IRISH CEMENT PLATIN

INVESTING IN OUR FUTURE

Irish Cement

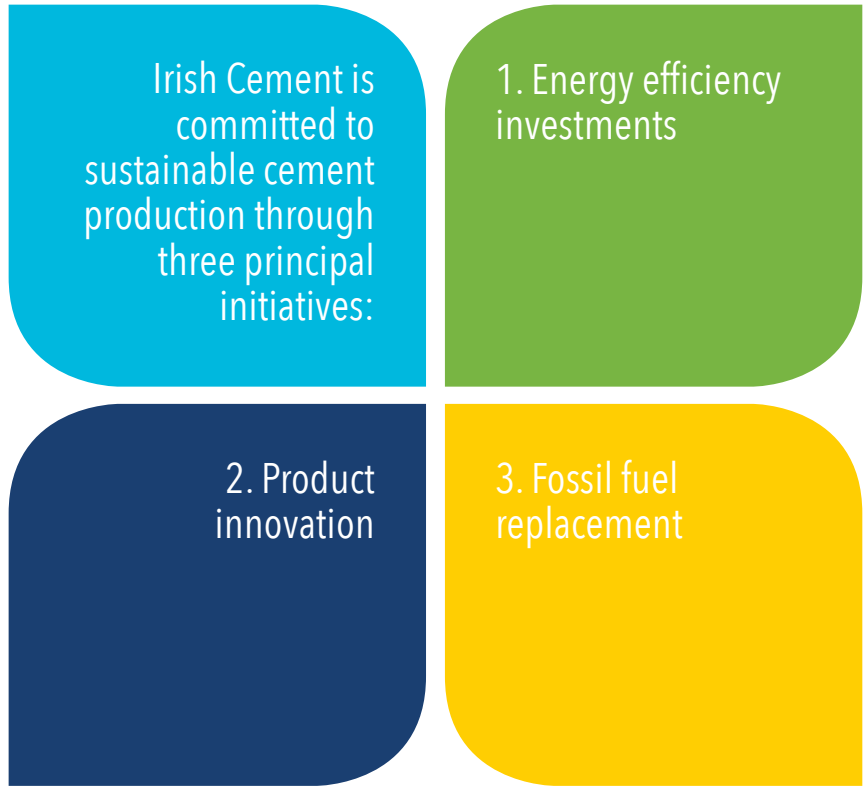
INTRODUCTION

Investing in our future.

The next phase of investment in Platin will see further energy efficiency improvements with on site electricity generation and reduced dependence on fossil fuels through advances in the range and quantity of alternative fuels.

Continuous investment in new technology has been the hallmark of Irish Cement's operations since the opening of the plant in Drogheda in 1938. In 1972, a new dry process plant, Kiln1 was constructed when operations transferred to the current site in Platin. A major upgrade was completed with the addition of Kiln 2 in 1977 and then again in 2008 with the construction of Kiln 3, making Platin one of the most energy efficient cement plants in Europe.

These investments have been vitally important in helping Platin to maintain efficiency and sustain local jobs in a competitive industry. As well as supplying cement to the domestic market Platin also exports cement to the UK and Europe.



CEMENT PRODUCTION

A precisely controlled, high temperature manufacturing process. Quality Control is critically important during all stages of the process.

1

RAW MATERIALS

Limestone, quarried on site, is the main raw material. Clay overburden, also from the site, with shale and small quantities of bauxite and iron ore are also required. These raw materials are crushed, ground and homogenised to produce a blend called 'raw meal'. This raw meal is then 'melted' inside the cement kiln.

2

FUEL

Traditionally fossil fuels are used to fire cement kilns. Since 2011, an increasing proportion of the fossil fuels in Platin have been replaced by Solid Recovered Fuel (SRF). Fuels are introduced and combusted at both ends of the kiln to provide the high temperatures needed to 'melt' the raw meal and manufacture clinker.

