ENVIRONMENTAL REPORT 2018
ENVIRONMENT AND HEALTH & SAFETY

aalborgportland
CEMENTIR HOLDING

ENVIRONMENTAL REPORT 2018 ENVIRONMENT AND HEALTH & SAFETY

Aalborg Portland A/S

Aalborg Portland has been manufacturing cement at the Aalborg factory for almost 130 years and is the sole producer of cement in Denmark. The development towards sustainable production had its origins in the 1970s when the energy crisis meant closure of three competing Danish cement plants. Energy efficiency entered focus, and in 1988 Kiln 87 was introduced into service with an efficient semi-dry process for production of grey cement.

Further energy and environmental initiatives have been developed subsequently, and sustainable production remains of major importance for employment, technological evolution and export. Aalborg Portland has therefore been engaged with socio-economic sustainability for many years. The present Environmental Report describes Aalborg Portland's approach and contribution to the UN 2030 Agenda for Sustainable Development and its 17 Global Goals, and to the global climate agreement signed at COP 21 in Paris.

Formal particulars concerning Aalborg Portland A/S appear in the "General information" section of this report, cf. also www.aalborgportland.dk.

Environmental Report 2018 – target group

Aalborg Portland's Environmental Report 2018 is intended to provide stakeholders with easy access to an overview of our principal environmental impacts, initiatives relating to health and safety, and ongoing improvements.

These stakeholders include:
Customers, employees, suppliers, present and future investors, financial institutions, insurance companies, authorities, neighbours, political groups and interest organisations.

Part of the Aalborg Portland Holding Group

Aalborg Portland A/S is a part of the Aalborg Portland Holding Group, which is owned by the Cementir Group, an international supplier of cement and concrete based in Rome and listed on the Italian stock exchange in Milan. For more information on Cementir, see www.cementirholding.it/index-eng.php and Aalborg Portland Holding, see www.aalborgportlandholding.com.

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Environmental Report 2018 covers the Aalborg Portland cement factory situated at Rørdalsvej 44, 9220 Aalborg Øst, Denmark.

One of Denmark's largest industrial companies, Aalborg Portland owns 1,200 hectares in the Rørdal district. In addition to the cement factory, the site contains a variety of natural and agricultural areas and also a chalk pit.

The factory and the active chalk quarry cover a combined area of 190 hectares. In addition to production of cement and district heating, there is a recycling depot and two on-site landfills, one now closed.

Aalborg Portland A/S has 349 employees. A number of external employees from subcontractors also work there, corresponding to approx. 1½ man-years for each employee, - in all approx. 870 people.

This Environmental Report covers the period 1 January – 31 December 2018.

EMAS verification has been performed by Bureau Veritas Certification (Accreditation No. 6002) in accordance with the EMAS scheme, cf. the section "Environmental verifier's report and EMAS registration".

Certifications

Aalborg Portland's Management System for quality, environment, health & safety and energy has been certified by Bureau Veritas Certification.

Aalborg Portland is certified in accordance with the following standards:

- ISO 9001 – since 1989
- ISO 14001 – since 1998
- OHSAS 18001 – since 2002
- ISO 50001 – since 2013
- Product-certified according to EN 197-1 – since 2002

Furthermore, the Environmental Management System has been EMAS-registered since 2000.
Reg. no. DK-000132

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ENVIRONMENT, ENERGY AND HEALTH & SAFETY IN 2018

Aalborg Portland's Environmental Report 2018 is the Management's review of the year's most significant environmental, energy and health & safety activities relating to the company's Danish cement production.

Aalborg Portland – cement factory and chalk pit

Michael Lundgaard Thomsen,
Managing Director, Aalborg Portland A/S

At Aalborg Portland, over a period of many years, we have integrated sustainability and circularity into the very core of our business. By utilising homogeneous residues and wastes from other industries and recycling our own by-products, we have set the direction for a green transition within heavy industry that is sustainable both environmentally and economically.

As a part of our DNA since the 1970s, our work in the area of green transition focuses today on resource-efficient partnerships with other companies. Today, Aalborg Portland is at the heart of one of Denmark's largest industrial symbioses. And there still exists considerable potential in expanding these partnerships for the benefit of local area, society, the environment, business and the economy.

Ambitious goals
We have therefore set ourselves a large number of ambitious goals, including some that have strong links to the UN Global Goals. And we make sure that our good intentions are backed up by action. We do this by supporting our broad range of environmental and social initiatives through annual investments in ambitious eco-tech improvements at the Aalborg factory.

In 2018, we set a new record in our work to replace the use of fossil fuels and natural raw materials in cement production with sustainable alternatives. We achieved this by substituting more than 200,000 tonnes of alternative fuels and more than 480,000 tonnes of alternative raw materials for similar quantities of conventional fuels and conventional raw materials that would otherwise have had to be excavated in Denmark or imported.

This is a development we are very proud of and want to see continue. Overall, energy savings and switch to alternative fuels have resulted in a reduction of 18% in relative CO_2 emissions during the period 2000-2018.

Words backed by investments
Aalborg Portland's pursuit of the UN Global Goals is therefore driven by massive investments, extensive circularity, and the firm belief that socio-economic sustainability is the way forward.

Energy savings and switch to alternative fuels have resulted in a reduction of 18% in relative CO_2 emissions during the period 2000-2018.

In concrete terms, we made green investments totalling around EUR 35m in the period 2014-2018. This sum was predominantly devoted to activities linked to those UN Global Goals which have particular relevance to Aalborg Portland and its operations. These include Global Goals 7 Affordable and Clean Energy, 9 Industrial Innovation and Infrastructure, 11 Sustainable Cities and Communities, 12 Responsible Consumption and Production and 13 Climate Action.

Plant for recycling heat from cement production

In this context it is the recovery of heat from cement production which has become Aalborg Portland's particular hallmark. In 2018, we supplied sustainable district heating to approx. 20,000 Aalborg households, a number that may potentially double in an environment that creates incentive for the ambitious investments needed to expand such recovery.

In addition, Aalborg Portland will in future also use cold water from our chalk lake to supply sustainable district cooling to the new Aalborg University Hospital. This is merely the latest example of our constant search for valuable industrial symbioses that will benefit both ourselves and the community.

As Denmark's sole cement manufacturer, we also take a responsibility for accelerating development within our own industry. We therefore regularly engage in R&D projects, the latest example being "Green Concrete II". This project holds out significant perspectives for the global building and construction industry. We are proud of Aalborg Portland's leading involvement in the ongoing work of developing an even greener cement – appropriately called FUTURECEM.

Good neighbours

We consider it important to be an active player in the sporting and cultural life of the local community we are part of and in neighbouring districts. Through our activities in this regard, we support the aims of Global Goal 11, Sustainable Cities and Communities.

We support the cultural and artistic scene in Aalborg, provide sponsorship for sports clubs and recreational associations, and pursue openness and dialogue with our nearest neighbours. In 2018, Aalborg Portland was host to 2,000 visitors, staged information events and held meetings with neighbours. We look forward to the continuation of this close contact and positive cooperation with our neighbours in the years ahead.

As one of Denmark's largest industrial companies we are inevitably visible in the landscape, but we constantly seek to limit our impact on the daily lives of our neighbours. We have therefore also invested in a number of dust and noise reduction measures. In 2018, these included a specially designed 32-ton noise shield for our deep-excavator operating in Rørdal chalk pit. During 2019, our neighbours will be invited to a meeting where they can view this and other activities.

An important workplace

At Aalborg Portland, our employees are our most important resource, and UN Global Goal 8, Decent Work and Economic Growth, is therefore also a cornerstone for our organisation.

The skills, ideas and commitment of our people translate into improvements in routines, equipment and processes, continuously driving the company's development. This makes great demands on both the individual employee and the individual manager.

> At Aalborg Portland, our employees are our most important resource, and UN Global Goal 8, Decent Work and Economic Growth, is therefore also a cornerstone for our organisation.

The working environment, wellbeing and safety are therefore high on the agenda. With a strong H&S organisation and leaders, and with employees who are aware, we have good potential for making Aalborg Portland one of the best and safest work-places in heavy industry. The work done at Aalborg Portland must at all times be done safely. This calls for clear guidelines and consequences. In 2016, we therefore launched Safe Workplace, a project aimed at strengthening our safety culture still further by clarifying and implementing work performance guidelines at Aalborg Portland. This initiative has yielded visible results, with a perceptible change in risk thinking and safety culture. We want to do even better, however, and we therefore continue to focus on making risk assessment the "first step" at the start of every task and on making it natural for all persons "to interfere" in the work of others if there are questions concerning, for example, health and safety.

In accordance with UN Global Goal 4, Quality Education, Aalborg Portland also takes a responsibility for bringing forward the next generation of talented employees. Our graduate programme launched in 2017 for young, newly trained engineers, economists etc. is therefore continuing. In addition, we have 18 qualified apprentices and interns at the Aalborg factory, which means that Aalborg Portland has the highest ratio of apprentices per employee among production companies in Denmark.

Our market-leading position is founded on the knowhow and skills of our employees, so when it comes to upgrading their qualifications and training, our experienced personnel never stand still. Through our Technical Training Programme we ensure that both the individual employee and our business are constantly up to date and evolving.

We need skilled specialists, knowledge workers and tradesmen - now and in the future. We therefore take a responsibility for securing the pipeline of both present and next-generation talents in a good working environment.

Michael Lundgaard Thomsen
Managing Director, Aalborg Portland A/S
June 2019

Aalborg Portland, a responsible company promoting sustainable development

Chalk pit with deep-excavator

Environmental and energy policy

This policy is applicable to the cement factory in Aalborg and shipping terminals in Denmark.

Our policy is to:

- Respect statutory legislation and relevant official requirements. If a limit is exceeded we will inform the authorities and prepare remedial action plans.
- Promote sustainable development and cleaner technology within the scope of economic feasibility.
- Set pro-active targets for our future work and review our targets once a year at the Management's seminar established for that purpose.
- Support our customers in achieving their environmental targets by developing and helping to develop sustainable cement and concrete products which improve the life cycle of concrete.
- Protect the environment by reducing emissions and consumption of energy and raw materials per tonne of cement product through energy efficiency, energy management and other means.
- Inform our suppliers and subcontractors of relevant procedures and requirements.
- Adopt an active and open approach towards communication, knowledge and dialogue with customers, employees, authorities, neighbours, organisations and other collaboration partners.
- Educate and motivate our employees to ensure that we live up to the requirements contained in our policies, targets and action plans.
- Oppose introduction of further anti-competitive environmental levies and work for a reduction of the existing tax burden.

Central control room – operation and monitoring of production

To realise these objectives we undertake to:

- Maintain and develop a Management System that embraces environment, energy and CO_2. The system is certified according to ISO 14001, ISO 50001 and the Danish Energy Agency's supplementary requirements hereto and is registered under the EMAS scheme.
- Publicise our policy, targets, action plans and results in the form of an annual Environmental Report.
- Formulate and use indicators as guidance mechanisms to achieve defined targets.
- Assess our products, facilities and significant renovation projects in relation to the scope of this policy, and support energy-efficient procurement and eco-friendly project planning.
- Be an active collaboration partner in Danish environmental and energy policy by utilising alternative raw materials and fuels.

THE GLOBAL GOALS
For Sustainable Development

UN GLOBAL GOALS AND AALBORG PORTLAND

Development and manufacture of Aalborg Portland's cement products take place with focus on socio-economic sustainability.

Aalborg Portland contributes to the global achievement of the UN Global Goals in several dimensions and both economically, socially and environmentally.

Bucket wheel excavator in the chalk pit

ARoS Art Museum, Aarhus, Denmark

Bagged cement for delivery

At Aalborg Portland we operate from a holistic approach in which sustainability is an integral part of our overall business strategy. We focus on activities relating to the UN Global Goals in, among others, the following areas:

UN GLOBAL GOAL NO. 4

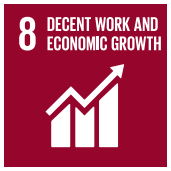
We supply ongoing training for the Danish work force. We do this by educating apprentices and interns, recruiting graduates and re-training our experienced personnel. In 2018 we had 18 apprentices and interns and also six graduates. We also provided re-training for our experienced personnel corresponding to 600 man-days.

UN GLOBAL GOAL NO. 6

We reuse water in production by recycling process water and capturing rainwater from selected areas. In 2018, we recycled 1,200,000 m^3 of technical and process water and 30,000 m^3 of rainwater.

UN GLOBAL GOAL NO. 7

In connection with the production of cement we exploit the potentials for supply of sustainable energy. For example, we supply energy by recycling the heat from our kilns to provide district heating, and the cold water from our chalk lake will in the future be used to provide district cooling for Aalborg's coming University Hospital. In 2018, we supplied heat corresponding to the needs of around 20,000 households, and the district cooling project was begun.



UN GLOBAL GOAL NO. 8

We create economic growth and jobs. We cooperate across functions and address the possibilities for engaging employees on special terms. In 2018, we generated added value of EUR 104.4m, which included social benefit amounting to EUR 32.4m in the form of VAT, levies, taxes, etc. and EUR 22.2m in employee wages and pension contributions. Furthermore, employees are regularly engaged on special terms.

UN GLOBAL GOAL NO. 9

We combine the unique structural properties of cement, characterised by high strength and long life, with development of sustainable production and "green cements". In partnership with others, we develop cements and concretes that can be made with less energy consumption and less CO_2 emission.

UN GLOBAL GOAL NO. 11

We are committed to close contact with our neighbours and to being part of the sporting and cultural life of Aalborg and North Jutland. In 2018, Aalborg Portland was host to 2,000 visitors, staged information events and held meetings with neighbours. We also sponsor the zoo, theatre, art museum, and handball and football clubs, and participate in a variety of events and workshops.

UN GLOBAL GOAL NO. 12

In our cement production we utilise production residues from other companies as a substitute for the natural raw materials. In 2018, we recycled 480,000 tonnes of external by-products.

UN GLOBAL GOAL NO. 13

We invest in measures which reduce energy consumption and seek to meet the remaining energy need from alternative energy sources. To reduce our CO_2 emission per tonne of cement produced we have introduced mine-ralised operation, a less fuel-intensive kiln process that also produces less CO_2 emission. In 2018, we invested in measures that reduce actual energy consumption by 1,365 MWh. Furthermore, we have replaced 30% of fuel consumption with alternative fuels.

UN GLOBAL GOAL NO. 15

The chalky soil at Aalborg Portland is conducive to rare plant species. It is planned to rehabilitate the Rørdal chalk pit so as to deliver both recreational areas and natural areas. Rehabilitation is being performed in step with chalk extraction and will be completed section by section.

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

The resource-efficient partnership

Aalborg Portland converts raw materials, by-products and wastes into cement and district heating. We focus on promoting sustainable development by basing large parts of our cement manufacture on recycling of material flows from society and industry in a resource-efficient partnership. UN Global Goal 12, Responsible Consumption and Production, is an integral part of our manufacturing concept.

For Aalborg Portland, waste and homogenous by-products are a resource. We recycle and recover wastes and homogeneous by-products from other industries for use as fuel and raw materials in production of cement.

By recovering and recycling fuels and alternative raw materials in cement manufacture, wastes and by-products are fully utilised. All the constituents are used and no new residues are formed. High temperatures and special process conditions make cement kilns ideal for using alternative fuels and raw materials. At the same time the flue gases are effectively cleaned in the kiln system, in filters and scrubbers, so that factory's environmental footprint is not increased.

In 2018, Aalborg Portland set a new record by using 215,000 tonnes of alternative fuels and more than 480,000 tonnes of alternative raw materials were also used. These amounts replaced equivalent volumes of fossil fuels and natural raw materials that would otherwise have had to be sourced in Denmark or imported. Overall, Aalborg Portland used more than 700,000 tonnes of alternative fuels and raw materials in 2018, an increase of more than 11% on the previous year.

> In 2018, Aalborg Portland set a new record by using 215,000 tonnes of alternative fuels.

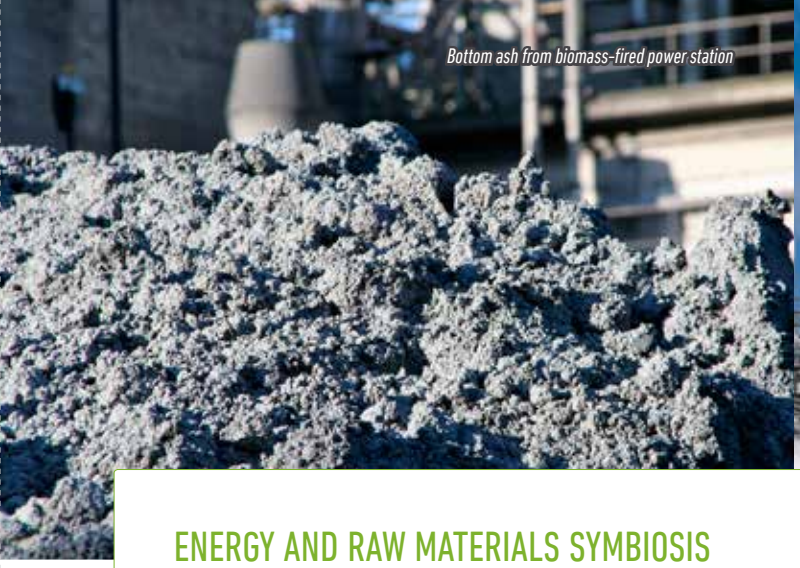
Cooperation on resources between Troldtekt and Aalborg Portland

Troldtekt boards – production waste recycled for cement

A resource-efficient partnership

In 2018, Aalborg Portland joined forces with Danish building materials supplier Troldtekt to receive offcut waste from board production. The boards consist of wood and cement. The pulverised waste is used as a by-product in Aalborg Portland's cement manufacture. The waste is carried to Aalborg Portland by road tankers which deliver cement to Troldhede and would otherwise return empty. On arrival at the cement factory the dust is injected into a silo and then fired in Kiln 87 in a closed system.

