



British Lime Association

Fifth sustainable development report

December 2015



Foreword

This is our fifth sustainable development report as the British Lime Association and we are extremely proud of the progress we have made so far. As an industry, we have continued to invest heavily through very challenging economic conditions to make UK lime production both efficient and sustainable. At present, annual UK lime and dolime sales are approximately 1.25 million tonnes, which is 20% below the pre-recession levels.

Lime producers have made some significant and beneficial changes to the lime manufacturing process. From introducing systems that use waste heat to power the plant to constructing anaerobic digesters on site, the industry is finding new, innovative ways to reduce its environmental impacts.

The UK lime industry has also made great progress in health and safety in recent years. As part of a dedicated working group, producers collaborate and share knowledge of common incidents and best practice throughout the industry, towards a target of zero incidents every year. Whilst there is still work to do, we are fully committed to achieving this.

The coming years will be a fragile stage in the industry's recovery, particularly with the perilous state of the steel industry, the largest single sector that uses lime. It is important that the UK government supports home grown, historic sectors such as ours which utilise the natural resources in a sustainable way, creating wealth and contributing to GDP. For lime, continued recovery of UK construction and manufacturing is essential.

EU ETS reform is the other significant threat to the lime industry. The post 2020 EU ETS should be reformed so that full carbon leakage protection is given to the best performers in the absence of a robust, and fully implemented, global climate change commitment. In addition, there needs to be the provision for the compensation of increasingly important indirect costs of EU ETS in electricity prices.

All these issues will pose huge challenges. We stand ready to face these but the Government must play its part in supporting this vital local industry by reducing the regulatory burden to enable us to remain competitive. We shall continue to work together to further reduce our environmental impacts, operate sustainably and ensure all of our employees are safe, year-on-year.

Richard Stansfield, Chairman, British Lime Association

KEY ACHIEVEMENTS

There are two types of lime made in the UK; high calcium lime and dolomite. High calcium lime is produced from burning limestone or chalk, which is calcium carbonate (CaCO_3), at temperatures of up to 1400°C in either a vertical kiln or horizontal rotary kiln.

Dolomite is produced from burning dolomitic limestone, which consists of CaCO_3 and MgCO_3 , at temperatures of around 2000°C in long rotary and preheater rotary kilns.

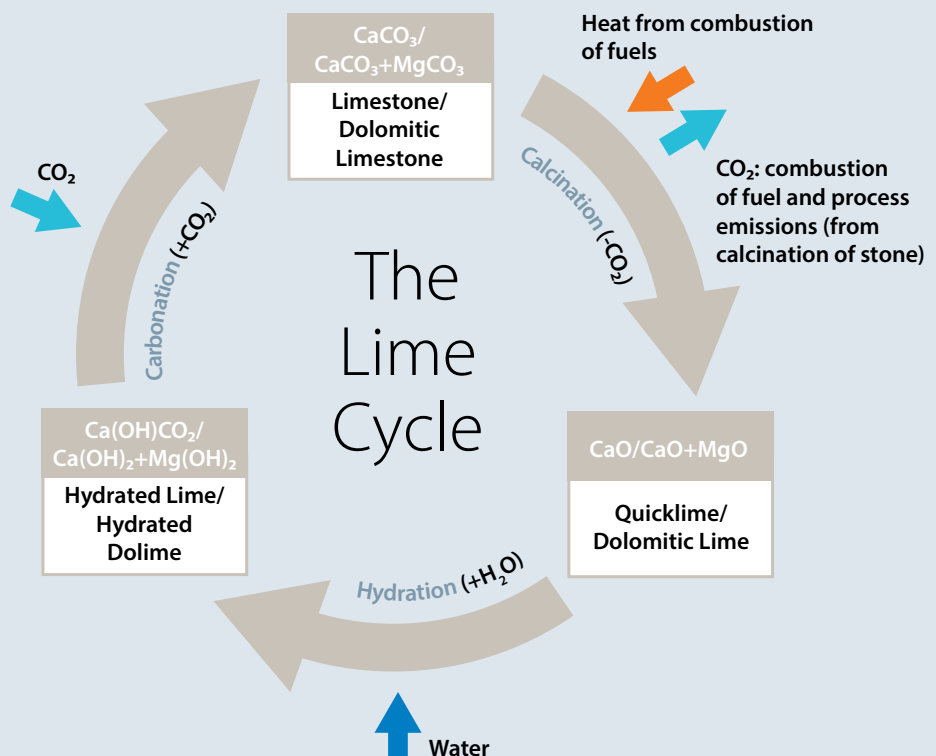
The key performance indicators related to the production process have been separated into the two types of lime in this report, due to the substantial differences between the two methods of manufacture.