3

QUALITY CONTROL

Quality control is critical to each stage of the cement manufacturing process. Our laboratories, which are linked to a state-of-the-art central control room, operate continuous testing regimes for raw materials, fuel and our final products. Platin also has an R&D laboratory on site involved in on-going product development.

4

CHEMISTRY

The creation of clinker inside the kiln is the result of a precise set of chemical reactions between calcium oxide (CaO), silicon dioxide (SiO_2), aluminium oxide (Al_2O_3) and iron oxide (Fe_2O_3). At the high temperatures inside the kiln, these compounds combine to form new the clinker minerals.

5

TEMPERATURE

Large fans draw air into the kiln providing oxygen for fuel combustion. The powdered raw meal flowing towards the kiln is heated by this hot air. The flow of raw meal helps to remove particles and compounds from the hot air and return them to the kiln. Inside the kiln the heated raw meal 'melts' and in this molten state the clinker is formed. The temperature required for clinker formation is 1450°C.

6

CLINKER

The clinker is cooled from 1450°C to 120°C as it exits the kiln and it is then stored on site in dedicated silos. The hot air from the clinker is used to dry and preheat the raw materials. The exhaust air from the kiln is cooled and passes through a fabric filter which removes dust particles before it is discharged from the stack.

7

CEMENT

Cement is produced by milling the clinker to a fine powder with the addition of small quantities of gypsum to control the setting time. Eco-efficient CEM II cement is produced with the addition of unburnt limestone, reducing the energy requirement and carbon footprint of the cement. The finished cements are conveyed to silos for dispatch by tanker or packed into 25kg bags.

WASTE HEAT RECOVERY

An energy efficiency investment.

In 2015, Irish Cement received planning permission for a new development in Platin that can recover surplus heat from the process to generate up to 7.5 Megawatts (MW) of electricity on site. Once installed this heat recovery unit could supply around 25% of Platin's electricity needs. This project will also reduce annual CO_2 emissions in Platin.

There will be no change to the quantity or nature of the air discharged, other than it will be at a lower temperature because the heat contained in the exhaust will be used to generate electricity. In effect, existing hot gases from the process will be diverted through a heat exchanger or boiler, to generate steam that, in turn, drives a turbine to generate electricity. The 'cooled' gases will be filtered as normal before being discharged through the stack.

Platin will be the first cement plant in Ireland and among the first in Europe to install this type of technology. The benefits are that Platin will need less electricity from the grid, will make better use of existing heat and will improve competitiveness, helping to secure operations into the future.

PLATIN WILL USE
LESS ELECTRICITY
FROM THE GRID

REDUCTION
OF ANNUAL
CO_2 EMISSIONS

CO-PROCESSING

Our contribution to the circular economy.

Since 2011, Irish Cement has contributed to the circular economy through its recovery and reuse of discarded resources. The use of alternative fuels, known as 'co-processing', involves the recycling of materials and recovery of energy: two processes happening in parallel inside the kiln.

Co-processing delivers many benefits. It reduces CO_2 emissions from the process; contributes to improved resource efficiency, by reducing the use of primary resources, including fossil fuels and it also directly reduces the need for traditional disposal options like landfill.

In 2015, the average fossil fuel replacement rate around Europe was 41% with some countries at much higher levels. In Germany, for example, the average replacement rate is 62% and some of the cement plants have replaced 100% of their fossil fuels. The types of alternative fuels used in Germany includes tyres, oil, paper pulp, plastics, animal meal, SRF/RDF, wood, solvents, sewage sludge.