The waste from Troldtekt replaces raw materials (chalk, sand and fly ash) and fossil fuel, the wood content of the boards being considered CO_2 neutral.

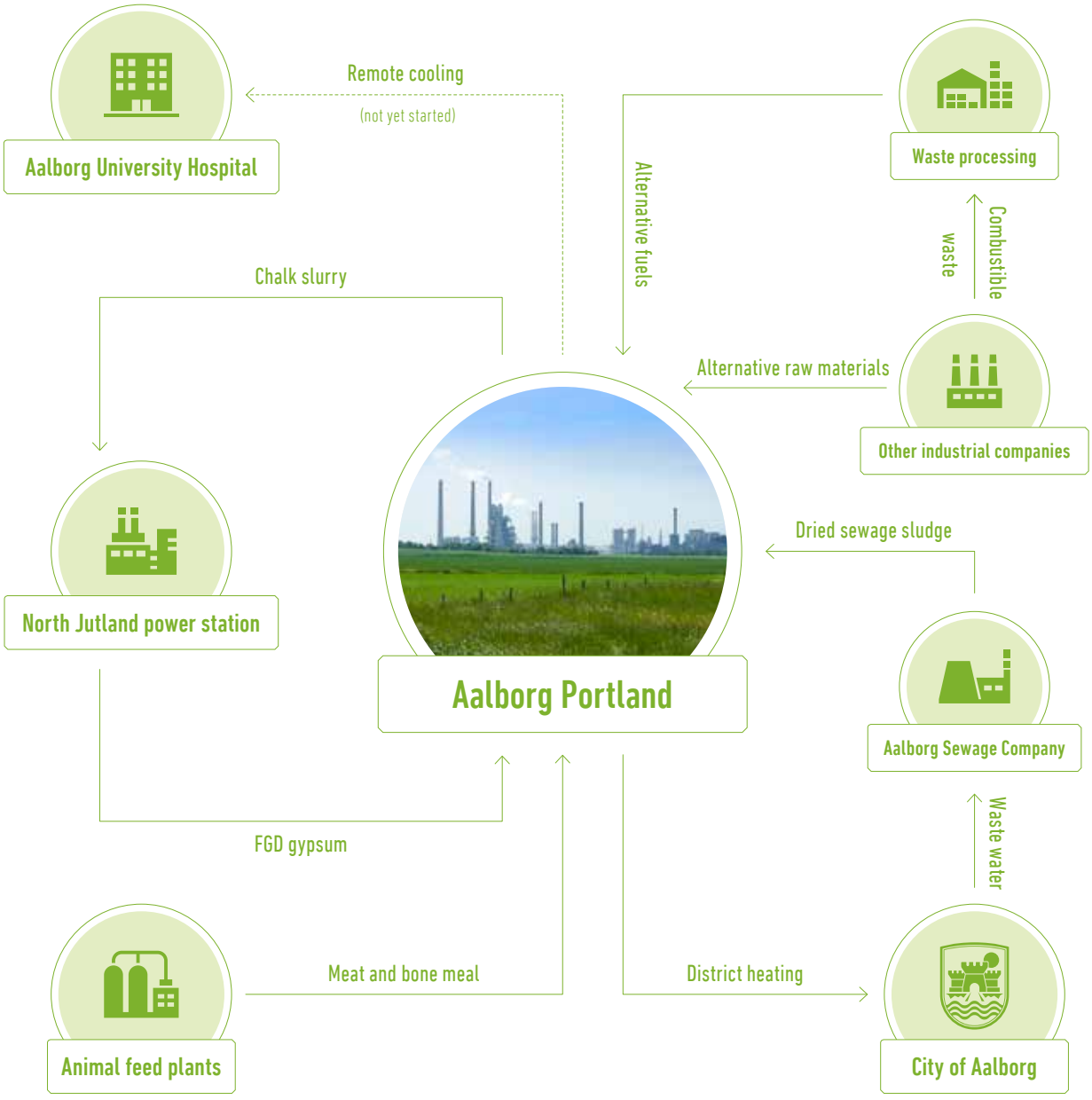


Bottom ash from biomass-fired power station

Kiln 87 with slurry basin

ENERGY AND RAW MATERIALS SYMBIOSIS

To reduce the use of fossil fuels and conserve natural materials, Aalborg Portland participates with other companies in a circular business model. For example, FGD gypsum from North Jutland power station ends up in our cement, while chalk slurry from cement production is used in flue gas cleaning at the power station. Municipal sewage sludge from Aalborg is used in our cement kilns, in return for which the city's residents are supplied with surplus heat from our production.



Manufacture of cement

The manufacture of grey and white cement is essentially identical except for differences in kiln configuration.

Sourcing of raw materials
Chalk and sand are the core components in all cements produced at Aalborg Portland. The chalk is sourced from Aalborg Portland's chalk pit, while the sand is obtained from Sandmosen and from dredging at Hals Barre. This dredging also serves to keep the Limfjord navigable.

Initial processing of raw materials
The chalk is first mixed with water in a slurry drum, while the sand is ground in a sand mill. The two ingredients are then mixed to form the finished kiln slurry.

Kiln process (grey cement)
The slurry is injected together with fly ash and pyrite ash into a dryer-crusher where the material is converted with the help of hot flue gases into raw meal. The raw meal is conveyed via a separating cyclone to the cyclone preheaters where it is heated to 750° C.

The raw meal is further heated in the calciners to 900° C, at which temperature the carbon dioxide is released. The material then enters the 74-metre long rotary kiln where it is gradually heated to a temperature of 1500° C to form cement clinker. The clinker is then cooled in the clinker cooler.

Process heat for the kiln is provided by coal, petcoke and alternative fuels, including waste products, dried sewage sludge and meat and bone meal.

Heat recovery
Heat recovered from the manufacture of white cement is used internally in the factory and supplied to the citizens of Aalborg. In 2018, the heat supplied was sufficient to meet the needs of 20,000 households.

Grinding in cement mill
After stockpiling in the clinker store, the clinker is ground in the cement mill to a fine powder together with a small percentage of gypsum to produce the types of cement required.

Packing and distribution
The cement is distributed in bags or in bulk by road or ship.

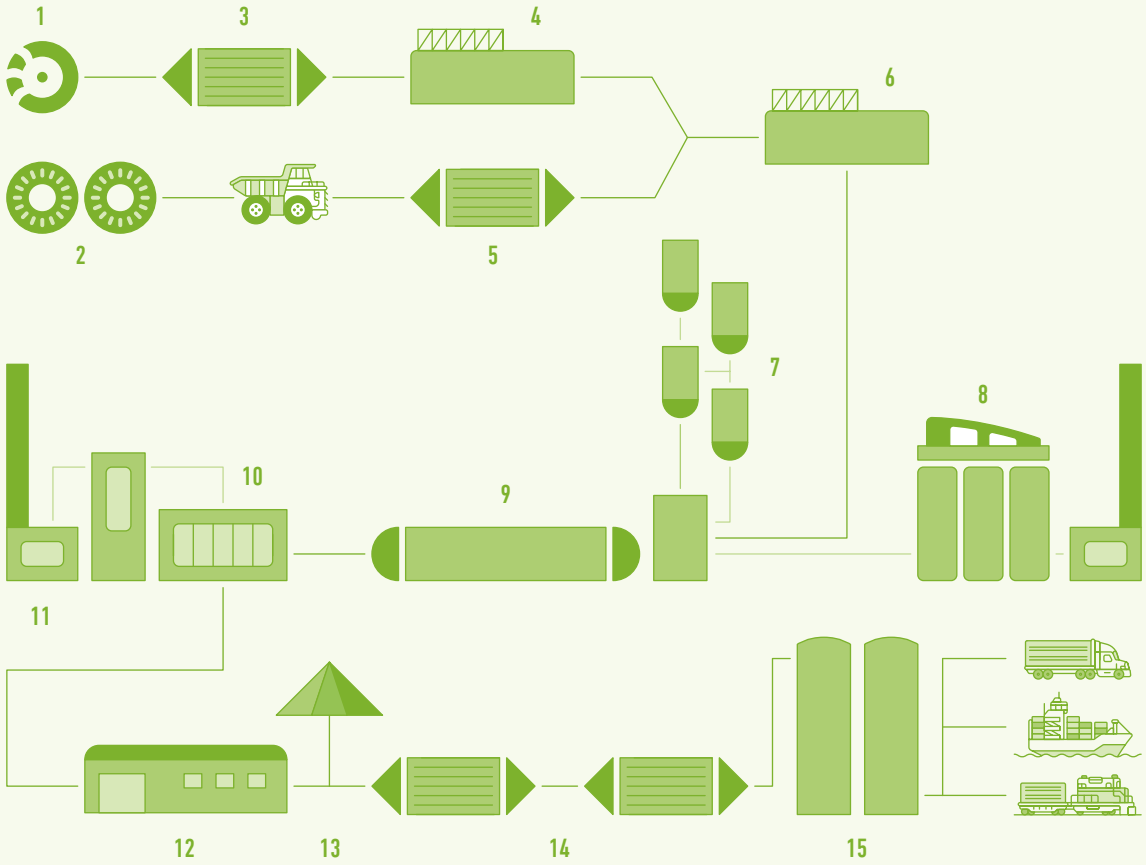
A quality product
The finished cement is ready for use in building projects large and small worldwide. It is a quality product which is used in concrete, mortar etc. and which adds strength, stability and long life to buildings and constructions everywhere.

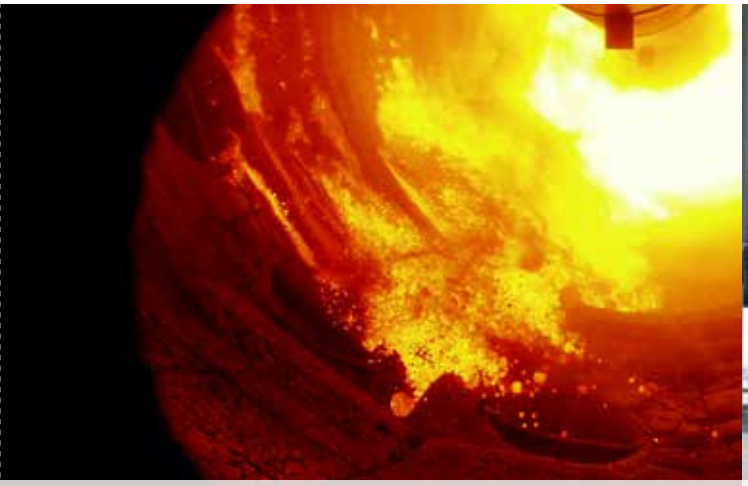
Excavator in the chalk pit with conveyor belt to the cement factory

Kiln 87 – cyclone tower

FROM RAW MATERIALS TO CEMENT

1. Chalk excavator
2. Sand dredger
3. Slurry drum
4. Chalk slurry
5. Sand mill
6. Finished slurry
7. Cyclone tower
8. Electrostatic precipitator
9. Rotary kiln
10. Clinker cooler
11. Electrostatic precipitator
12. Clinker store
13. Gypsum store
14. Cement mills
15. Cement silos





Burner zone in a rotary kiln with cement clinker

Transport of cement

CEMENT CONTRIBUTES WITH CONCRETE RESULTS IN A DYNAMIC WORLD

Cement is used to manufacture concrete and is the most widely used construction material in the world. Concrete's combination of functional, economic and aesthetic properties has made it the preferred building material. Foundations, metro, ports, bridges, tunnels, sewers, pavings, dams and buildings are examples of where cement is used. Architects, engineers and manufacturers are constantly seeking new areas of application.

The Great Belt Bridge, Denmark

House og Music, Aalborg, Denmark

Aalborg Portland products

Aalborg Portland manufactures both white and grey cement. Quality products which are distributed in bags and in bulk to the domestic and export markets.

All Aalborg Portland cements are CE-approved and conform to defined criteria in the cement standard EN 197-1 and the EU Construction Products Regulation. Monitoring of cement performance is carried out by Bureau Veritas which has certified Aalborg Portland's products. The CE mark also denotes that the product conforms to requirements for strength and physical, chemical and durability properties as defined in the cement standard.

Product properties are continuously tested by external independent laboratories in Denmark and internationally.

Supplementary classification
Furthermore, Aalborg Portland cements are classified and certified according to the standard DS/INF 135 relating to alkali content and sulphate resistance.

National product certification and marks
Aalborg Portland follows the market and customer wishes as regards certifications. Within Europe, there are several national product certifications, such as NF and BENOR. These are voluntary certifications relating to national cement standards.

Certifications impose additional quality demands on the product and are monitored by national certification bodies, AFNOR and BE-CERT. AALBORG WHITE cement is NF-certified in France and BENOR-certified in Belgium.

ARoS Art Museum, Aarhus, Denmark

Product information
It is important for us as manufacturers that information about our products is easily accessible. The intended use for each product must be stated in the product information and in the technical documentation produced for compliance with relevant legislation.

More information about our products can be found on our website www.aalborgportland.dk and relevant documents can be downloaded.

Declaration of Performance (DoP)
Declarations have been prepared for the individual products with name of cement. These are prepared according to the cement standard.

Safety Data Sheets (SDS)
Safety Data Sheets accompany the products and therefore form the basis for customers' own workplace instructions. The sheets contain details of any risks associated with working with the product along with information about relevant protection equipment etc. The sheets are prepared in accordance with CLP (Classification, Labelling and Packaging) regulations.

European Chemicals Agency and REACH
All our products are registered with the European Chemicals Agency (ECHA), and relevant documents are compiled in accordance with the REACH regulation.

Environmental Product Declarations (EPD)
The environmental profile of a product is based on declared values for climate and environmental impact, consumption of resources, waste, etc.

To ensure compliance with these new product information requirements we have joined forces with Aalborg University to develop Life Cycle Assessment (LCA) models, and thereby identify the environmental hotspots in our value chain – from chalk extraction to product packaging.

Aalborg harbour front

Cement products manufactured for the Danish market include the following:

BASIS® cement
Suitable for pre-cast concrete units and concrete products.

RAPID® cement
Suitable for ready-mixed concrete, pre-cast concrete units, concrete products, floors and screeds.
Also suitable for masonry mortars, including lime cement mortars used in building, rendering etc.

BASIS® AALBORG cement
Suitable for general concreting and construction work on building sites, such as foundations, floors, masonry, rendering etc.

MESTER® AALBORG cement
Suitable for lime cement mortars used in construction, pointing, rendering, roofing etc.

AALBORG WHITE® cement
General-purpose cement, but the preferred choice when the specification calls for white or pigmented concrete.

LOW ALKALI SULPHATE RESISTANT cement
Specially developed for concrete used for civil engineering structures such as bridges or constructions in contact with sulphate-containing groundwater.


aalborgportland
AALBORG WHITE® CEMENT

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

Cement and concrete of the future

Aalborg Portland is involved in developing a variety of cements and concretes for the future. We thereby contribute to UN Global Goal 9, which targets building of robust infrastructure, promoting inclusive and sustainable industrialisation, and supporting innovation.

GREEN CONCRETE II

The objective is to create cement and concrete that can be produced with less energy consumption and less CO_2 emission. The Danish Innovation Consortium has been working since 2014 to develop eco-friendlier concretes that promote sustainable future building.

Innovation and sustainability
The Innovation Consortium, often called Green Concrete II, is an R&D project run by the Centre for Green Concrete at the Danish Technological Institute. The project's aim is to develop concretes for the future that consist of alternative cement materials. The project is backed by Aalborg Portland and partners which consist of companies, public institutions and knowledge centres. The partners work closely together to create a platform for a transition to green cement and concrete production in Denmark.

The project therefore seeks to identify new ways of further reducing CO_2 emission from cement production and to find solutions that can remedy an increasing shortage of fly ash for concrete production.

