses were also provided.

## CAREER HELP

Knauf Insulation recently took part in the Rottal-Inn career fair in Germany where visitors to our stand could discuss job opportunities at our Simbach plant with members of our team.

KNAUF INSULATION


## Knauf Insulation Manufacturing Facilities

- MINERAL WOOL
- WOOD WOOL
- LAMINATION
- FABRICATION SHOP
- Planned for 2019 and 2020

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RUE DE MAESTRICHT 95, 4600 VISÉ, BELGIUM
CONTACT@KNAUFINSULATION.COM
**WWW.KNAUFINSULATION.COM**