| KEY ACHIEVEMENTS RELATIVE TO 2011 BASE YEAR | |
|---|---|
| ✓ 86% | Reduction in SO_2 emissions for high calcium lime production |
| ✓ 49% | Reduction in total waste for lime disposed to landfill |
| ✓ 48% | Reduction in NO_x emissions for high calcium lime production |
| ✓ 46% | Reduction in Point Source Dust emissions for dolomite |
| ✓ 40% | Reduction in overall Lost Time Incidents |
| ✓ 29% | Reduction in CO_2 emissions for dolomite production |
| ✓ 20% | Increase in waste-derived fuel for dolomite production |

CO_2 EMISSIONS

When limestone, chalk (CaCO_3) or dolomitic limestone (CaCO_3 , MgCO_3) rock is heated to high temperatures inside a kiln a chemical reaction is triggered, which releases carbon dioxide (CO_2) from the rock. The released carbon dioxide is called 'process CO_2 ' and makes up around 75% of the CO_2 generated from high calcium lime production and 53% from dolomite production.

Over its lifetime, lime reabsorbs CO_2 from the air around it. This natural process is known as carbonation and closes the link in the lime cycle.



CARBON MANAGEMENT

CO₂ mitigation and energy efficiency measures

All BLA members participate in UK and European carbon and energy efficiency schemes as well as holding environmental management certification. They have invested heavily in energy efficiency measures and process optimisation and in the last year alone, lime producers have spent over £6 million on improvements to their manufacturing process for environmental gain.

Where possible, alternative fuels are used to

replace fossil fuels. In 2014, the dolomite industry substituted 51% of total fuel used for production with alternative fuels derived from waste products. This is the highest level of fossil fuel replacement seen in the UK lime industry so far and reflects the commitment by the industry to reduce its reliance on fossil fuel sources as much as is technically possible.

One major restriction the lime industry experiences with fossil fuel replacement is

the high quality specification required for products that are used for pharmaceuticals and drinking water purification. This means that high calcium lime producers are technically constrained to using only the cleanest, highest quality fuels. Producers will continue to research and develop possibilities for fuel replacement in the future, that do not compromise the quality of their end-products.

CASE STUDY

Anaerobic digestion

Following on from the commissioning of a recently completed 1.5MW anaerobic digestion (AD) facility by Singleton Birch's Melton Ross lime works in Lincolnshire, the plant has been expanded with the addition of a digester drier powered from the waste heat generated by the eight on-site engines. The drier will take digesterate and dry it to make a better flowing more manageable digesterate product for distribution onto the land by local farmers.

The facility was officially opened on

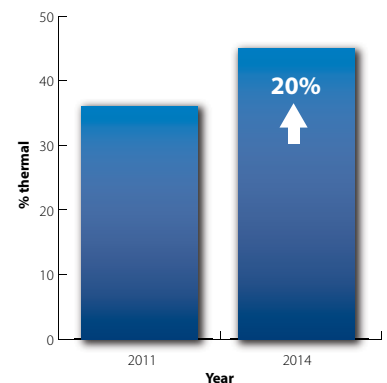
the day of the company AGM by Lord Haskins, Chairman of the Humber LEP.

The company embarked on the project as part of its sustainability strategy to control energy costs, reduce carbon footprint and reduce reliance on grid electricity.

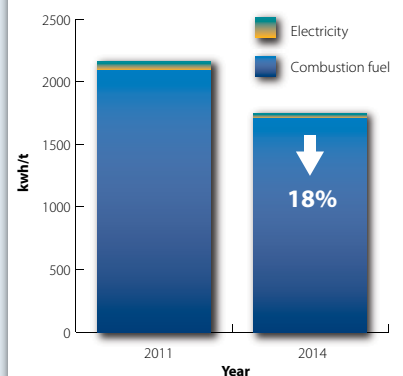
The facility has been project managed in-house by the Singleton Birch project team and constructed to the company's usual exacting standards. The key contractors were selected following a process of competitive tender and due diligence.