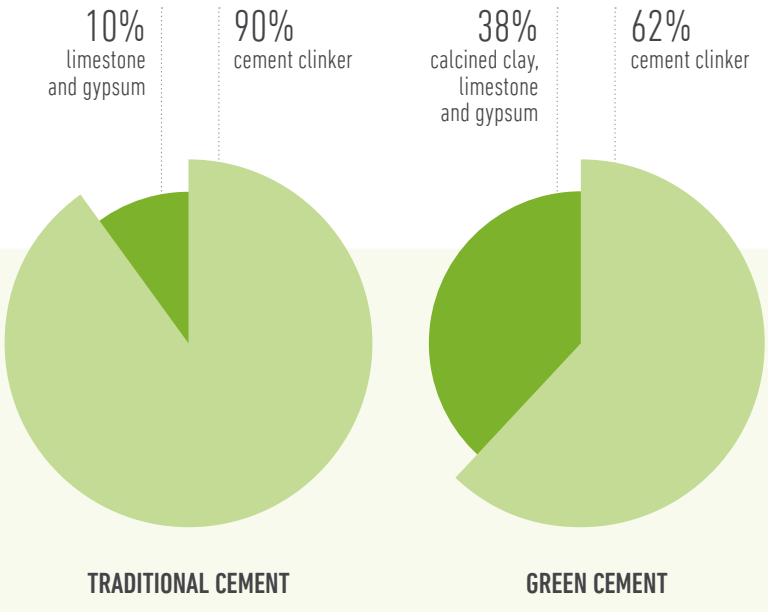
Composition of green concrete
Green concrete differs from conventional concrete in that the traditional cement content is replaced by limestone and calcined clay, which are burned at significantly lower temperatures than cement. This means substantially less energy consumption, reducing CO_2 emission by up to 30%.

Moreover, combination of cement, limestone and calcined clay as a binding agent in green concrete means that fly ash be wholly or partly excluded from the concrete composition.

Innovation with a sustainable perspective
Worldwide substitution of existing cements and concretes by the new green equivalents developed in Denmark can reduce global CO_2 emission from construction by 400 million tonnes annually.

FACTS ABOUT THE NEW GREEN CEMENT

Traditional cement consists primarily of approx. 90% cement clinker, the remainder being equal parts limestone and gypsum. The new green cement consists of approx. 62% cement clinker, just under 17% calcined clay, just under 17% limestone and the rest gypsum. The result is a significantly smaller CO_2 footprint.



BUILDING OF BRIDGE AND LABORATORY SHOWS THE WAY

2016

In 2016, sections of a new road bridge on the Herning-Holstebro motorway showcased the first major demo project for green concrete.

2017

In 2017, the project took another important step when parts of two new demo bridges in Lolland were cast using green concrete. An important contribution to a full-scale view of the new technology.

2018

In 2018, the Technological University of Denmark (DTU), one of the project participants, began work on a new concrete and materials testing laboratory built partly of green concrete.

Using green concrete, a wall was cast in situ in the main auditorium. The floor in an adjoining technical room was also constructed using green concrete. The concrete will be subject to ongoing analysis by scientists from DTU and the Technological Institute of Denmark who will test and assess curing and strength development.

Research & Quality Centre

THE INNOVATION CONSORTIUM

Formed on 1 March 2014, the Danish Innovation Consortium is co-funded by Innovation Fund Denmark and has a total budget of EUR 3.9m. The consortium members are: Aalborg Portland A/S, Femern A/S, Rail Net Denmark, Sweco A/S, Rambøll Denmark A/S, MT Højgaard A/S, Unicon A/S, Fabriksbetonforeningen, DTU Civil Engineering, Danish Road Directorate, Danish Energy Agency, Copenhagen School of Design and Technology (KEA), Business Academy Zealand, Lillebaelt Academy, Via University College - Campus Horsens, Centre for Concrete Education (AMU North Jutland) and Danish Technological Institute.

ENVIRONMENT AND ENERGY IN FOCUS

Aalborg Portland is an industrial company with a large land area that includes a cement factory and chalk pit, and environmental and energy factors are fully monitored.

The principal factors are covered in pages 32-51 under the following headings: Raw materials, Energy, Emission to the atmosphere, Noise, Water, Waste, Land use, and Sustainable distribution.

To govern these environmental and energy factors, Aalborg Portland has introduced environmental and energy management. We focus on ongoing improvements and operate with defined targets to deliver enhanced environmental and energy performance.

Conveyor belt for waste fuels to Kiln 87

Environmental management

Aalborg Portland has an integrated Management System that embraces quality, environment, CO_2, energy, and health & safety. The Management System is an integral part of our everyday life, is instrumental in keeping focus on the key factors and helps to make our policies a reality.

The Management System establishes requirements and defines targets and action plans so that our performance in the areas concerned can be continuously improved, cf. the section "Environmental and energy targets – actions and results".

The Aalborg Portland Management System conforms to international standards and is certified by Bureau Veritas. The certification is an independent guarantee that Aalborg Portland meets criteria defined in these standards.

In 2018, the Management System was re-certified according to the latest standards for quality (ISO 9001:2015) and environment (ISO 14000:2015). In addition, the filler product – asphalt binder – was certified by Bureau Veritas according to EN 13043:2002/AC:2004.

The Aalborg Portland Management System is subject to external audit, the purpose of which is to assess its effectiveness and to recommend improvements in control, risk management and business processes. The audit is based on objective evidence of business processes and analysis of data. In 2018, 14 external audits were performed, independently of one another, by Bureau Veritas, DANAK, AFNOR and BE-CERT.

> The Aalborg Portland Management System conforms to international standards and is certified by Bureau Veritas.

AALBORG PORTLAND'S CERTIFICATIONS

- ISO 9001:2015
- Technical regulation for Bulk Carriers No. 9639 of 09/10/2002
- ISO 14001:2015
- EMAS regulation 1221:2009
- CO_2
- ISO 50001:2011
- OHSAS 18001:2008 and Danish Health & Safety Order No. 1191
- KLS-A / D
- EN 197-1:2011, EN 197-2:2014
- DS/INF 135:2015
- NF 002:2017
- TRA 600 C and P+E:2016
- EN 12620:2002+A1:2008
- EN 13043:2002
- ISO 17025:2005

Principal environmental influences
Cement manufacture involves consumption of energy and raw materials, and therefore gives rise to environmental influences in the form of emission of flue gases, wastes, noise, effluent, etc. There are also environmental influences relating for example to product distribution, extraction of raw materials and reprocessing of fuels.

Materiality criteria
The point of departure is the list of pollutants and emission limits for reporting to the European Pollutant Release and Transfer Register.

In our environmental and energy activities the principal direct and indirect environmental influences have been mapped and chosen according to the following criteria:

- Spread of substances, and climate and environmental impact.
- Volumes.
- Terms of environmental approvals and consideration for neighbours.
- Optimisation of raw material resources.
- Receipt of waste products from other industries.
- Energy savings potential.
- Minimised energy consumption during distribution.
- Product development and research into sustainable manufacture of cement and concrete.
- Biodiversity.

Environmental approval
Environmental influences are regulated in Aalborg Portland's environmental approvals and permits, as listed in the section "General information".

On 10 March 2017, the Danish Environmental Protection Agency concluded its review of Aalborg Portland's environmental status with a decision on update of terms in existing environmental approvals.

Aalborg Portland has reduced both CO_2 and NO_X emissions materially since 2000 and continuously implements new environmental improvement initiatives, including environmental investments.

Ahead of this, Aalborg Portland had, among other things, updated its environmental technical description and noise, emission and immission calculations, and completed a basic status study for soil and groundwater. In addition, a BAT statement had been prepared for atmospheric emissions, containing a technical, economic and environmental assessment based on best available cement industry technology.

The current environmental approvals stipulate conditions for operation, including:

- Conditions for atmospheric emissions, covering kilns, cement and coal mills, cooler stack and boiler plant.
- Conditions for factory noise emissions.
- Conditions for release of process waste water, cooling water, rainwater, etc.
- Requirements for handling and reporting of serious breakdowns and accidents.
- Requirements for operation of raw material and fuel stores.
- Requirements for operation of on-site landfills and recycling facilities.

House of Music, Aalborg, Denmark

Basisår

KEY PERFORMANCE INDICATORS

	Unit	2000	2014	2015	2016	2017	2018
Grey cement production							
Energy	GJ per tTCE	4.78	4.50	4.45	4.31	4.41	4.43[a]
CO_2	Kg per tTCE	897	781	761	756	764	734[a]
NO_X	Kg per tTCE	3.72	0.62	0.70	0.63	0.76	0.65[b]
White cement production							
Energy*	GJ per tTCE	6.80	6.74	6.82	6.89	6.98	7.49[d]
CO_2*	Kg per tTCE	1,276	1,144	1,155	1,173	1,180	1,235[d]
NO_X*	Kg per tTCE	3.82	1.39	1.51	1.69	1.71	1.95[e]

* Adjusted for heat recovered and supplied to the City of Aalborg's district heating network. Adjustment for saved CO_2 and NO_X has been calculated using the North Jutland power station's emission and energy values for coal firing based on the 125% thermal efficiency method.

[a] In grey cement production, energy consumption was on a level with 2017, but increased slightly due to changes in fuel and raw material mix with consumption of more alternative fuel and grinding of more sand and oxiton.

[b] Increased consumption of alternative fuels with content of CO_2-neutral biomass has improved the CO_2 key performance indicator for grey cement production.

[c] In grey cement production, decreased NO_X was partly due to increased consumption of alternative fuel, which has a NO_X-reducing effect. It was also partly due to adjustment of NO_X reduction from SNCR equipment.

[d] In white cement production, energy consumption and CO_2 increased due to unstable first-half operation. Frequent kiln stops meant there was no production during kiln scavenging and reheating of kiln installations after operating stops. In addition, less heat recovery for district heating impacted the key performance indicators for energy consumption and CO_2 with reduced adjustment.

[e] Increased NO_X in white cement production was due to rising NO_X level in periods with kiln scavenging and no production. Unstable operation led to frequent scavenging in first-half 2018.

Environmental performance

As follow-up to our environmental and energy activities, material key performance indicators for grey and white cement production have been selected and can be seen in the table above.

Key performance indicators are relative values where consumption and emission are set in relation to production. The section "Material flows" shows KPI development in the past five years for overall production.

Increases can occur in certain key performance indicators from year to year, as was the case for white cement production in 2017-2018. The increases were due to short-duration periods of unstable kiln operation or changed production-technical conditions. Most importantly, however, Aalborg Portland has reduced both CO_2 and NO_X emissions significantly since year 2000, and is continuously implementing new environmental improvement initiatives, including environmental investments.

Environmental and energy targets – actions and results

TARGETS 2018	STATUS 2018
ELECTRICITY SAVINGS Continued focus on reducing base power load and on power-saving measures.	
The target in 2018 was to implement power-saving studies, including for baseload equipment. Special studies to be performed: • Reduction of power consumption by transfer of hot air from Kiln 87's clinker cooler to Kiln 76. • Installation of frequency converters on Kiln 87's cooler fans.	Target achieved by implementing the following studies and projects: • Study showed, seen in isolation, no net power saving from fewer coal mill grinding hours as this was offset by power consumption for transfer of hot air from Kiln 87's clinker cooler to Kiln 76. However, proven annual coal saving potential was 6,373 MWh. The project was completed. • Special study showed that that there was no need for damper adjustment of cooling air with frequency converter. Special studies for the following project were also performed: • Change to LED lighting in Kiln 87's cyclone tower. The completed project will deliver annual saving of 164 MWh.
The target was to maintain the specific variable power consumption of 108 kWh per tTCE.	Target not achieved. The specific variable power consumption could not be maintained, but was still reduced by 5.4% to 111.6 kWh per tTCE compared with 118 kWh per tTCE in base year 2010. Reasons included grinding of cement clinker without the roller press, which has been out of operation on Cement Mills 7-10, and increased slurrying of sand and oxiton as replacement for fly ash.
WIND TURBINES The 2018 target was to replace 18% of power consumption relative to 2014 by renewable energy supplied by five wind turbines to be installed at Aalborg Portland. In 2018, Aalborg City Council's approval of the local planning addendum for installation of five wind turbines at Aalborg Portland was awaited.	Target not achieved. Aalborg City Council approved the proposed local planning addendum of 15 December 2014 for installation of five wind turbines at Aalborg Portland (Bredhage). Objections from the 2015 public inquiry are being processed by the City of Aalborg. The parties are agreed on seeking dispensation from the overall noise picture in the district to enable Aalborg Portland to install wind turbines. Aalborg City Council's final approval of the local planning addendum is awaited.
FUEL SAVINGS In 2018 the target was to perform a study aimed at achieving an annual fuel saving of 6,750 MWh by a project: • To use surplus heat from Kiln 87's clinker cooler as hot primary air for Kiln 76.	Target achieved. A study was performed demonstrating a potential specific annual saving of just under 6,500 MWh. The project has been completed.

TARGETS 2018	STATUS 2018
ALTERNATIVE FUEL The ultimate target is to replace min. 60% and 20% of the fuel energy for grey and white cement production respectively by alternative fuel, reducing CO_2 emission.	
In 2018 the target was to replace 52% of the fuel energy in grey cement production.	Target achieved: 56% of fuel energy for Kiln 87 was replaced.
The target for the white cement kilns was to replace 3.2% of the fuel energy. To reach the 20% target, continue examining suitable waste fuels which do not change the cement quality. A promising alternative fuel is being tested to determine handling, storage, conveying and feed equipment, and scale of investment.	Target achieved – 4.0% of fuel energy for white cement kilns replaced.
CO_2 REDUCTION Continued focus on reducing CO_2 emission via increased consumption of biofuel, and ultimately development of new cement types*.	
The target was unchanged: Reduce CO_2 emission from grey cement production by 3% against 764 kg CO_2 per tTCE in 2012.	Target achieved. CO_2 emission was reduced to 734 kg CO_2 per tTCE. This was 4% less than in 2012 and a decrease of 18% since 2000 when activities were stepped up to recycle burnable waste containing CO_2 neutral biomass.
The target was unchanged: Reduce CO_2 emission** from white cement production by 2% against 1,139 kg CO_2 per tTCE in 2012. * "Cement and concrete of the future" is discussed on page 18 and forms part of research projects that promote sustainable development. ** Adjusted by CO_2 fraction relating to heat recovered for district heating in the City of Aalborg. Calculated according to the 125% thermal efficiency method.	Target not achieved. Unstable operation meant rising fuel consumption and associated CO_2 emission. CO_2 emission** from white cement production increased to 1,235 kg CO_2 per tTCE. equal to 8%.
NO_X REDUCTION The target was to maintain low NO_X emission in the normal range of 0.77 - 0.98 kg per tTCE with the NO_X-reducing technologies introduced, where regard is paid to reducing dust in the work environment and compliance with the NH_3 limit.	Target not achieved. Specific NO_X emission was 1.06 kg per tTCE, 8% above the normal range. This was due to unstable operation in white cement production in first-half 2018. Scavenging was frequent, production was not optimal and NO_X level increased.
WASTE The target was to recycle 40,000 tonnes of landfilled materials (filler) for rehabilitation of the chalk pit.	Target achieved. In 2018, 59,144 tonnes was recovered from landfill for use in rehabilitation of the chalk pit.

THE GLOBAL GOALS
For Sustainable Development

UN Global Goals and Aalborg Portland 2019

4 QUALITY EDUCATION

We supply ongoing training for the Danish work force. We do this by educating apprentices and interns, recruiting graduates and re-training our experienced personnel.

GOALS 2019

Aalborg Portland has decided to continue its graduate programme launched in September 2017. In 2019, six newly qualified graduates will therefore receive two years of rotational training consisting of three eight-month periods with different departments, both nationally and internationally, and with our sister company Unicon.

In 2019, staff re-training and provision of knowledge relating to new technology will be delivered through 11 specialist technical courses planned in collaboration with VDZ (Verein Deutscher Zementwerke e.V).

7 AFFORDABLE AND CLEAN ENERGY

Aalborg Portland is committed to contributing to sustainable development in partnership with society.

Sustainable energy embraces a host of possibilities. For Aalborg Portland these include the potential to supply surplus heat and district cooling and to generate energy from internal wind turbines.

GOALS 2019

In 2019, Aalborg Portland will continue to recover surplus heat for supply as district heating to Aalborg residents.

2019 will see the start of the project to use cold water from Aalborg Portland's chalk lake to supply district cooling for Aalborg's future University Hospital. This will replace the provision of conventional comfort and process cooling by electrical cooling systems.

Our target is to produce 18% of electricity consumption compared with 2014 by five wind turbines to be installed on Aalborg Portland land. Final approval by Aalborg City Council is awaited in 2019.

Cement is used in many contexts and is characterised by high strength and long life. Cement research is investigating the possibilities for minimising CO_2 footprint, partly by efficient use of resources and partly by developing new types of cement.

For efficient use of resources, see the section on "Raw materials".

GOALS 2019

Our target in 2019 is to carry out pilot production of FUTURECEM cement.

We see ourselves as a part of the city of Aalborg and are committed to maintaining close contact with neighbours and being part of the sporting and cultural life of the city and North Jutland. We arrange guided tours, information events and hold meetings with neighbours. We also sponsor the zoo, theatre, art museum, handball and football clubs, and participate in a variety of events and workshops.