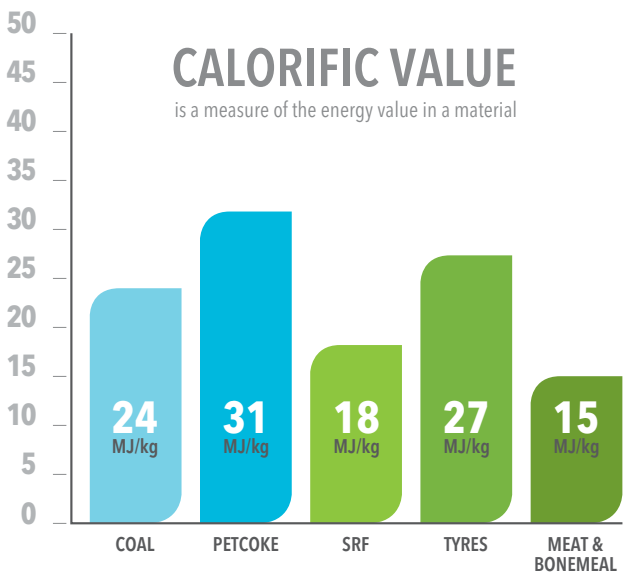
In 2011, Platin began replacing its fossil fuels with SRF and by 2016 had achieved 50% replacement. With the appropriate planning and licensing, a realistic target for Platin is to achieve 85% fossil fuel replacement. Many of the same alternative fuels used around Europe like tyres, solvents and sewage sludge are also available locally in Ireland. Irish Cement is now planning a phased programme of additional alternative fuel introductions in Kiln 2 and Kiln 3 to build on the success achieved to date and to further enhance the sustainability of the operations in Platin.

In many European countries, the use of suitable residual waste to fuel the cement plants helps to meet recovery and recycling targets.

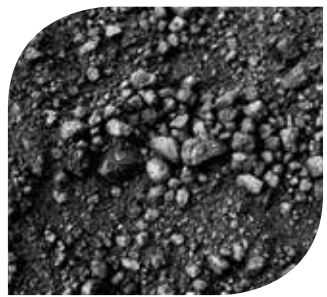
In Switzerland, Germany and Sweden for example, the use of these fuels by local cement plants contributes to the achievement of high recycling rates, high energy recovery rates and zero or near-zero landfill rates.

In Ireland, the three Regional Waste Management Plans, published in 2015, recognise the important role of cement plants like Platin for the efficient recovery of residual waste.

FUELS AT PLATIN



Existing Fossil Fuels



PETCOKE

Petcoke (petroleum coke) is a by-product of the oil refining industry. This is currently the main fossil fuel used in Platin. It is imported by ship, delivered in trucks, milled and dried on site before being used. Calorific value 31MJ/kg.

COAL

Coal has been used in the past when it was sourced from a range of overseas locations. It was imported by ship, delivered to site in trucks, milled and dried before being used. Calorific value 24MJ/kg.

Existing Permitted Alternative Fuels

SRF

SRF (Solid Recovered Fuel) is made locally to a defined specification and contains fragments of paper, plastics, cardboard and textiles. SRF is produced from residual waste materials after the recyclable fractions are removed. It currently makes up 50% of the fuel mix in Platin. Calorific value 18MJ/kg.

TYRES

Tyres are not currently used in Platin. Consisting mainly of rubber compounds, textiles and small quantities of wire tyres are a common fuel for cement plants in Europe. Plans are in place to introduce them as a fuel over the coming years. Both chipped or whole tyres can be used in Platin Calorific value 27MJ/kg.

MEAT AND BONEMEAL

Currently Meat & Bonemeal (MBM) is not used in Platin. MBM is produced by rendering, grinding and sterilising at high temperature and pressure by-products of the meat industry. This fuel is produced off site to a defined chemical and physical standard for the cement industry. Calorific value 15MJ/kg.

ALTERNATIVE FUELS AND RAW MATERIALS

Irish Cement intends to apply for planning permission and for a review of the Industrial Emission (IE) licence in Platin to allow for an increase in the quantity and range of alternative fuels (AF) and alternative raw materials (ARM) to be used in both kilns. A range of materials have been selected as suitable for Platin following reference to existing permissions and guidance by the Environmental Authorities in Switzerland and Germany. These materials are already licensed by the Environmental Protection Agency (EPA) as fuel for cement production in Ireland. The use of these additional materials will advance the fossil fuel replacement programme in Platin.