Waste-derived fuel use as a percentage of total fuel – dolomite manufacture only (% thermal)

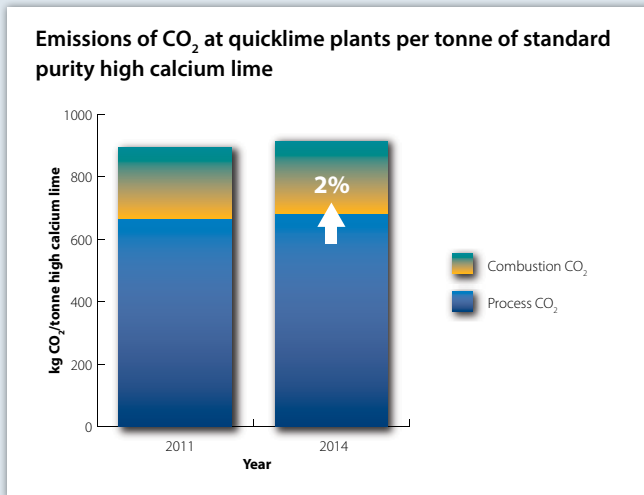


Combustion fuel and electricity use per tonne of dolomite manufactured



CARBON MANAGEMENT

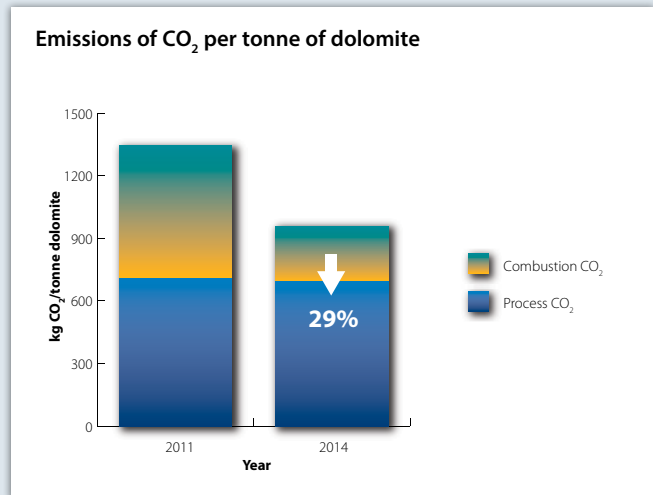
High calcium lime



Total CO₂ emissions have increased by 2% between 2011 and 2014. Whilst combustion emissions remained fairly stable, process emissions have increased slightly due to natural variations in the carbon content of the stone.

Improvement actions taken at a lime plant at Hindlow in Derbyshire, including the automation of the kiln controls, kiln charging modifications, quality control checks and improved reliability of the burners/lances have helped the plant achieve a 4% reduction in fuel consumption and subsequently lower CO₂ emissions.

Dolomite



CO₂ emissions have decreased by 29% in total. This is very encouraging and is a direct result of positive changes to the dolomite manufacturing process (see case study below).

CASE STUDY

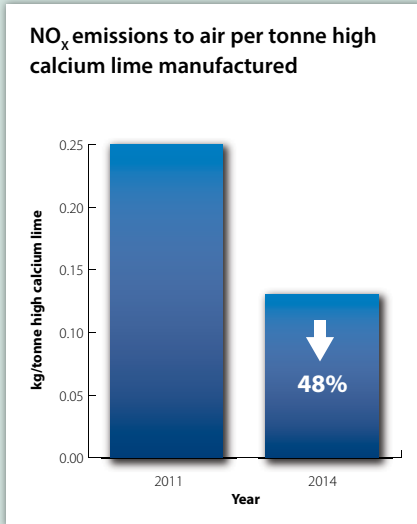
Dolomite energy improvement through technical innovation

The conversion of a long rotary kiln (LRK) to a preheater (PRK) type unit has achieved a reduction in energy per tonne from 10 to 6GJ/t at a Lhoist dolomite plant at Whitwell in Derbyshire. The increased fuel efficiency has allowed the business to produce more products whilst using less energy to complete the process along with lower CO₂ emissions and reduced production times.