GOALS 2019

In 2019, we plan to hold information meetings for our neighbours on activities in Rørdal chalk pit and to initiate collaboration on development of Portland Lake Park.

In the manufacture of cement we use by-products from other companies as substitutes for natural raw materials, and wherever possible we use alternative fuels instead of fossil fuels.

A by-product of our cement manufacture is also being used in the rehabilitation of Rørdal chalk pit.

For efficient use of resources, see the section on "Raw materials".

GOALS 2019

Substution of alternative fuel for fossil fuel
Our target is to replace 58% of the fuel energy used in grey cement production and 5% of the fuel energy used in white cement product with alternative fuels.

Recycling
Our goal in 2019 is to rehabilitate the chalk pit with 40,000 tonnes of a cement manufacture by-product (filler).

Aalborg Portland is focused on reducing CO_2 emissions by action several fronts: We are involved in research to develop cement that can be manufactured with a lower CO_2 footprint. Details of this research are contained in the section "Cement and concrete of the future". We are also implementing energy-saving investments in our existing production. We are further engaged in an optimisation programme to expand the degree to which fossil fuels can be replaced by alternative fuels.

In addition, we are carrying out ongoing studies / pilot projects to exploring the opportunities for energy-saving projects.

GOALS 2019

In 2019, we have defined the following specific targets and action on support of UN Global Goal 13, Climate Action:

For information on research activities, see the section "Cement and concrete of the future".

CO_2 reduction

Our target is to maintain CO_2 emission from grey cement production at 734 kg CO_2 per tTCE, as in 2018.

For white cement production our target is to continue reducing CO_2 emission* by 2% compared with 1,139 kg CO_2 per tTCE in 2012.

* Adjusted by CO_2 fraction relating to heat recovered for district heating in the City of Aalborg. Calculated according to the 125% thermal efficiency method.

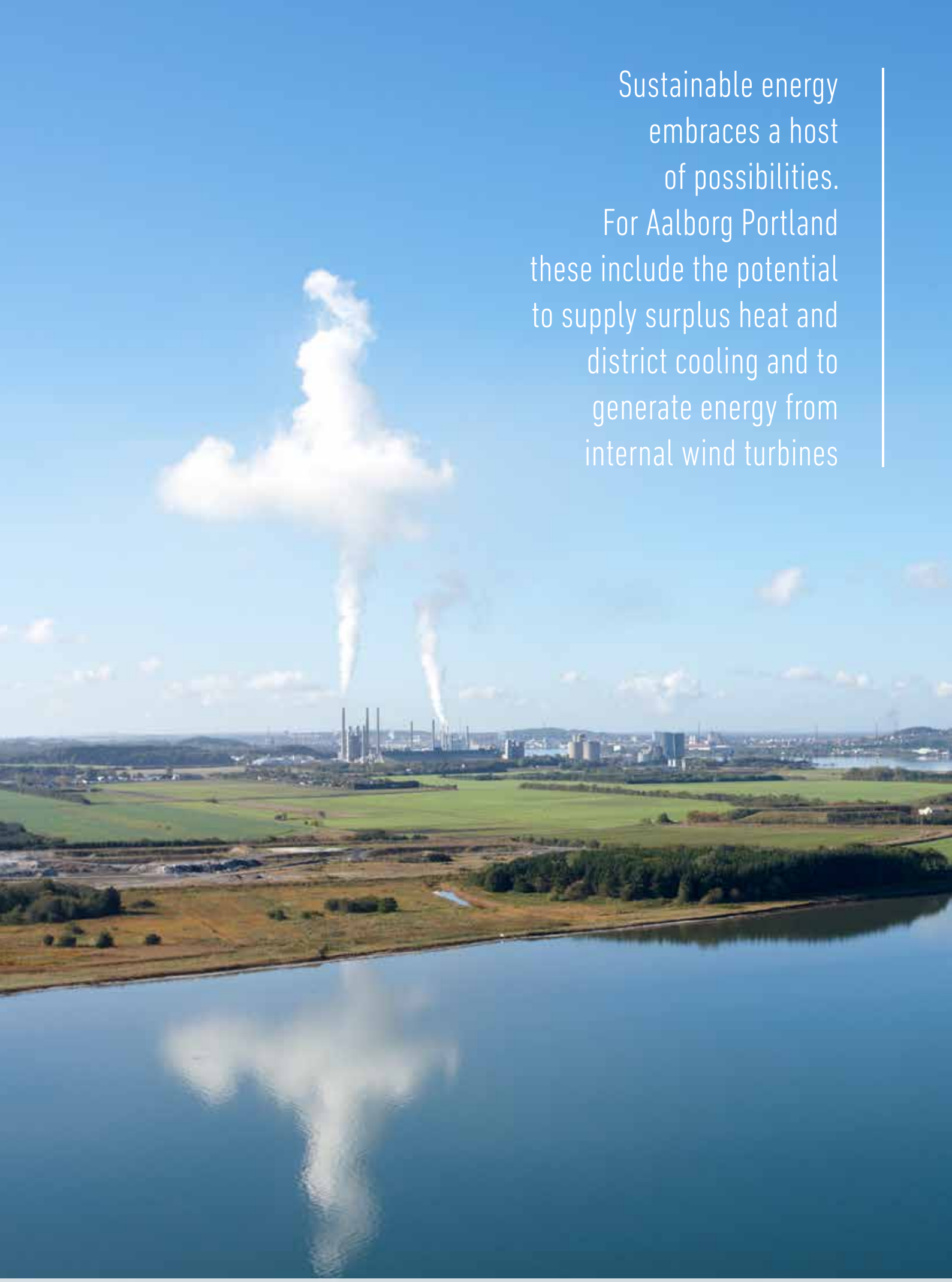
Fuel savings

In 2019, our target is to achieve an annual fuel saving of 22,000 MWh by the following specific project:

- Installation of energy-efficient lining bricks in the burning zone on Kilns 74 and 78.
- Use of surplus heat from Kiln 87's clinker cooler as hot primary air for Kiln 74 and 78 and Coal Mill 7.

Besides the targets above, the following studies / pilot projects are planned for 2019 to examine the scope for energy-savings:

- Feasibility study for upgrading the existing slurry feed system (expected reduction: 75,000 kWh).
- Feasibility study for eliminating bottlenecks in the fly ash feed system (compressed air system) (expected reduction: 300,000 kWh).
- Study of selected compressed air consumptions and potential for improvements (anticipated reduction: 300,000 kWh).
- Replacement of selected lighting to LED in the store, grey cement mills and outdoor lighting along the administration building (expected reduction: 300,000 kWh).
- Testing of a dispersant that allows slurry water content to be reduced without compromising fluidity. Less energy will thereby be required for subsequent evaporation of the water volume (expected reduction: up to 170,000,000 kWh).



Sustainable energy
embraces a host
of possibilities.
For Aalborg Portland
these include the potential
to supply surplus heat and
district cooling and to
generate energy from
internal wind turbines

Environmental dialogue

Aalborg Portland is a part of the community both locally, regionally, nationally and internationally. It is important for us to have close contact with our neighbours and other stakeholders and to be a part of the local community. We do this through invitations to events and by supporting local sport and culture. The aspirations of UN Global Goal 13, Sustainable Cities and Communities, are encapsulated in our longstanding presence in the city of Aalborg.

Aalborg Portland strengthens ongoing contact with stakeholders through a variety of important activities:

- In 2018, we hosted around 100 visits and some 2,000 guests. Visitors were briefed on Aalborg Portland's sustainability activities and had opportunity to ask questions.
- We held information meetings with neighbours and other stakeholders at which we described our excavation and rehabilitation plans for Rørdal chalk pit and presented our initiatives and results with regard to environment and energy.
- Aalborg Portland employees address external courses and meetings.
- We involve environmental data from suppliers through supply contracts which embrace environment.
- We maintain ongoing contact with Danish and EU environmental authorities on proposed legislation and regulations that will affect the company.

The Aalborg Portland Environmental Report is distributed to many stakeholders nationally and internationally, including neighbours, owners, authorities, politicians, the Danish Society for Nature Conservation, customers and suppliers.

The report is also freely available on Aalborg Portland's website.

To ensure optimum motivation and dialogue with internal and external stakeholders on our environmental activities, all parties are urged to voice opinions and suggest improvements concerning our reporting.

External complaints
Aalborg Portland received 37 external complaints in 2018, mainly about noise and dust.

Number of emissions resulting in complaints

	2014	2015	2016	2017	2018
Dust	21	33	39	30	34
Noise	1	1	1	4	3
The Limfjord	1	1	1	5	0
Other	1	0	0	1	0

The complaints about dust related to handling of outdoor clinker, electrostatic precipitator outages, and airborne dust caused by excavation in the chalk pit. To minimise the annoyance due to dust, indoor clinker storage has been established and two new calciners have been installed for Kiln 87. This has helped to stabilise operation, thereby reducing precipitator downtime. A new precipitator control method has also been developed and is currently being tested. If suitable, this will further reduce the number of outages on the kiln precipitators.

The airborne dust from excavation was mainly due to the very dry summer when the water content of the chalk evaporated and the chalk was extra dry. Watering of chalk and roads was established to bind the dust and thereby minimise the problem. Together with the supplier, solutions are also being developed to enclose the bucket wheel excavator. Meetings have been were held with neighbours concerning the measures taken.

The complaints about noise relate to excavation in the chalk pit. In order to minimise noise emission a number of measures have been introduced. These involve both replacement of mechanical parts and enclosure of relevant equipment, cf. "Noise reduction project for deep-excavator" in the section "Noise".

In conjunction with these measures, meetings have been held with the relevant neighbours to identify problem perception and provide ongoing information on remedial action.

In 2018, Aalborg Portland hosted around 100 visits and some 2,000 guests. Visitors were briefed on sustainability activities and had opportunity to ask questions.

Active students at Concrete Workshop 2018

SUPPORT FOR SPORTING, CULTURAL AND EDUCATIONAL ACTIVITIES

Aalborg Portland provides sponsor support for a variety of local sporting and cultural activities, including Aalborg zoo, theatre, art museum, Utzon centre, and football and handball clubs.

In 2018, Aalborg Portland also sponsored the Danish nationwide charity organisation (Danmarksindsamlingen), cancer relief, Danish Hospital Clowns and the Multiple Sclerosis society.

In addition, Aalborg Portland participated in "Concrete Workshop 2018" where 300 students from Aalborg University, AMU North Jutland and UCN University College created concrete sculptures for Frederikshavn Municipality on a coastal theme.

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

Raw materials

Cement is produced using raw materials from natural resources, including chalk, sand and gypsum. UN Global Goal 12, Responsible Consumption and Production, is an integral part of our manufacturing concept.

Aalborg Portland began using fly ash – a power station by-product – almost 40 years ago. A number of other alternative raw materials have subsequently been included in production.

In order to limit the impact on natural reserves of these materials, Aalborg Portland in 2018 replaced more than 10% with alternative raw materials in the form of by-products and wastes from other industries and society which are therefore recycled as a resource.

Sand from dredging
Sand dredgers keep navigation channels at Hals Barre and in the Limfjord open for the passage of ships. The dredged sand, which would otherwise be dumped in the Kattegat, thereby impacting the marine environment, is instead used in cement manufacture. It takes the place of sand from quarries, thereby helping to preserve the landscape. The cement factory's position next to the Limfjord also offers an effective logistical solution as the dredgers can pump the sand directly into drainage basins ashore.

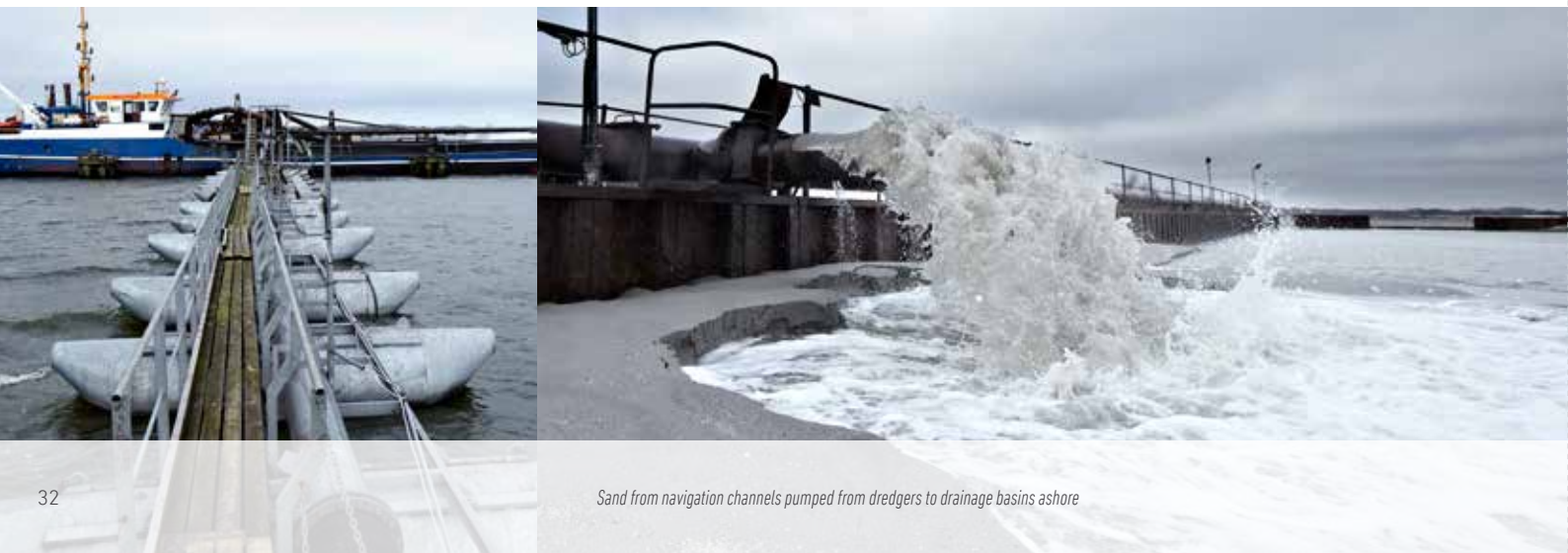
FGD gypsum
Gypsum from desulphurisation of flue gases is used as an additive in cement manufacture. Obtained from both Aalborg Portland itself and the local North Jutland power station, this product replaces natural gypsum and anhydrite sourced in Morocco and Germany. The amount of long-distance transport by sea is thereby reduced.

The local partnership between Aalborg Portland and North Jutland power station is a good example of industrial symbiosis. We supply chalk slurry to the power station for use in desulphurisation and take the desulphurised gypsum product in return.

Fly ash
Fly ash, a mineral product resulting from power and heat generation at coal-fired power stations, has been recycled at Aalborg Portland since the 1970s. In cement production the fly ash replaces natural clay which would otherwise have to be sourced in Denmark.

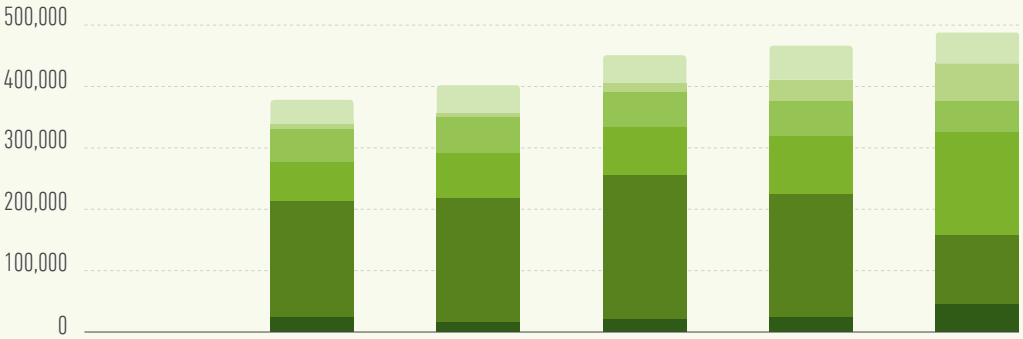
Iron oxide
Iron oxide (pyrite ash) is a by-product of the manufacture of sulphuric acid and is a necessary source of iron for production of grey cement.

Oxiton
Oxiton, also called serox, is an aluminium oxide derived from the processing of recycled aluminium.



Sand from navigation channels pumped from dredgers to drainage basins ashore

ALTERNATIVE RAW MATERIALS – tonnes



	2014	2015	2016	2017	2018
Iron oxide	39,102	42,763	45,154	55,617	50,936
Oxiton	7,328	7,643	12,413	33,888	64,189
FGD gypsum	53,490	56,961	57,203	58,172	51,077
Sand	64,314	75,410	79,239	92,913	161,106
Fly ash	189,339	201,406	235,031	202,801	124,225
Other	24,608	16,107	21,313	23,882	36,581
Total	**378,181**	**400,290**	**450,353**	**467,273**	**488,114**

In 2018, the volume of alternative raw materials used at Aalborg Portland is just over 480,000 tonnes. Usage of sand and oxiton particularly increased, compensating for falling supplies of fly ash for the production of grey cement clinker.