Emissions from industrial facilities, like cement plants are tightly controlled under European Regulations. Experience in Europe, together with our own experience over the past 7 years, demonstrates that the emissions do not increase when we use alternative fuels. All of these materials can be processed safely in Platin because of the high operating temperature which ensures complete consumption. All materials accepted in Platin are subjected to testing to ensure they meet the agreed specifications and comply with strict quality control standards which are a requirement of the cement manufacturing process.

The range of proposed materials has been grouped into six general categories based on their handling characteristics and includes: fine, coarse and 'free-flowing' solids, pumpable fluids and alternative raw materials. Whole tyres can also be used in Platin and can be considered a separate category based on how they will be handled.

FINE SOLIDS

e.g. chipped timber, shredded plastics, shredded textiles, tyre fluff

These fine materials (typically sized 10-50mm) will be delivered to site, ready to use and offloaded from trucks into enclosed storage bays or halls from where they will be pneumatically conveyed to the kiln system. This system will be similar to the existing SRF handling and feeding system in Platin.

COARSE SOLIDS

e.g. shredded wood, dry filter cakes, and shredded rubber

These materials will be prepared off site to a defined specification before being delivered to site. The materials will typically have a larger particle size (30-120mm) and will be offloaded from trucks into bunkers inside enclosed halls and then transferred using screw-feeders or overhead cranes to the kiln feeding system.

FREE-FLOWING SOLIDS

e.g. sewage sludge pellets, SRF pellets

Some fuels will be 'free-flowing' solids or powders that will be offloaded into sealed silos. From here, they will be pneumatically conveyed to the kiln burners in enclosed pipelines.

PUMPABLE FLUIDS

e.g. secondary liquid fuels (SLF), waste oils, paint sludge

These fuels will be delivered by tanker and offloaded using pumps into on site storage tanks located in bunded areas. The fuels will be pumped to the kiln burners in enclosed pipelines.

WHOLE TYRES

e.g. car and van tyres

The whole tyres will be delivered by truck and offloaded onto a concrete storage pad. The tyres will be screened and mechanically conveyed to a double flap sluice feeding platform at the rear of the kiln. The feed rate will be automatically controlled based on the weight of each tyre.

ALTERNATIVE RAW MATERIALS

e.g. water treatment filter cake, soils and stones

These materials can have a variable consistency, from sludges, filter cakes, powders, dust, etc. They will be stored on site in covered storage areas and conveyed into the existing raw materials handling and dosing systems. The use of these materials will allow Platin to replace some of the traditional raw materials it currently consumes.

ENVIRONMENT

Platin, like all large industrial facilities, operates under an Industrial Emission (IE) licence from the Environmental Protection Agency (EPA) and all emissions are strictly monitored and controlled. The plant also operates to the international environmental management standard ISO 14001. Under the current IE licence, the use of alternative fuels is permitted in Kiln 3. As part of our new plans, an application will be submitted to the EPA for a revision of the existing licence to increase both the range and quantity of permitted alternatives fuels and to allow the introduction of alternative raw materials in both Kiln 2 and Kiln 3.

The IE licence is based on European Environment Regulations which set out minimum temperatures and residence time limits when waste is being used as fuel. Both the temperature and residence time in our kiln systems significantly exceed what is required under current Regulations.

When alternative fuels were first introduced to European cement plants, local communities naturally had questions about them, particularly in relation to emissions and traffic. These concerns were addressed by engaging in open dialogue and by providing information about the fuels, the technology and the controls in place.

Furthermore, the successful use of alternative fuels over time in Europe has contributed to confidence among the local communities. We now also have positive experience over the past seven years in Platin to confirm the safe use of alternative fuels.

Ahead of this proposed increase in alternative fuel use, detailed monitoring and modelling of future emissions and traffic have been completed.

This work demonstrates no increase in emissions from our operations and no traffic impacts on local roads around Platin.