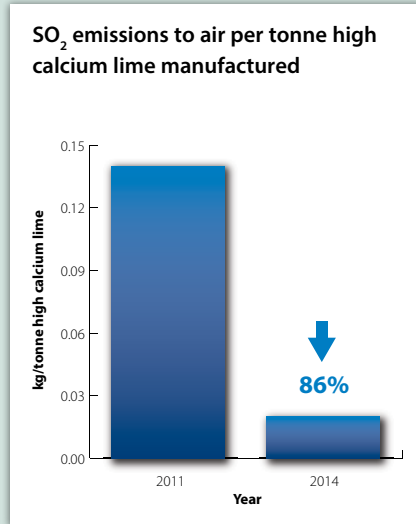
EMISSIONS TO AIR (excluding CO₂)

High calcium lime



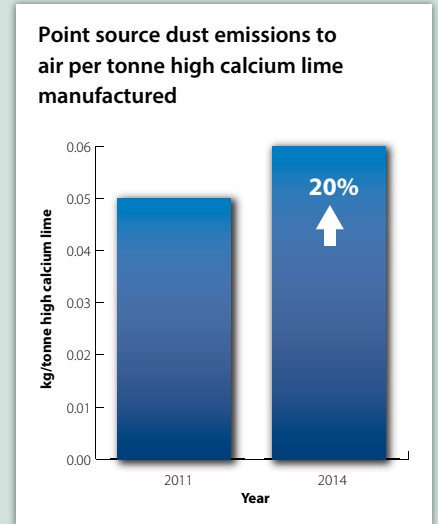
Oxides of nitrogen (NO_x) emissions

NO_x emissions have decreased by 48% between 2011 and 2014. Once again, the change away from less efficient rotary kiln (more heat energy and particulate emissions) has been one of the key factors. All production emissions are governed by the Industrial Emissions Directive and thus obtaining environmental permits is based on a commitment to Best Available Technique improvements for the lime sector as outlined in this directive. Crucially, all site emissions remained below the permitted limits for lime plants, as regulated and audited by the Environment Agency.



Sulphur dioxide (SO₂) emissions

Encouragingly, SO₂ emissions generated from high calcium lime manufacture have decreased by 86% since 2011. This is as a result of the sector actively managing emissions and making changes to its manufacturing processes to achieve noteworthy reductions.



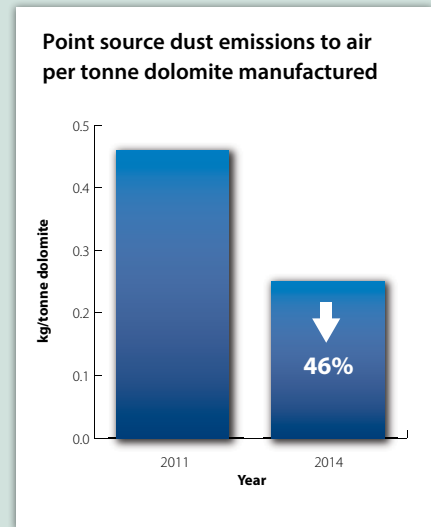
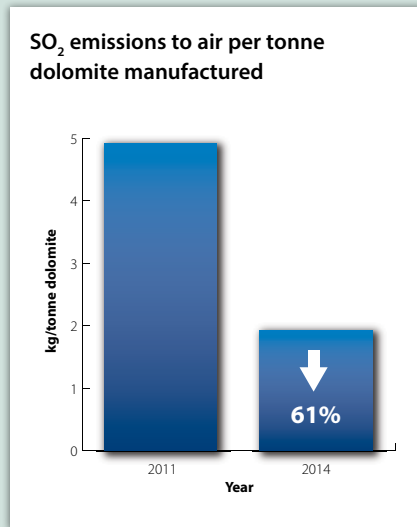
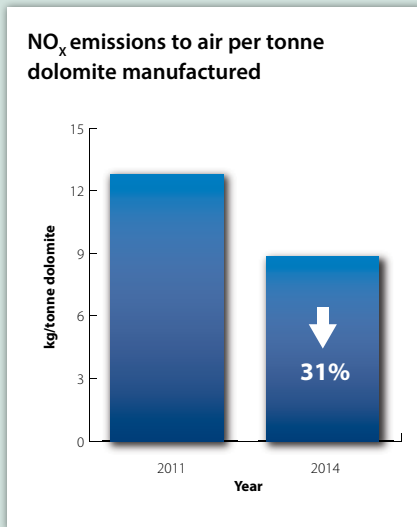
Point source dust emissions