Bucket wheel excavator in the chalk pit

Climate action

Aalborg Portland has invested in energy savings in the form of power and fuel consumption since the 1990s. In the case of fuel consumption, massive changes in technology have also taken place that have made it possible to substitute alternative fuels for fossil fuels. Climate Action, UN Global Goal 13, is therefore a longstanding area of focus for Aalborg Portland. In 2018, alternative energy sources accounted for more than 56% of energy consumption in grey cement production, a new record.

Energy saving
Aalborg Portland has worked hard for many years to identify energy savings in factory power and fuel consumption. The heightened focus in recent years on improving energy efficiency of existing production equipment has led to new ideas and new projects for saving energy.

Surplus heat from Kiln 87's clinker cooler to Kiln 76
Kiln 87 produces around 4,500 tonnes of grey cement clinker daily. The hot cement minerals, with a temperature of 1400° C, are cooled in a clinker cooler by injection of atmospheric air.

Most of the hot air is returned and recycled energy-efficiently in Kiln 87's calciners, but a small fraction from the kiln back end is not fully utilised.

An energy-saving project has therefore been launched which aims to use the hot air in the factory's five other kilns, which produce white cement clinker, and for drying coal in one of the factory coal mills.

Aalborg Portland has teamed up with consultants and machine builders to build a supply line and a branch pipe for recycling the hot air.

More than 100 metres of large diameter (1800 mm) pipe have been fabricated and installed, along with 30 tonnes of load-bearing structural steel.

Kiln 76, the first kiln to be connected to the supply line, has demonstrated that Aalborg Portland can save approx. 6,400 MWh annually, corresponding to 865 tonnes of coal. With all five white cement kilns and one coal mill connected the potential saving will be 29,800 MWh annually or more than 4,000 tonnes of coal.

Surplus heat from Kiln 87's clinker cooler to Kiln 76

In 2018, Aalborg Portland succeeded in raising consumption of alternative fuel to a record 215,000 tonnes, 50,000 tonnes higher than the previous year.

Alternative fuel – Waste is energy

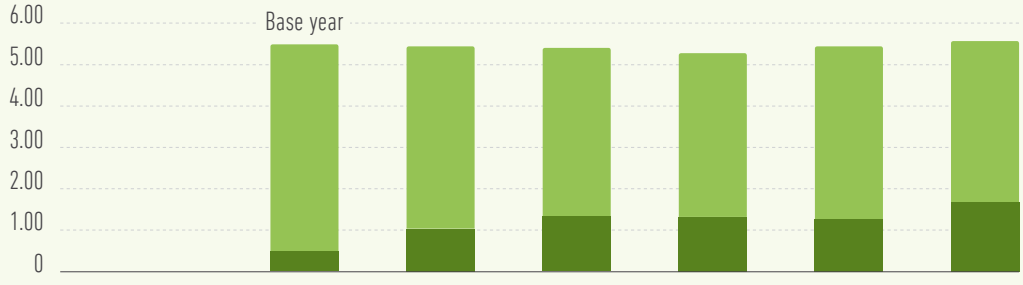
Recycling of waste contributes to a resource-efficient society. In cement production, waste can be recycled as a resource by replacing coal and petcoke. Waste fuels helps to reduce emissions of CO_2, NO_X, SO_2 etc. in the flue gases, and biomass content can be recycled, which supports the global climate cause. By way of example, meat and bone meal are considered wholly CO_2 neutral, and in industry waste the fraction of biomass carbon is typically 30-40% when substituted for fossil fuels.

In 2018, Aalborg Portland succeeded in raising consumption of alternative fuel to a record 215,000 tonnes, 50,000 tonnes higher than the previous year. This was a result of previous years' investment in equipment and technology for recycling waste as a resource. For more information, see fact box in the section "Investment in climate and environmental improvements".

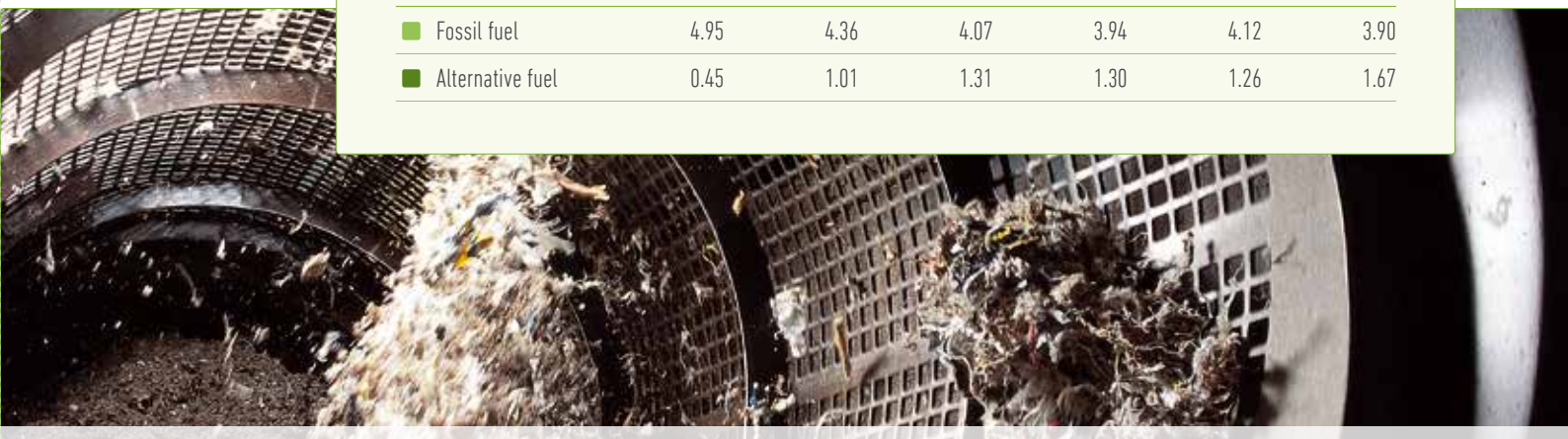
The relative consumption of alternative fuel which replaces fossil fuel such as coal and petcoke has risen from 0.45 to 1.67 GJ per tTCE since 2000, which in 2018 corresponds to a substitution of 30% of total fuel consumption.

In 2017 and 2018, relative fuel consumption increased slightly as kiln slurry consisting of sand and oxiton must be evaporated. This slurry mix is increasingly substituted for dry fly ash due to the phasing out of coal at power stations. First-half 2018 was also characterised by unstable white cement production with frequent kiln stops, and with scavenging and reheating of kiln equipment after operating stops. This resulted in fuel consumption without optimal production.

CONSUMPTION OF FOSSIL AND ALTERNATIVE FUEL – GJ per tTCE



	2000	2014	2015	2016	2017	2018
Fossil fuel	4.95	4.36	4.07	3.94	4.12	3.90
Alternative fuel	0.45	1.01	1.31	1.30	1.26	1.67



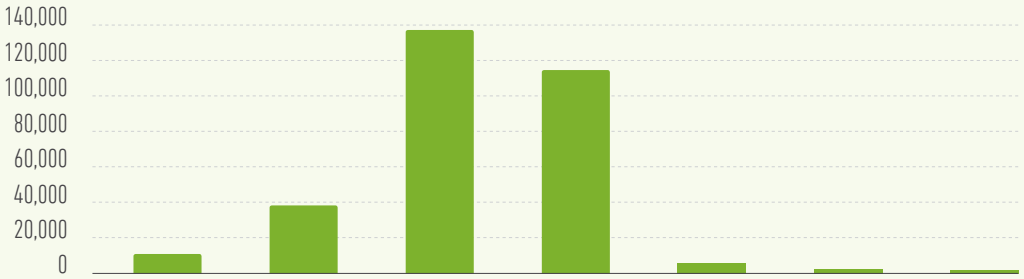
Dried sewage sludge
Aalborg Portland receives dried municipal sewage sludge from Aalborg as a CO_2 neutral biofuel substitute for coal and other fossil raw materials.

Electricity
Electricity is essential for the operation of cement plant equipment, and consumption in 2018 was 310,000 MWh.

The distribution of electricity consumption is shown in the graph below.

The largest consumption locations are kilns and cement mills. Consumption of electricity consists of a base load for factory plant and a variable component that depends on the size of production on primary equipment.

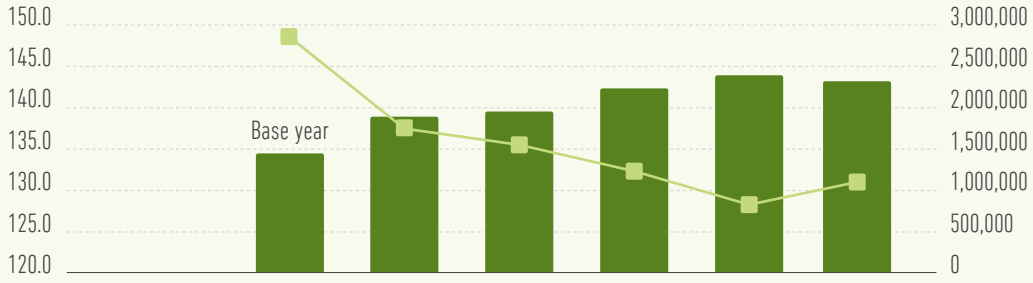
DISTRIBUTION OF ELECTRICITY IN 2017 BY CONSUMPTION POINTS – MWh



	Excavation in chalk pit	Slurry preparation	Kilns	Cement mills	Packing plant and dock	Workshops and lab	Admini-stration
	11,004	38,405	138,728	113,904	5,963	1,425	549

ELECTRICITY CONSUMPTION – kWh per tTCE

PRODUCTION – tTCE



	2010	2014	2015	2016	2017	2018
Electricity – kWh per tTCE	148.8	137.4	135.5	132.6	128.1	131.3
Production – tTCE	1,454,043	1,819,341	1,902,072	2,202,472	2,415,907	2,360,011

7 AFFORDABLE AND CLEAN ENERGY

Sustainable energy

We also supply energy. The heat from our kilns is recycled for district heating, and the cold water from our chalk lake will be used to supply district cooling to Aalborg's new University Hospital. For Aalborg Portland, UN Global Goal 7, Affordable and Clean Energy, is about challenging and exploiting our potentials for producing sustainable energy.

Recovery of heat from kiln fuel
Aalborg Portland recovers surplus heat from production to supply district heating to the citizens of Aalborg. In 2018, the heat supplied corresponded to the annual heat consumption of approx. 20,000 households. Focus will in future be given to increasing this volume as our plant has the capacity to supply sufficient district heating to meet the annual needs of 36,000 households.

Wind turbines – Green energy
Aalborg Portland plans to install five wind turbines on company land close to the factory. This will mean that even more green energy is used for manufacturing cement. In 2018, more than half of the energy used in Danish cement production derived from renewable sources such as wind and solar power, and also from biofuel which is considered CO_2 neutral. Installation of Aalborg Portland's own wind turbines will mean that CO_2 emissions related to electricity consumption will be reduced further.

Energy saving by district cooling
Aalborg Portland is committed to sustainable development in partnership with the community. Sustainable development covers many possibilities. Aalborg Portland presides over a very large cold-water chalk lake, and can therefore supply district cooling to Aalborg's future University Hospital as an energy-efficient alternative to comfort and process cooling provided by electrical equipment.

District cooling is the cooling equivalent of district heating. Cold water is pumped through a closed pipe system to the buildings to be cooled. The water absorbs the space heat from the buildings and is pumped back for cooling, which in this case is done by the cold lake water.

Emission to the atmosphere

There are a number of sources of atmospheric emission at Alborg Portland, ranging from chimney stacks to workshop extractors.

Overall, there are approx. 400 points of emission where the air is cleaned in a variety of filters before release. The largest stacks are equipped with sensors that continuously meter the level of relevant emissions. In addition, a number of emissions are regularly sampled and analysed to provide further documentation of the contents. This sampling and analysis are performed by an independently accredited laboratory.

Flue gases

CO_2
Relative CO_2 emission for grey and white cement production fell by 1.5% compared with 2017 due to increased use of alternative fuel with CO_2 neutral biomass content and is now 9% below base year 2000. In grey cement production, where substitution of alternative fuel for fossil fuel was highest, the key performance indicator for CO_2 was at a record low level of 734 kg per tTCE, a fall of more than 18% compared with 2000.

NO_X
NO_X cleaning equipment was developed and installed on all kilns in the period 2004-2007. As a result, relative NO_X emission in 2018 has fallen by 72% from 2000 when it was 3.8 kg per tTCE. In absolute quantities, NO_X has been reduced from 9,945 tonnes in 2000 to 2,494 tonnes in 2018.

In 2018 there was an overall decrease of 1% to 1.06 kg per tTCE.

On the grey cement kilns, NO_X is reduced by injecting aqueous ammonia. This led to an increased release of ammonia (NH_3) which was in compliance with the limits specified in our environmental approval.

SO_2
Relative SO_2 emission decreased by 15% from 0.45 to 0.38 kg per tTCE. This was primarily because the scrubber system, which is dimensioned for flue gases from two kilns, handled flue gases from one-string kiln operation more frequently than in 2017. This enabled greater scrubbing efficiency.

CO
Relative CO emission increased by 17% from 1.32 to 1.54 kg per tTCE. This was due to increased use of alternative fuel in grey cement production. Alternative fuel is associated with a relatively higher CO level than coal and petcoke. In addition, white cement production was challenged with periods of unstable operation, which caused formation of more CO. The CO limits specified in our environmental approval were complied with.

Dust
Relative emission is unchanged at 0.04 kg per tTCE. Complaints arising from dust emissions due to operating issues are described in the section "Environmental dialogue".

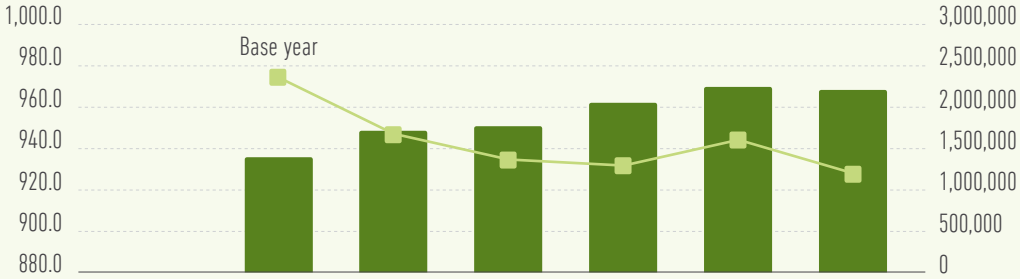
Emission limits
Aalborg Portland's Environmental Approval of 10 March 2017, which is the result of the review carried out by the Danish Environmental Protection Agency based on BAT requirements, includes amended requirements for operating emissions and limit emissions.

In 2018, emission limits for SO_2, NO_X, CO and dust were exceeded 17 times. These incidents were notified to the Danish Environmental Protection Agency in Aarhus, and preventive measures to avoid repetitions were disclosed in monthly reporting.

The table on the next page shows the principal sources of air contamination, the associated emission limits, and Aalborg Portland's current average emission levels. NO_X, SO_2 and dust emissions are determined by averaging continuously recorded data. Limits stated are average emissions per 24-hour period.
For clarity the table shows the average daily level over the year. As shown, emission levels in 2018 were generally within the required limits. Operator control and monitoring of kiln processes and cleaning measures from the control room are a determining factor for low emissions.

CO_2 – RELATIVE FIGURES – kg per tTCE

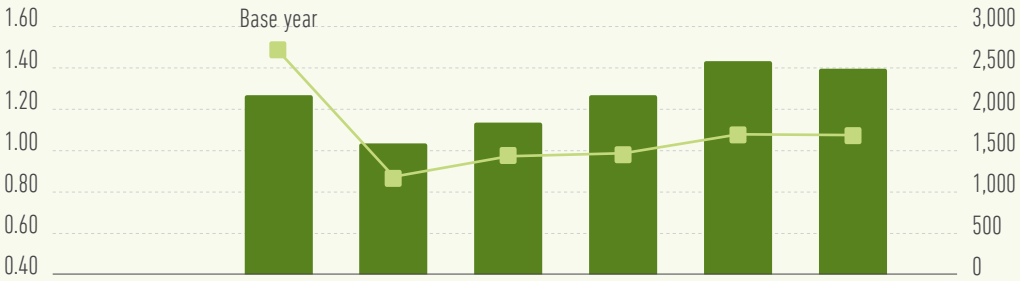
CO_2 – ABSOLUTE FIGURES – tonnes



	2010	2014	2015	2016	2017	2018
CO_2 – kg per tTCE	976.6	944.3	936.1	933.0	942.6	928.3
CO_2 – tonnes	1,420,067	1,718,011	1,780,564	2,054,900	2,277,214	2,190,706

NO_X – RELATIVE FIGURES – kg per tTCE

NO_X – ABSOLUTE FIGURES – tonnes



	2010	2014	2015	2016	2017	2018
NO_X – kg per tTCE	1.48	0.87	0.96	0.98	1.07	1.06
NO_X – tonnes	2,153	1,580	1,832	2,164	2,586	2,494

LIMITS AND LEVELS DURING OPERATION – THE MAIN SOURCES

	NO_X		SO_2		Dust	
	Limit *	Average level 2018 **	Limit *	Average level 2018 **	Limit *	Average level 2018 **
Heat recovery Kiln 73/79	500	386	400	112	20	5
Heat recovery Kiln 74/78	500	253	400	203	20	0.1
Heat recovery Kiln 76	500	319	400	173	20	0.8
Kiln 87	500	166	50	0,02	20	8

* Daily average according to enviromental approval valid at 31.12.2018.
** Daily average over the year.