HEALTH AND SAFETY

The health and wellbeing of our employees, visitors and neighbours is a primary concern for Irish Cement. All operations in Platin must be carried out in full compliance with Irish Cement safety procedures.

For Irish Cement, managing health and safety at our facilities is our primary concern. Safety Managers work closely with and assist managers and supervisors in developing safety management systems, improving safety performance and encouraging a 'Safety Culture' on site. The activities of our Safety Committee, which has members from across the workforce, helps to ensure employee engagement in eliminating day to day risks and identifying 'better ways of working'. Safety Statements provide the necessary detail for safe operations and work practices on site. Through the use of risk assessments, safety inductions and regular safety training, Irish Cement is dedicated to the ongoing safety of our employees, contractors, visitors and neighbours. Measurement and reporting against targets ensures that safety remains a top priority for workers and management alike.

Irish Cement's parent company, CRH, also sets the highest priority on Health and Safety and ensures that safety management is a daily priority for managers in every CRH location. CRH health and safety management systems are well established and are regularly reviewed, taking into account international best practice. Knowledge-sharing around the CRH Group also plays an important part in maintaining focus on safe working practices and elimination of risks.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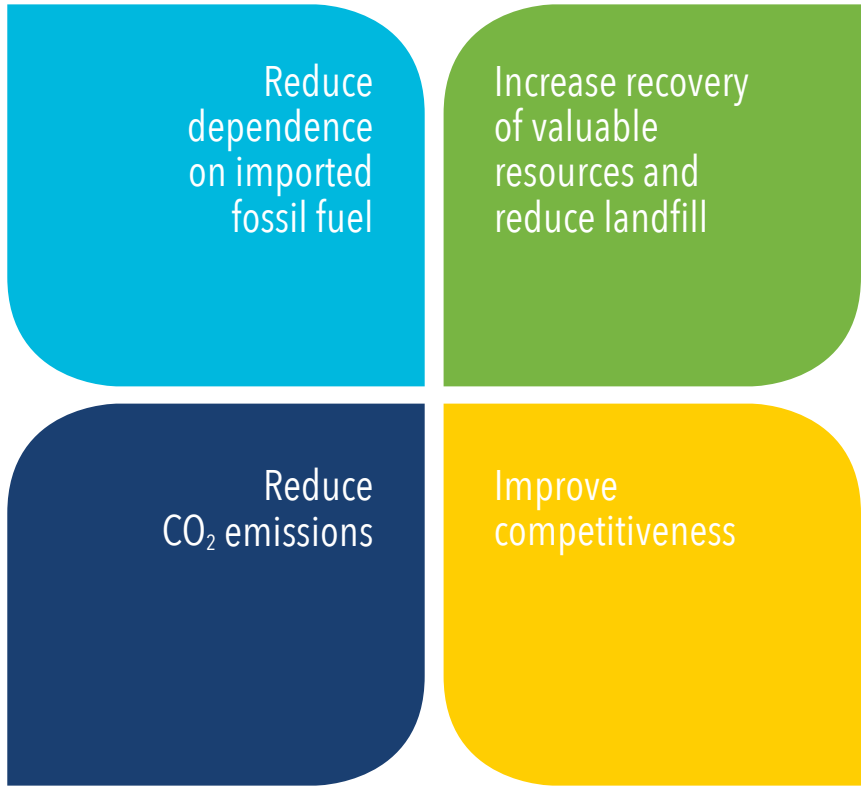
THINK
SAFETY
WORK
SAFELY