Dust emissions from high-calcium lime production have increased by 20% since 2011. Despite this increase, emissions are still in compliance with the regulated limits for lime sites. The difference in the data is likely to be due to variation in spot measurements taken between the two years, which is the best available technique for monitoring dust emissions in the lime sector.



EMISSIONS TO AIR (excluding CO₂)

Dolomite



Oxides of nitrogen (NO_x) emissions

NO_x emissions have decreased significantly by 31% between 2011 and 2014. This is a reflection of a change in the dolomitic product sales mix being produced (a higher ratio of products with lower NO_x emissions were sold) as well as manufacturing enhancements undertaken throughout the year, namely, improvements in the energy usage by the kilns and therefore a reduction in the overall thermal NO_x emissions.

Sulphur dioxide (SO₂) emissions

SO₂ emissions from dolomite production have decreased hugely by 61% since 2011. This is due to a combination of further investment in production equipment and the fuel mix that is used to feed the production process.

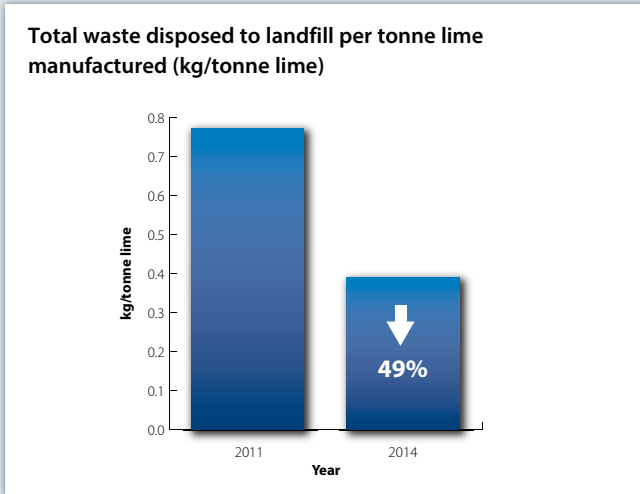
Point source dust emissions

Dust emissions from dolomite production have decreased by 46% since 2011. Further improvements to raw material screening techniques and electrostatic precipitators during 2014 have caused this reduction.



ENVIRONMENTAL IMPROVEMENTS

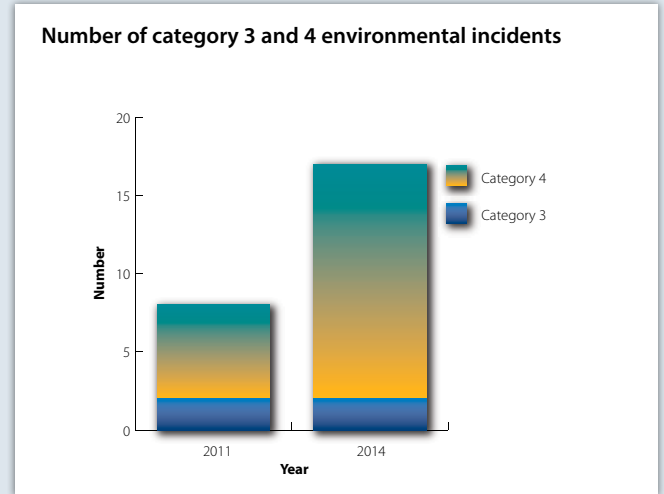
Waste minimisation



Minimising waste and reducing waste sent to landfill is a high priority for the lime sector. Producers strive to use landfill as the last resort for waste disposal, and this is illustrated in the 49% reduction they achieved between 2011 and 2014.

In 2014, the UK dolime sector used nearly 88 times more waste for fuel than the volume it disposed of in landfill.