All values are stated in mg/Nm³ dry flue gas at 10% oxygen content.

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

Noise

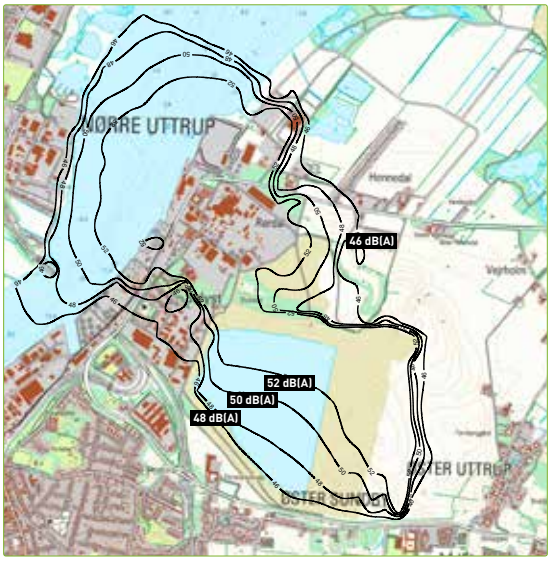
Noise emission at Aalborg Portland is attributable to a large number stationary sources, both indoors and outdoors, as well as internal factory traffic. Responsible production is also about limiting this noise.

The noise sources include chimney stacks, kilns, cement and coal mills, belt conveyors, fans, ships loading and unloading, lorries, and excavation and rehabilitation in the chalk pit.

Aalborg Portland has compiled a noise map which is continuously updated, most recently in January 2016 in conjunction with the Danish Environmental Protection Agency's review of the company's overall environmental status.

To comply with tighter noise regulations entering into force on 1 March 2022, Aalborg Portland has initiated a five-year action plan for noise abatement extending to 2022.

Noise abatement at the factory will continue in 2019. In the chalk pit, the noise embankment will be extended northwards from the south-eastern corner to screen the village of Øster Uttrup from quarry operations.



Noise map in dB(A) – evening conditions

Noise measurement of the deep-excavator

Deep-excavator with installed noise shield

Aalborg Portland's chalk pit

Noise abatement project: Deep-excavator
Enclosure with baffle plates has substantially reduced noise from chalk excavation. The project to design, fabricate and install the noise shield, was concluded in April 2019 and cost app. EUR 1m.

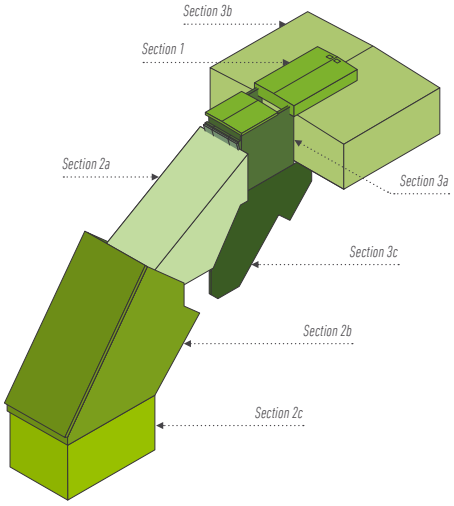
The deep-excavator weighs more than 1,300 tonnes and digs chalk from the chalk lake at a depth of 40 metres by means of a bucket chain. The machine is electrically powered and runs on rails, approx. 1 km, backwards and forwards in the chalk pit. During excavation there is noise emission from the engine compartment, bucket chain, drive wheel and idlers.

Over the years, work has been done to reduce the noise at source. Lining the idlers with rubber and rubber padding between the buckets and lids have been tried, but the rubber has either been torn to pieces or become quickly worn out due to the heavy forces at play when excavating.

The excavator has this year been the subject of a major noise screening project.

Surveyors preparing the 3D laser scanning of the deep-excavator

NOISE SHIELD – SECTIONAL VIEW



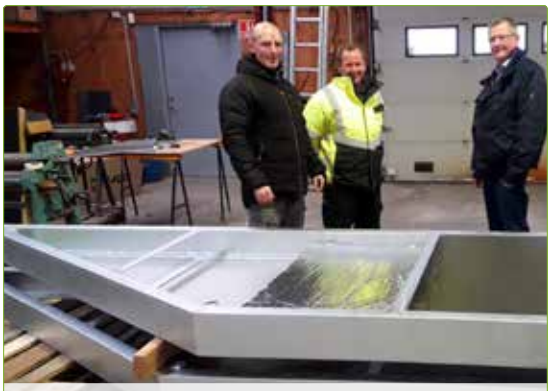
Project partners
In partnership with insulation specialists Persolit, baffle plates were designed, fabricated and installed on the excavator by Maskinfabrikken Fuglsangs Eftf. As the noise shield consists of moving sections, a 3D scan carried out by surveyors LE34 formed the basis for design and construction.

The noise shield weighs a total of more than 32 tonnes and is equipped with a 16-tonne counter-weight. Static calculations showing approved design strengths and wind load were performed by Frandsen & Søndergaard.

ThyssenKrup of Germany, which was responsible for the original static calculations when the machine was designed, fabricated and delivered to Aalborg Portland in 1979, performed load stress calculations on the excavator itself and at points of attachment.

Fabrication
A noise shield consisting of several sections has been fabricated. The bearing construction and frames for the baffle plates were welded, rust-proofed and assembled as a sandwich solution with insulating materials and perforated plates for optimal sound reduction.


Trial mounting


Noise baffles with initial insulation

Installation
The various sections were installed in stages, effectively supported by crane lift and mobile lift.


Section 1: First stage, September 2018


Section 2: Installation in winter, February 2019


Installation using mobile lift


Craning of baffle plates

RECYCLING OF CONVEYOR BELT AS NOISE INSULATION

DID YOU KNOW ...

- that the chalk pit contains 20 km of rolling conveyor belt. Redundant belt can be recycled for other purposes.
- that rubber belt is a robust material with high noise density.
- that approx. 120 metres of rubber belt have been recycled – mounted on the bottom section of the noise shield towards the chalk lake.

Conveyor belt in the chalk pit

Water

Water is used in the various processes involved in cement manufacture and also for cooling production plant. We strive wherever possible both to recycle our process water and to capture and reuse rainwater from selected areas. For Aalborg Portland, UN Global Goal 6, Clean Water and Sanitation, is among other about harnessing the possibilities for limiting the use of new water resources and instead recycling process water.

Aalborg Portland obtains technical water for production purposes from on-site wells in a limestone aquifer.

Aalborg Portland is licensed to extract a total of 5.2 million m^3 annually. In 2018, 4.9 million m^3 was extracted. This includes approx. 1.3 million m^3 of water recovered below the water table by obtained by deep-excavator in the chalk pit. The remaining 3.6 million m^3 includes 2.6 million m^3 sourced from 15 on-site wells close by the cement factory, and 1.0 million m^3 from lowering of the groundwater around Kilns 76 and 85.

In 2018, 10% more water was used than in 2017, mainly due to increasing replacement of fly ash by oxiton. Fly ash is being phased out and Aalborg Portland is currently seeking a substitute. Oxiton has proven to be a possibility. In this connection sand and oxiton have to be ground, which involves consumption of water.

To limit water consumption a number of projects have been carried out and are described below.

Groundwater lowering for plant cooling
Local lowering of the groundwater table has over the years proven an effective solution for keeping dry underground basements, passages and conveyor systems on factory premises. More than 820,000 m^3 of water is also recycled for cooling the factory's compressor plant. This water would otherwise have to be obtained from Aalborg Portland own water resources.

Split water system
Following bacterial contamination of drinking water in 1998 the water supply system was split into two parts – one for drinking water and one for technical water used for production purposes. In 2018, Aalborg Portland still received its drinking water from the City of Aalborg's municipal supply as some years ago pesticide residues were found in company's drinking water wells.

Recycling of filtrate water
Filtrate water arises in the heat recovery and desulphurisation system during production of gypsum. Until 2004, filtrate water was released into the Limfjord.

Water meter

Cement factory with slurry preparation department in front

> In 2018, almost 30,000 m³ of surface water captured from the store next to the slurry preparation department and from the pyrite ash store was used in slurry production, thereby replacing the recovery of an equivalent volume of technical water.

The effective solution was, and still is, to recycle filtrate water in cement production. In 2018 approx. 400,000 m³ of technical water was replaced in this way – water that would otherwise have to be extracted from Aalborg Portland's own resources. Release of filtrate water into the Limfjord ceased at the same time. A win-win situation.

Use of surface water from lake
Aalborg Portland is licensed to extract surface water from a clay pit lake to be used as process water, slurried with pyrite ash, in cement production.

The lake, which originated from earlier quarrying, is situated on Aalborg Portland land at Bredhage. The adjacent fields have to drained. The resulting water is led to the lake and from there to the Limfjord. Before entering the Limfjord, part of this water is utilised by Aalborg Portland, replacing around 23,500 m³ of groundwater annually.

Capture of surface water
In 2018, almost 30,000 m³ of surface water captured from the store next to the slurry preparation department and from the pyrite ash store and was used in slurry production, thereby replacing the recovery of an equivalent volume of technical water.

Monitoring programme
Every year since 1991, an external company has performed a series of hydro-geological surveys and analyses of water quality at Aalborg Portland. Ongoing reporting provides an overview of developments, and thereby ensures effective protection and utilisation of the water resource.

Waste water and surface water
Waste water is piped by Aalborg Portland into the public sewer. Surface water and cooling water are released directly into the Limfjord. Waste water diverted to the public sewer passes through the public treatment plant before release into the Limfjord. Waste water and surface water that may contain mineral oils and sand pass through oil-water separators and sand filters on factory premises.

Groundwater in chalk lake for district cooling
Cooling for Aalborg's future University Hospital could be provided by cold water supplied from Aalborg Portland's chalk lake. See the section "Energy" for more information.

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

Waste and by-products

Waste is reused and recycled whenever possible. It is sorted close to the source and deposited in containers and oil and chemical receivers located around the factory. At Aalborg Portland, UN Global Goal 12, Responsible Consumption and Production, is also about recycling, utilising and handling waste in the most sustainable manner.

The waste is recycled and incinerated in accordance with municipal regulations or landfilled on site.

In 2018, more than 99% of factory waste was non-hazardous. The remainder was characterised as hazardous - oil and chemical waste for recycling and mixed waste for landfilling externally.

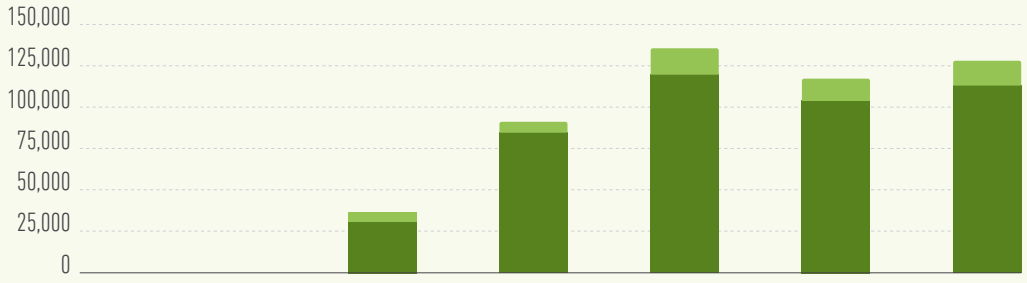
Waste strategy implemented
Since 2013, a significant shift from landfill to increased recycling has taken place at Aalborg Portland. Recycled waste has thus increased by more than 90,000 tonnes compared with 2014.

Recycling of by-product
Aalborg Portland's waste statistics have particularly been changed by the project to use microfiller - a kiln by-product – for rehabilitation purposes in the chalk pit. For more project information, see pages 48-49.

Container site for waste sorting

Recycling of waste is in harmony with the Danish Government's resources policy, which encourages the substitution of wastes for natural raw materials.

RECYCLING OF NON-HAZARDOUS WASTE – tonnes



	2014	2015	2016	2017	2018
Recycling	7,416	8,077	14,791	14,550	13,508
Of which, recycled microfiller for rehabilitation of the chalk pit for "Portland Lake Park"	27,399	78,371	119,142	103,082	112,699
Total	**34,815**	**86,448**	**133,933**	**117,632**	**126,207**

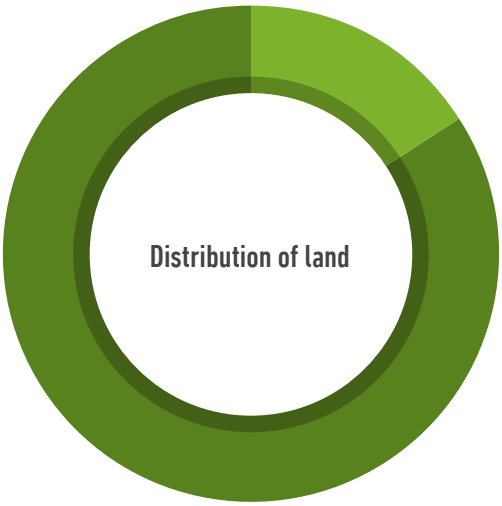
WASTE – amount in tonnes	2014	2015	2016	2017	2018
TOTAL WASTE	**38,260**	**46,904**	**62,773**	**83,874**	**74,915**
UTILISED NON-HAZARDOUS WASTE	**35,131**	**87,605**	**134,365**	**118,420**	**126,803**
Recycling	**34,815**	**86,448**	**133,933**	**117,632**	**126,207**
Microfiller from kilns	27,399	78,371	119,142	103,082	112,699
Sweepings	1,683	824	2,776	3,142	2,777
Sand and grate material	377	48	3	21	12
Building waste	1,191	1,060	1,850	1,818	1,798
Metals	414	736	741	1,200	1,025
Paper and cardboard	14	9	16	14	14
Glass	1	0	0.3	0.5	0.3
Plastics	649	746	620	669	1,150
Electronic scrap	1	0	4.4	2.4	3.2
Other recyclables	3,087	4,653	8,780	7,683	6,728
Incineration	**317**	**1,157**	**431**	**788**	**596**
Mixed combustible	301	1,139	415	771	582
Municipal collection	16	18	17	17	14
UTILISED HAZARDOUS WASTE	**229**	**30**	**77**	**85**	**68**
Oil	216	27	74.0	77.6	61.7
Chemicals	13	3	2.6	7.4	6.1
DISPOSAL OF NON-HAZARDOUS WASTE *	**2,522**	**-40,809**	**-71,759**	**-34,702**	**-52,012**
On-site landfill – added	2,522	3,390	4,057	5,308	7,132
On-site landfill – microfiller removed for recycling	-	-44,199	-75,816	-40,010	-59,144
DISPOSAL OF HAZARDOUS WASTE					
Off-site landfill	377	78	90	71	56

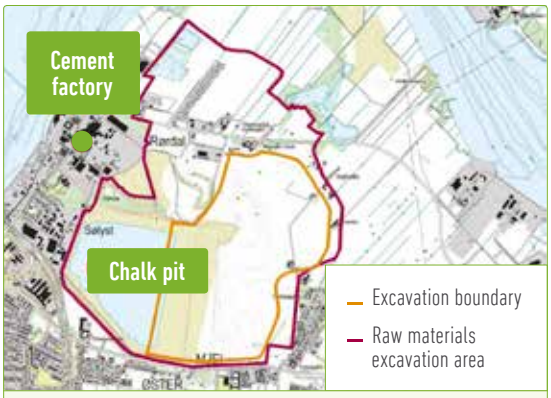
* In 2015 - 2018 more waste was removed from landfill for recycling than was sent to landfill.

Land use and biodiversity

Aalborg Portland covers 1,200 hectares, of which 190 hectares are used in connection with cement production. The remaining 1,010 hectares consist of lakes, woods, meadows, salt marshes, fallow and farmland. At Aalborg Portland, UN Global Goal 15, Life on Land, is reflected in actions to create natural areas with high biodiversity.

- 84% Nature and agriculture · 190 hectares
- 16% Industry · 1,010 hectares





Aalborg Portland-owned land in Rørdal area (hectares)	1,200
Factory	120
Chalk pit – working quarry	54
Landfill	12
Pyrite ash plant	4
Total land use	**190**

Chalk pit
The chalk pit is situated close by the factory and will have an area of approx. 240 hectares when fully excavated. A significant part of the chalk pit is the lake with its characteristic azure blue water.