KEY BENEFITS OF CO-PROCESSING ALTERNATIVE FUELS



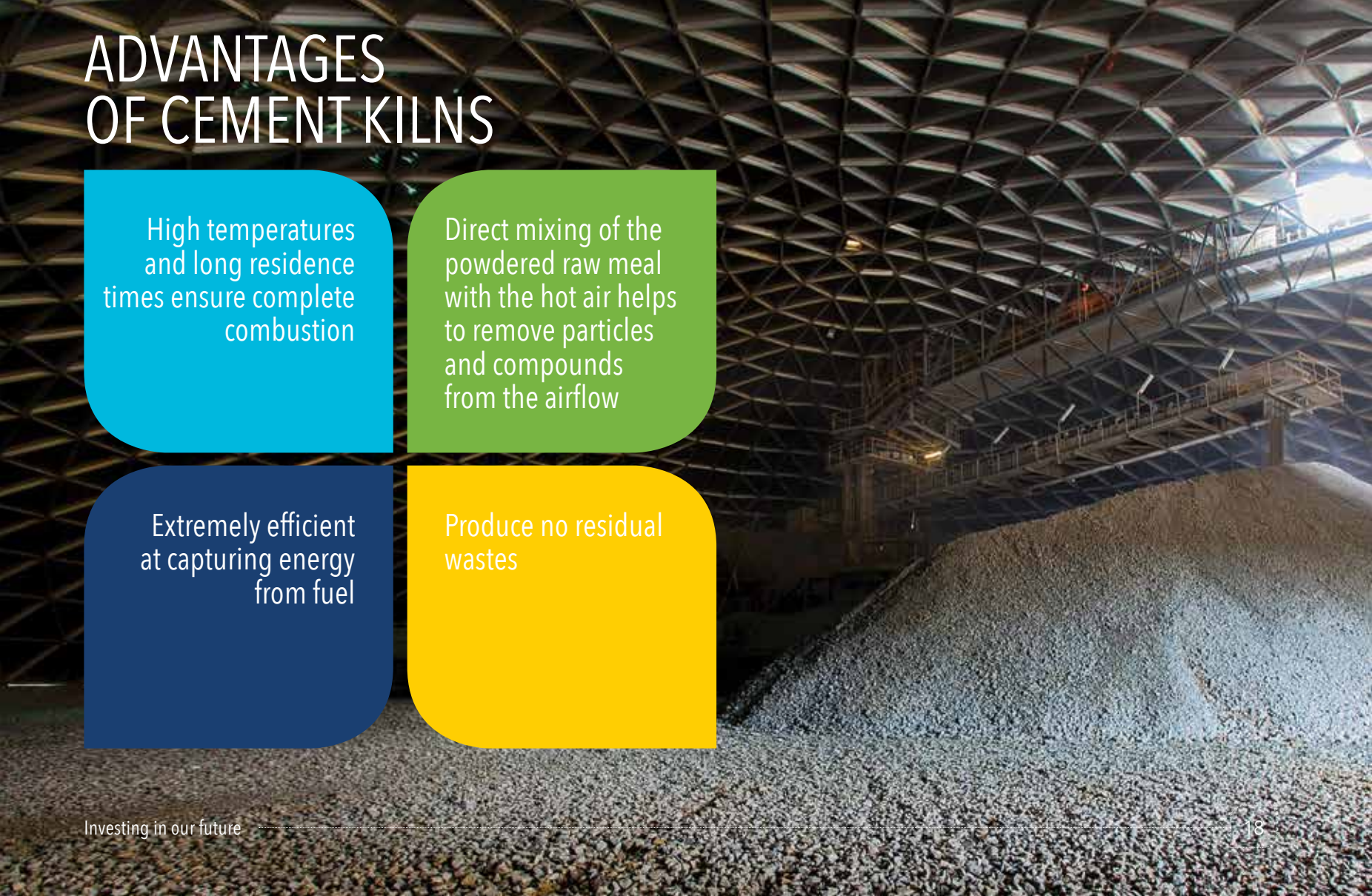
ADVANTAGES OF CEMENT KILNS

High temperatures and long residence times ensure complete combustion

Direct mixing of the powdered raw meal with the hot air helps to remove particles and compounds from the airflow

Extremely efficient at capturing energy from fuel

Produce no residual wastes



If you have any questions or would like to discuss any of the information contained within, please contact us.

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