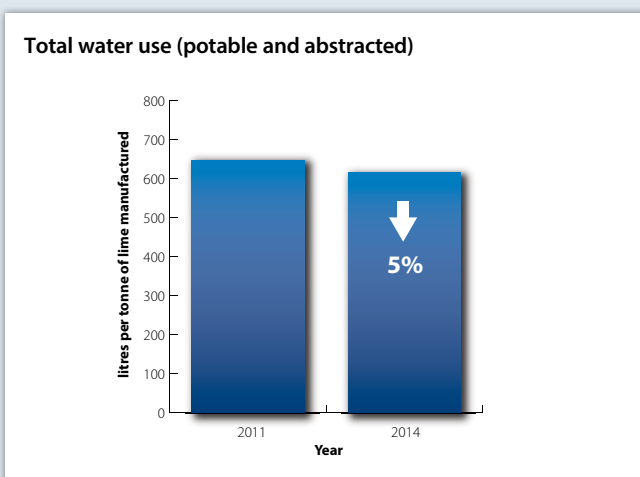
Environmental management



In 2014, there were no enforcement notices, formal cautions or prosecutions. The number of environmental incidents has increased since 2011, however in 2014 the majority of all incidents were Category 4 incidents, which are “a non-compliance that has no potential to have an environmental impact”², as defined by the Environment Agency.

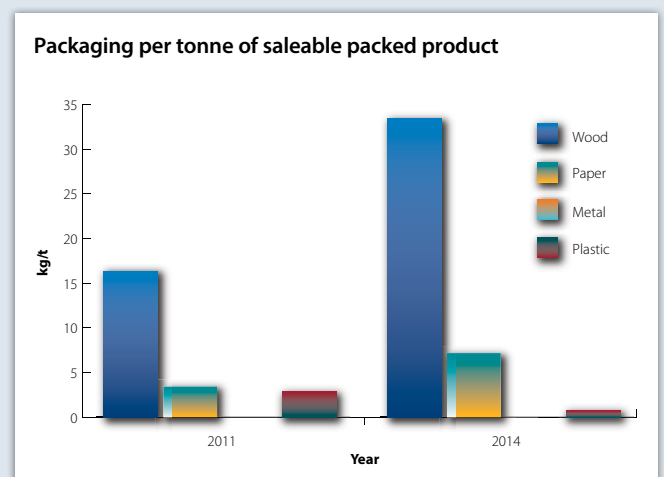
² please see notes on page 12

Water resource efficiency



The lime sector is very aware of the current and potential pressures on water resources in the UK and has taken action to reduce its usage. Between 2011 and 2014, total water consumption reduced by 5%. This has been achieved by continuous efforts to minimise usage for activities such as wheel washing and dust suppression. A similar trend

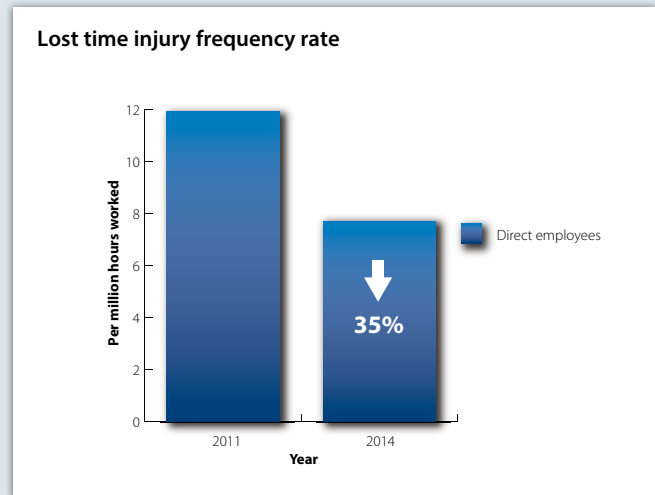
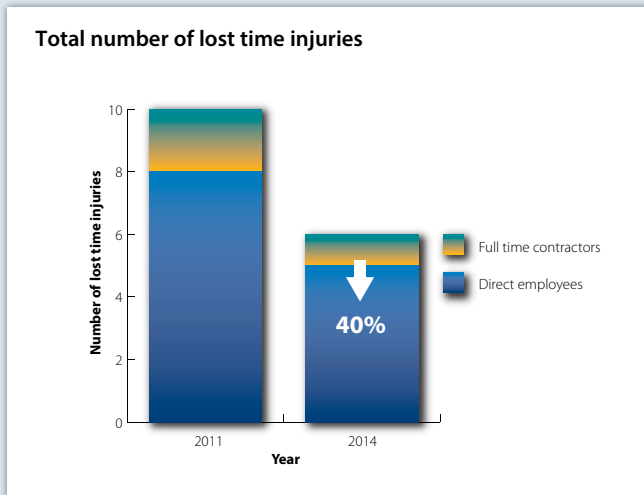
External packaging materials