Aalborg Portland is licensed to quarry chalk in the Rørdal area within the designated excavation zone in the Raw Materials Plan for North Jutland. The licence is valid until 2052.

Chalk pit rehabilitation plan – Portland Lake Park
The concept of the chalk pit rehabilitation plan is to develop the chalk pit as "Portland Lake Park", which will offer the local population a variety of leisure and sporting activities close to the city.

The lake is envisaged used for sailing, water-skiing, diving and bathing, while the surroundings provide amenities for jogging, walking and similar pursuits.

The basic principle is to create a scenic space with steep, exposed slopes, soft green hills, opportunities for walking and leisure, and a rich natural environment.

Development of chalk pit to Portland Lake Park

Establishment of banks and terraces
In defined areas of the chalk pit, establishment of banks and terraces has begun. These earthworks are constructed with microfiller which is subsequently covered and planted.

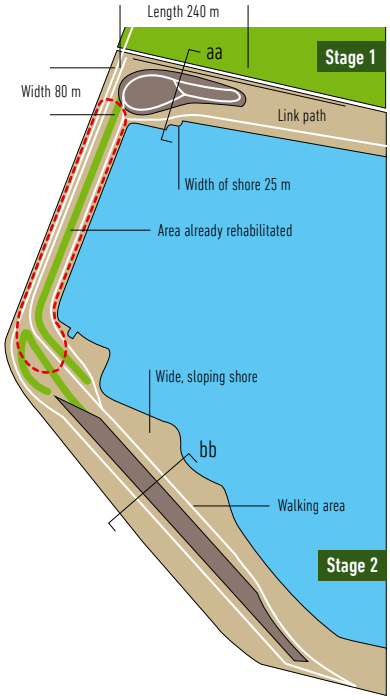
Stage 1 is now in place, Stages 2 and 3 are under construction.

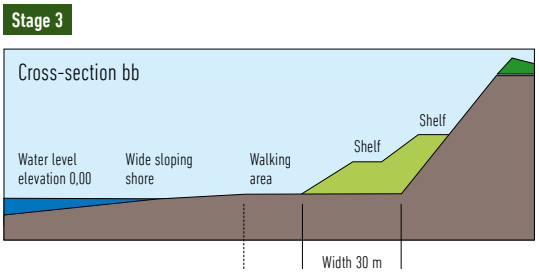
Stage 1
The embankment is intended to create a natural transition between the area at the transfer station and the lakeside. It will also screen the factory from view and act as a partial noise barrier between the factory and the public access area planned for the northern and western parts of the chalk pit.

Stage 2
Establishment of terraces in the western part of the chalk pit.

The terraces will be used for a variety of sporting activities. A path system and public spaces are also planned. Stage 2 is established but currently serves as road access to Stage 3. Stage 2 will be finalised when Stage 3 is in place.

Stage 3
Under establishment.





Sustainable distribution

In 2018, the distribution of cement from Aalborg Portland consisted of the handling and transport of more than 2.3 million tonnes of product to the domestic and export markets. At Aalborg Portland, UN Global Goal 9 on infrastructure includes choice of distribution mode and placement of shipping terminals inside and outside Denmark.

Our influence on the distribution to export markets is chiefly limited to the choice of ship transport, and this part of distribution may therefore be termed an indirect environmental impact.

In 2018, 71% of cement was distributed by ship and 29% by road.

All our cement manufacture takes place in Aalborg, from where most of our production is sent by sea to our seven shipping terminals strategically positioned around Denmark and to shipping terminals abroad. From the shipping terminals the cement is transported by road to the customers in the individual areas.

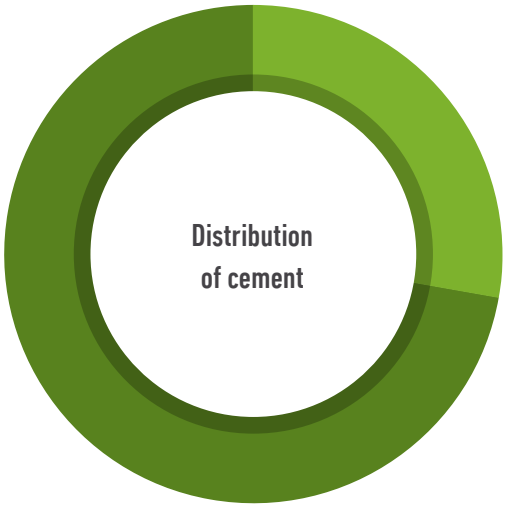
Aalborg Portland's harbour

Distributing our cement by ship means that we avoid long-distance road transport by heavy tankers, and also has the advantage of being more sustainable.

In 2017, the environmental benefit of ship transport became a reality with the completion of holding silos for white cement at a newly built shipping terminal in the French port of Rochefort to serve the French market. By sending our cement by sea directly from Aalborg to Rochefort, rather than from a shipping terminal in the Dutch port of Moerdijk, we avoid two 900 km return journeys on Dutch, Belgian and French roads for each individual road tanker.

In Denmark, some cement distribution is contracted out to external road hauliers. Customers in northern and central Jutland are supplied direct from Aalborg. Distribution of all bagged cement also takes place from Aalborg.

- 29% Cement distributed by lorry and road tanker
- 71% Cement distributed by ship



Material flows

Key performance indicators 2018 - Aalborg Portland cement plant

The material flows for the Aalborg Portland cement plant are stated using both absolute and relative figures as key performance indicators.

The absolute amounts are calculated as tonnes in the wet state. The relative values are based on the quantity (kg) of materials in the wet state used to make one tonne of Total Cement Equivalent (tTCE), a standard unit for production. This is obtained by calculating the equivalent cement tonnage if all the clinker were processed into cement.

The relative values thus enable year-on-year comparison of the material flows, independently of any variations in volume of cement production, changes in clinker stocks and sales and imports of clinker.

INPUT

	Absolute figures – tonnes *					Relative figures – kg per tTCE *				
	2014	**2015**	**2016**	**2017**	**2018**	**2014**	**2015**	**2016**	**2017**	**2018**
COMBUSTION AIR										
(02, N etc.)	593,783	592,568	676,406	751,904	709,416	326,4	311,5	307,1	311,2	300,6
RAW MATERIALS										
Chalk	3,064,648	3,173,982	3,649,362	4,003,719	3,905,097	1,684.5	1,668.7	1,656.9	1,657.2	1,654.7
Water	2,881,522	3,170,668	3,499,229	3,584,351	3,842,658	1,583.8	1,667.0	1,588.8	1,483.6	1,628.2
Sand	129,488	129,595	152,484	192,502	158,617	71.2	68.1	69.2	79.7	67.2
Gypsum	32,126	42,373	56,557	60,302	65,850	17.7	22.3	25.7	25.0	27.9
Other	24,536	33,290	35,394	35,763	31,522	13.5	17.5	16.1	14.8	13.4
Packaging	1,129	1,305	1,018	887	886	0.6	0.7	0.5	0.4	0.4
RECYCLABLES										
Fly ash	189,339	201,406	235,031	202,801	124,225	104.1	105.9	106.7	83.9	52.6
Sand	64,314	75,410	79,239	92,913	161,106	35.4	39.6	36.0	38.5	68.3
FGD gypsum	53,490	56,961	57,203	58,172	51,077	29.4	29.9	26.0	24.1	21.6
Oxiton	7,328	7,643	12,413	33,888	64,189	4.0	4.0	5.6	14.0	27.2
Iron oxide	39,102	42,763	45,154	55,617	50,936	21.5	22.5	20.5	23.0	21.6
Other	24,608	16,107	21,313	23,882	36,581	13.5	8.5	9.7	9.9	15.5
Total	378,181	400,290	450,353	467,273	488,114	207.9	210.4	204.5	193.4	206.8
FUELS										
Coal	44,820	49,456	60,189	74,670	75,106	24.6	26.0	27.3	30.9	31.8
Petcoke	207,863	201,429	223,584	243,938	211,217	114.3	105.9	101.5	101.0	89.5
Fuel oil	4,447	4,637	4,831	5,031	4,779	2.4	2.4	2.2	2.1	2.0
Alternative	100,817	126,618	149,491	164,746	214,839	55.4	66.6	67.9	68.2	91.0
Total	**357,947**	**382,140**	**438,095**	**488,385**	**505,942**	**196.7**	**200.9**	**198.9**	**202.2**	**214.3**
	(MWh)	(MWh)	(MWh)	(MWh)	(MWh)	(kWh per tTCE)	(kWh per tTCE)	(kWh per tTCE)	(kWh per tTCE)	(kWh per tTCE)
ELECTRICITY	**250,048**	**257,703**	**291,953**	**309,580**	**309,977**	**137.4**	**135.5**	**132.6**	**128.1**	**131.3**
INTERNAL RECIRCULATION										
	(GJ)	(GJ)	(GJ)	(GJ)	(GJ)	(MJ per tTCE)	(MJ per tTCE)	(MJ per tTCE)	(MJ per tTCE)	(MJ per tTCE)
District heat from heat recovery	21,197	24,090	19,672	24,486	23,863	11.6	13.2	10.3	11.1	9.9
Microfiller	109,429	100,549	116,082	114,316	113,728	60.1	52.9	52.7	47.3	48.2
Water	1,237,969	1,195,258	1,192,066	1,218,148	1,227,285	680.4	628.4	541.2	504.2	520.0
Own FGD gypsum	28,439	27,591	33,012	33,231	32,251	15.6	14.5	15.0	13.8	13.7
Recycling of clinker/raw meal	37,081	19,418	30,810	27,260	33,320	20.4	10.2	14.0	11.3	14.1
Recycling of cement from silo cleaning	1,505	4,054	216	393	159	0.8	2.1	0.1	0.2	0.1

* Determined with water content of materials.

OUTPUT

	Absolute figures – tonnes *					Relative figures – kg per tTCE *				
	2014	**2015**	**2016**	**2017**	**2018**	**2014**	**2015**	**2016**	**2017**	**2018**
FLUE GASES										
CO_2	1,718,011	1,780,564	2,054,900	2,277,214	2,190,706	944.3	936.1	933.0	942.6	928.3
NO_X	1,580	1,832	2,164	2,586	2,494	0.87	0.96	0.98	1.07	1.06
SO_2	682	844	948	1,099	895	0.37	0.44	0.43	0.45	0.38
CO	1,649	1,601	1,969	3,186	3,624	0.91	0.84	0.89	1.32	1.54
Dust	91	96	107	90	89	0.05	0.05	0.05	0.04	0.04
NH_3	39	40	46	51	86	0.02	0.02	0.02	0.02	0.04
HCl	6	7	7	9	7	0.003	0.004	0.003	0.004	0.003
Hg	0.03	0.03	0.04	0.03	0.03	0.000014	0.000014	0.000018	0.000011	0.000013
PRODUCTS										
Cement	1,877,284	1,971,721	2,256,013	2,346,692	2,313,489	1,031,8	1,036,6	1,024,3	971,4	980,3
Clinker **	-47,969	-60,456	-56,954	44,545	37,994	-26.4	-31.8	-25.9	18.4	16.1
Filler **	1,583	1,373	-2,022	2,539	-200	0.9	0.7	-0.9	1.1	-0.1
Chalk slurry to power station	17,945	8,846	10,893	5,820	8,785	9.9	4.7	4.9	2.4	3.7
Total	**1,848,843**	**1,921,484**	**2,207,930**	**2,399,596**	**2,360,068**	**1,016.2**	**1,010.2**	**1,002.6**	**993.2**	**1,000.0**
Adjustment	-	-	-	-	-	-16.2	-10.2	-2.6	6.8	0.0
Total Cement Equivalent	**1,819,341**	**1,902,072**	**2,202,472**	**2,415,907**	**2,360,011**	**1,000.0**	**1,000.0**	**1,000.0**	**1,000.0**	**1,000.0**
Packaging	1,129	1,305	1,018	887	886	0.6	0.7	0.5	0.4	0.4
WATER										
Water vapour	1,361,211	1,407,063	1,880,371	1,998,008	2,021,656	748.2	739.8	853.8	827.0	856.6
Cooling water, incl, Kiln 85 groundwater	2,241,899	2,409,532	2,514,030	2,568,453	2,866,764	1,232.3	1,266.8	1,141.5	1,063.1	1,214.7
Groundwater lowering (Kiln 76)	221,125	313,543	201,436	213,265	147,490	121.5	164.8	91.5	88.3	62.5
Waste water	28,835	41,396	31,200	36,769	38,423	15.8	21.8	14.2	15.2	16.3
HEAT RECOVERY FOR DISTRICT HEATING	(GJ) **1,152,611**	(GJ) **1,214,257**	(GJ) **1,199,988**	(GJ) **1,449,809**	(GJ) **1,185,306**	(MJ per tTCE) **633.5**	(MJ per tTCE) **638.4**	(MJ per tTCE) **544.8**	(MJ per tTCE) **600.1**	(MJ per tTCE) **502.2**
OTHER ***										
Recycling	34,815	86,448	133,933	117,632	126,207	19.1	45.4	60.8	48.7	53.5
Incineration	317	1,157	432	788	596	0.2	0.6	0.2	0.3	0.3
Landfill	2,899	-40,731	-71,669	-34,631	-51,956	1.6	-21.4	-32.5	-14.3	-22.0
Oil and chemical waste	229	30	77	85	68	0.13	0.02	0.03	0.04	0.03
Total	**38,260**	**46,904**	**62,773**	**83,874**	**74,915**	**21.0**	**24.6**	**28.5**	**34.7**	**31.8**

** Incl. sales and changes in stocks and adjustment for import of clinker.

*** Waste volumes are classified as hazardous and non-hazardous wastes on page 47 stating whether the materials are utilised or disposed of.

8 DECENT WORK AND ECONOMIC GROWTH

OUR WORK ENVIRONMENT

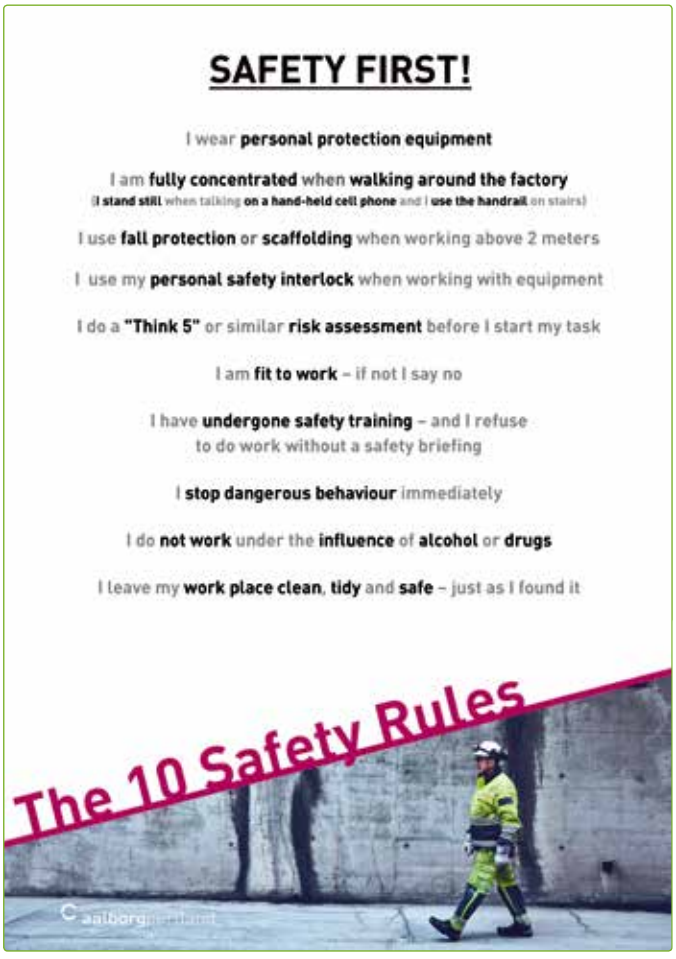
Planning, risk assessment and performance of tasks in compliance with current legislation and internal safety rules is mandatory for all work carried out at Aalborg Portland. A safe and healthy work environment, as expressed by UN Global Goal 8, Decent Work and Economic Growth, is thus central for Aalborg Portland.

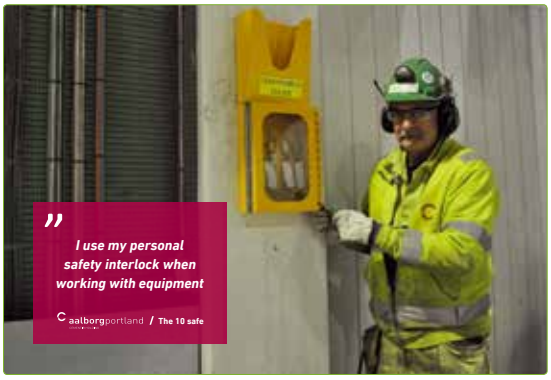
Aalborg Portland safety rules
In 2018, intensive focus was given to implementing our heightened safety rules.

We have 10 basic rules, which apply to all work performed at Aalborg Portland. In addition, we have 10 specific rules which define the requirements for work carried out at Aalborg Portland by external contractors, so that conformity exists between expectations at tendering and expectations at performance.