had been observed when it comes to the use of external packaging materials; minimising the amount of external product packaging (especially wood and plastic) not only reduces costs but helps promote a less wasteful industry.

HEALTH AND SAFETY

Health and safety



Statistics

The health and safety of employees and contractors is the top priority for the UK lime industry – all companies have a target of zero incidents. Accordingly, the excellent improvements made from the sector over the past few years is evident by the significant reduction in recorded incidents throughout the sites.

The UK lime industry has reduced the number of Lost Time Injuries for direct employees and contractors by 40% between 2011 and 2014 (data collected from BLA members only). Furthermore, there has been a 35% reduction in the Lost Time Injury frequency rate (direct employees, BLA Members only).

Communication and sharing

All companies are represented on the lime health and safety working group, where members meet throughout the year to openly share experiences, best practices and details of any incidents or near hits that have occurred.

Health & safety risk assessment workshop

A BLA health and safety risk assessment workshop recently attracted delegates from many operational areas of all lime-producing member companies to the Tarmac site at Tunstead near Buxton.

The representatives exchanged experiences

and different risk assessment techniques, reviewed the PPE requirements, as well as discussing ways to continually improve attitudes to safety within the industry. All agreed that co-operating across the industry helps promote best practice in health and safety and that similar events would be arranged in the future.

Wider health and safety strategies

The lime sector is part of the Mineral Products Association (MPA), which was the first trade association to sign up to the Health and Safety Commission's *Hard Target* and have a huge range of specific programmes and resources to help with the task, see the sustainability microsite: <http://www.mineralproducts.org/sustainability/>

The MPA has created a whole family of 'Safer by' initiatives, which focus on a range of key issues, including machinery and plant design, staff competence and sharing knowledge industry-wide.

The industry is also committed to ensuring that local residents,

especially children, are aware of the dangers of entering a quarry unsupervised. An annual "Stay Safe" campaign delivers this important message. Find out more at http://www.mineralproducts.org/youth_playsafe01.htm

The MPA has also launched a Cycle Safe campaign which aims to prevent collisions between cyclists and Large Goods Vehicles (LGVs) by raising awareness of how to cycle and drive as safely as possible. For more information, see http://www.mineralproducts.org/feature_cycle_safe.htm.

The MPA Health and Safety Awards encourage good practice and are strongly supported by lime member companies. Find out more about the awards at www.safequarry.com.



HEALTH AND SAFETY

CASE STUDY

Conveyer demonstration safety unit

Conveyors have been used to move large quantities of material over long distances

and, given their continuously moving components, are inherently dangerous. They also feature many nip points with large amounts of mechanical energy which carries the risk of entanglement – the root cause of more than 50% of conveyor accidents.



Two apprentices based at Tarmac’s workshops at Tunstead in Derbyshire were given a project to construct a working rig which simulates a worker coming into contact with conveyor moving parts and nip points. The rig, see left, was transported around site during an on-site safety week before being taken to Chesterfield College engineering careers evening for demonstration prior to being presented at other BLA lime producers in order to share best practice.

CASE STUDY

Lhoist Zero Harm Behaviour Framework

Good equipment, good systems of work and good working conditions all help improve safety performance. However, how we behave (individually and collectively) has the most impact on our long-term safety performance. How we behave towards safety can be talked about in terms of our safety culture.

With the support of behavioural psychologists and following consultation with employees and contractors, Lhoist has developed a behaviour framework which identifies the key behaviours required to achieve excellence in safety culture.

- The positive behaviours that will help drive culture towards excellence
- The negative behaviours that will hinder advancement.

To achieve excellence, there are

some behaviours that everyone in the organisation needs to exhibit. In addition, supervisory staff need to exhibit behaviours to support the workforce, and managers need to exhibit a set of behaviours that support supervisory staff as well as the workforce.

The *Zero Harm Behaviour Framework* has been rolled out to all employees and selected contractors at the Hindlow site in Derbyshire and a baseline behaviour gap analysis has been performed. Following review of the baseline data, a behaviour modification improvement plan will be prepared.



LIME IN THE COMMUNITY

Quality and innovation

As can be seen by the major reductions in CO₂ and particulate emissions as well as improvements in energy usage and waste minimisation outlined in this report, the industry is constantly striving towards an increased environmentally-efficient and sustainable approach. A lot of improvements, especially in relation to emissions, have been regulatory-driven. However, lime manufacturers are also embracing new available kiln technology, renewable energy sources and in-house quality improvement measures.

Regular engagement with the Environment Agency has meant a common approach to the protection of the local environment and strict adherence to emission regulations.

Working in the community

Lime production facilities are located in rural areas of the UK and provide jobs for the local population, both directly and indirectly, through local supply chains.

Wherever the location, lime companies tend to have a deep-rooted social and historical connection to their locality. As well as helping to support the local economy, regular engagement with the local community through liaison meetings is important in maintaining positive community relationships. To this extent, 20 such meetings (eight with the Environment Agency) were held throughout the year. Furthermore, throughout the year, most major sites participated in public open days or the sponsorship of local educational and exhibition events or social activities.

Student scheme

A competition was held for students with the aim of rewarding originality and innovation in uses of lime. UK undergraduates were invited to submit papers or projects on any topic within the building, construction and civil engineering sectors that demonstrated novel and sustainable uses of lime. A cash prize of £1,000 was given to the winning entry.

CASE STUDY

ISO 50001 energy management system

Tarmac has recently attained accreditation to the prestigious international energy management standard, ISO 50001, across its Cement and Lime division.

ISO 50001 provides organisations with a framework to manage and improve their energy performance, while enhancing operational efficiencies, decreasing energy intensity and reducing environmental impacts.

Over the past year, Tarmac has worked to bring each of its cement and lime plants in line with the ISO 50001 energy management system and in doing so has become the first UK operator to achieve this certification across its cement and lime operations.

Viv Russell, lime and powders director explains: "We are committed to reducing energy consumption and increasing efficiency across all operations. This achievement reflects our continued efforts to ensure our solutions are as sustainable as possible – from the way our materials are produced through to how they perform in use and at their end of life".

CASE STUDY

Singleton Birch celebrates 200th anniversary

Singleton Birch recently celebrated its 200th anniversary at Melton Ross Quarry in Lincolnshire.




The festivities included a VIP day with

suppliers, customers and local politicians, as well as a schools day (almost 400 local young people were entertained with site tours and fun activities) and finishing with an open day for the general public. The British Lime Association was amongst the exhibitors attending to help promote the sector.






LIME PLANTS

BLA members

| Factory/site owner | Location |
|---|----------------|
|  | Buxton 1 |
| | Thrislington 2 |
| | Whitwell 3 |
|  | Melton Ross 4 |
| | Batts Combe 5 |
|  | Tunstead 6 |
| | Hindlow 7 |

BLA associate members

| Factory/site owner | Location |
|---|--------------|
|  | Birmingham 8 |
|  | Shapfell 9 |
|  | Norwich 10 |
| | Norfolk 11 |
| | Notts 12 |
| | Suffolk 13 |



NOTES

1 Standard purity stated for lime (94.5%) is sourced from the EU Commission Decision of 27 April 2011 "determining transitional Union-wide rules for harmonised free allocation of emission allowances pursuant to Article 10a of Directive 2003/87/EC of the European Parliament and of the Council", Page 37 Available: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2011:130:0001:0045:EN:PDF>

2 Environment Agency's Compliance Classification Scheme (CCS):

Category 1 incident defined as "a non-compliance which would have the potential to have a major environmental impact".

Category 2 incident defined as "a non-compliance which would have the potential to have a

significant environmental impact".

Category 3 incident defined as "a non-compliance which would have the potential to have a minor environmental impact".

Category 4 incident defined as "a non-compliance which has no potential to have an environmental impact".