The 10 safety rules
Work performed at Aalborg Portland must comply with our safety rules.

This applies both to our own employees and to external contractors. In 2018, focus was given to providing information on these rules, which among other things led to improvement to handrails and platforms and purchase of equipment. This equipment included trikes and trailers, pannier bags, hand-free headsets etc. with view to implementing the requirement for safe traffic on factory premises.





HEALTH & SAFETY POLICY

Aalborg Portland focuses on the production of quality products which conform to customer requirements and expectations. Health and safety is an integral part of daily life in the workplace, and there is constant focus on improvement.

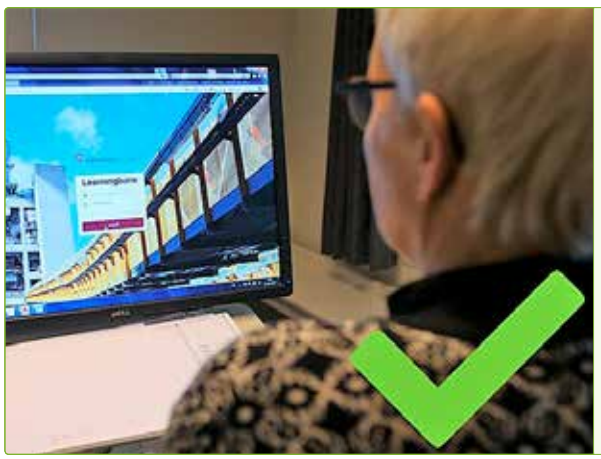
Guidelines
All activities must always be performed in accordance with relevant legislation, and in accordance with the company's internal guidelines, which ensure a continued safe and healthy work environment. The underlying platform is at all times Aalborg Portland's core values: the value of people, quality, dynamism, sustainability and diversity, and inclusion.

Our employees
Within the scope of technical and economic feasibility, Aalborg Portland will create the best possible frame-work for a safe and healthy work environment by utilising the best possible tools and solutions. Aalborg Portland will ensure that all employees are trained and motivated to work actively to improve the work environment. It is the responsibility of each employee to help improve health & safety in and around the performance of their own work.

External contractors
Aalborg Portland recognises its responsibilities and obligations towards external contractors working at the production location.

Society
Aalborg Portland adopts an open and active role in interaction with employees, authorities, customers, suppliers, organisations and other collaboration partners.

Policy, targets and objectives
Targets for the year ahead are proposed at the annual meeting of the Health & Safety Organisation. These targets are discussed at the Management's QHS Review where the final targets for the period are established. The Health & Safety policy is updated on an ongoing basis and at least every two years.



HEALTH & SAFETY DRIVING LICENCE

To ensure easy acquaintance with our safety rules we have developed an e-learning course which covers by means of short video sequences, photos and text.

The course has been rolled out to Aalborg Portland employees, subcontractors and suppliers.

Any accident – is an accident too many
For Aalborg Portland, preventing accidents is paramount. We do this by planning, risk assessment and awareness in work performance. Unfortunately, in 2018, we had 16 accidents leading to more than one day's absence from work and 17 accidents with no absence. The most common accidents were superficial injuries and twists or sprains. The average number of days lost per accident was 5.8. 62 near-accidents were also reported.

Despite our preventive efforts therefore we did not manage to reduce the number of accidents. Each accident and near-accident was investigated thoroughly to find the specific cause, identify means of prevention and initiate corrective actions to avoid repetition.

We are strongly committed to reducing risks and to sharing experiences and information on solutions across the organisation.

ACCIDENTS

	2014	2015	2016	2017	2018
Accidents reported to the Working Environment Authority					
Number of accidents reported	14	13	13	10	16
Number of days lost	84	134	48	36	92
Accident frequency / Time lost – Hourly paid and salaried employees					
Accident frequency *	26.8	24.9	23.3	17.9	28.7
Time lost **	1.2	1.9	0.6	0.5	0.2
Accident frequency / Time lost – Hourly paid employees					
Accident frequency *	49.2	49.2	46.0	35.4	56.6
Accident frequency * – stone, clay and glass industries	10.0	13.3	9.9	3.8	***
Time lost **	2.3	3.8	1.3	0.9	2.4

* Number of accidents per one million working hours ** Number of hours lost per 1000 working hours
*** National work accident statistics for 2018 not yet published

Expectations to the future
Aalborg Portland's managers have a particular responsibility for motivating and developing our people so that we deliver solid results today and also develop the skills to meet the challenges of tomorrow.

UN Global Goal 4, Quality Education, is therefore a focus area for Aalborg Portland. To ensure high standards of competence we provide ongoing employee training, and to continuously maintain a specialised work force we train apprentices and interns and recruit graduates.

In 2018, Aalborg Portland therefore had 18 apprentices and interns as well as six graduates. We also provided re-training equivalent to 600 man-days for our experienced personnel.

MIKKEL KNUDSEN, APPRENTICE ELECTRICIAN

" It's great to be part of a large, international company where you get experience from a variety of projects and a wide range of tasks. Everyone knows Aalborg Portland and what it stands for.

For me, this will open up many future opportunities. I also enjoy being in a workplace where I get to work with very big equipment and advanced technology. "

EMERGENCY SITUATIONS

To train our employees for a variety of emergency situations we arrange regular drills and courses.

In 2018, we held courses in first aid and readiness, and implemented six drills focused on various emergency situations, ranging from high-level rescue and fire in electrical installations to cardiac arrest.

These drills provide opportunity to develop both the mental and physical alertness to intervene quickly in a critical situation.

Health & Safety Targets

TARGETS 2018	STATUS 2018	TARGETS 2019
ACCIDENTS WITH MORE THAN ONE DAY'S ABSENCE Max seven.	Target not achieved. 16 accidents were registered in 2018.	**ACCIDENTS WITH MORE THAN ONE DAY'S ABSENCE** Max five.
SAFE WORKPLACE Continue work according to the three-year plan for implementation of the following: • Basic safety rules • H&S driving licence • Consequence management • Risk assessment / toolbox • Safety in plant / walking and driving • Housekeeping / holes in road	Target achieved. • 10 basic safety rules implemented, and 10 safety requirements for external contractors implemented gradually over the year. • Safety rules e-learning programme developed for both internal and external personnel (H&S driving licence). • Updated procedure for consequences for breach of rules. • 2,277 risk assessments completed during the year. • Improvements made to selected access ways and platforms. Purchase of trikes, pannier bags etc. • Holes in road repaired in step with reports received.	
COMPETENCE AND AWARENESS Increased behavioural awareness to create a safe workplace. Internal personnel and external tradesmen must have completed safe behaviour training.	Target achieved. Success will be measurable by the number of risk assessments and by the results of safety walks.	
		**RISK ASSESSMENTS** 4,000 completed risk assessments. **SAFETY WALKS** 500 completed safety walks.

8 DECENT WORK AND ECONOMIC GROWTH

BENEFIT TO SOCIETY

Aalborg Portland is one of the largest employers in northern Denmark. As well as those employed directly, many more people are employed in the companies that supply us with raw materials, goods and services and use our cement products. Our investments in the factory will generate still further employment.

The Oresund Bridge

Rabalderparken, Roskilde, Denmark

Investments with climate and environmental improvements

Aalborg Portland has made significant ongoing investments in projects with climate and environmental improvements and also in health & safety. In the period 2014-2018 a total of EUR 34.9m has been invested in a variety of technology improvement projects of benefit to nature, environment and society.

In 2018, Aalborg Portland invested a total of more than EUR 5.6m in projects with climate and environmental improvements, including energy-saving projects, preventive safety and health & safety.

After significant investment in 2017, that has delivered more stable operation and therefore potential for more alternative fuel and reduced CO_2, investment in climate and environmental improvements in 2018 was on a par with 2016.

Investment projects in 2018 included:

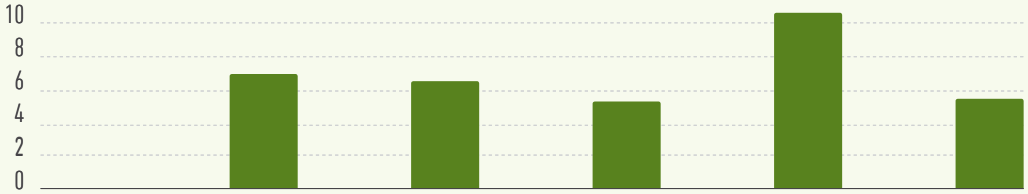
- Noise abatement of deep-excavator in chalk pit
- Use of surplus heat from Kiln 87's clinker cooler as hot primary heat for Kiln 76
- Expansion of reclamation equipment for rehabilitation of chalk pit
- Optimised operation of white cement kilns by installation of new chains and preheater system
- Establishment of pre-insulated pipeline to carry filtrate water to buffer tanks with view to increased heat recovery from kilns
- Upgrade of selected dedusting filters with at the same time improved noise abatement
- Preventive safety measures for dock facility
- Preventive safety by replacement of handrails and gratings, separation of traffic, and procurement of technical equipment for heavy lifting.

Investment in environmental technology improvements also included:

- New consumption materials in the form of alternative raw materials and fuels, as described on page 10
- Inclusion of environment-friendlier products in research projects to develop the cements of the future. This will take place in collaboration with universities and other partners.

Aalborg Portland continues to plan measures that will reduce consumption and emission levels and

INVESTMENTS WITH CLIMATE AND ENVIRONMENTAL IMPROVEMENTS – EURm



	2014	2015	2016	2017	2018
Investments	6.9	6.6	5.5	10.3	5.6

thereby have positive environmental impact. These measures are governed by the environmental action plan for which targets, actions and results are stated in pages 24-25.

Preventive maintenance
Maintenance expenditure on production plant amounted to more than EUR 5m in 2018. Preventive maintenance by, say, filter replacement will impact dust emission, while repairing leaks in the kiln system will prevent ingress of false air and thereby save on energy.

Furthermore, there is strong focus on production reliability to achieve the targets set. For example, timely replacement of kiln lining bricks minimises unscheduled kiln stops.

Preventive maintenance leads to stable, optimal operation of production and cleaning equipment, thereby also minimising environmental impacts.

NEW RECORD FOR ALTERNATIVE FUEL

In 2018, many years' investment in equipment and technology for handling and recycling waste as a resource paid off when 56% of the fuel energy for Kiln 87 was replaced by alternative fuel, a new record.

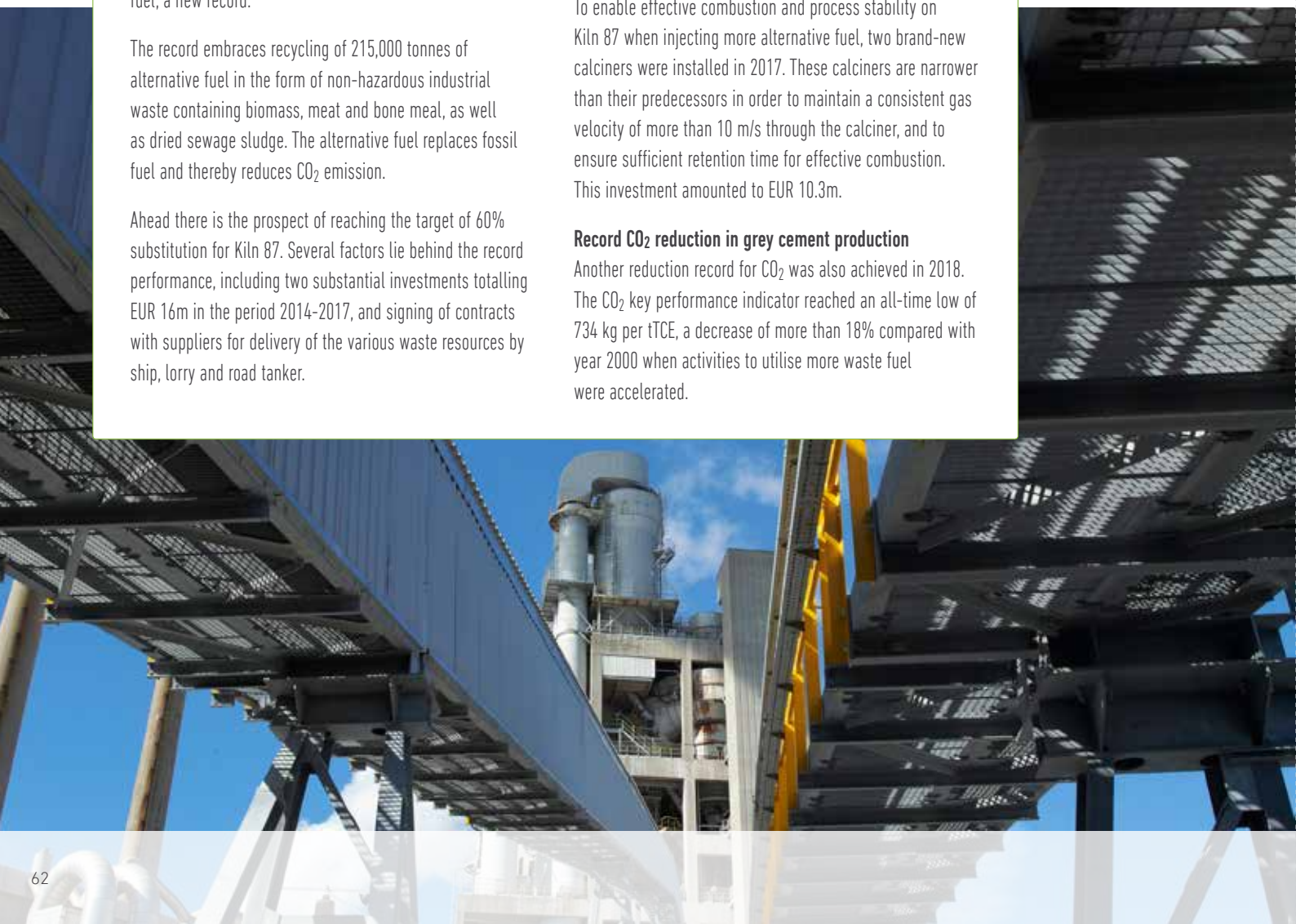
The record embraces recycling of 215,000 tonnes of alternative fuel in the form of non-hazardous industrial waste containing biomass, meat and bone meal, as well as dried sewage sludge. The alternative fuel replaces fossil fuel and thereby reduces CO_2 emission.

Ahead there is the prospect of reaching the target of 60% substitution for Kiln 87. Several factors lie behind the record performance, including two substantial investments totalling EUR 16m in the period 2014-2017, and signing of contracts with suppliers for delivery of the various waste resources by ship, lorry and road tanker.

Expansion of alternative fuel handling facilities
Since the start of 1998, our facilities for alternative fuel have been expanded several times, most recently in 2014-2015 when EUR 5.6m was invested in new conveying and feed equipment for Kiln 87.

Kiln 87 calciner upgrade
To enable effective combustion and process stability on Kiln 87 when injecting more alternative fuel, two brand-new calciners were installed in 2017. These calciners are narrower than their predecessors in order to maintain a consistent gas velocity of more than 10 m/s through the calciner, and to ensure sufficient retention time for effective combustion. This investment amounted to EUR 10.3m.

Record CO_2 reduction in grey cement production
Another reduction record for CO_2 was also achieved in 2018. The CO_2 key performance indicator reached an all-time low of 734 kg per tTCE, a decrease of more than 18% compared with year 2000 when activities to utilise more waste fuel were accelerated.



Financial highlights and social contribution

Social contribution
Aalborg Portland's cement production in Denmark is of significant economic importance to the nation.

In 2018, Aalborg Portland's value added was calculated as EUR 104.4m. Of this, EUR 32.3m (31%) went to society in the form of VAT, company tax, other taxes and employee income tax. EUR 22.1m (21%) went to the employees in the form of pay and pension contributions (after tax). EUR 46.6m was transferred to the company's equity.

A social contribution is also created through our sub-contractors involved in transport, maintenance, facility management, and other activities at Aalborg Portland.

Environmental levies
As regards the development in environmental levies a fall can be seen. This is a result of the decision of the Danish Government to reduce the NO_X tax and phase out the PSO charge over a five-year period from 2017 to 2021.

These two special Danish taxes have very considerable importance for the competitiveness of Danish production companies and pose a significant disadvantage for Aalborg Portland in competition with European companies not subject to these levies.

A removal of these levies will enable long-term investments in new production equipment and employment in Denmark.

EUR 32.3m

of the value added went to the public sector.

DISTRIBUTION AND VALUE ADDED

EURm	2014	2015	2016	2017	2018
Revenue	192	210	232	245	245
Spent on materials, services, depreciation etc.	85	109	117	134	141
Value added	**107**	**101**	**115**	**111**	**104**
Society	35	38	36	33	33
Employees	17	18	22	24	22
Interest on loan capital	5	4	4	4	3
Transferred to equity	50	41	53	50	46
Dividend to the owner	0	0	0	0	0
Total	**107**	**101**	**115**	**111**	**104**

The company has incurred the following direct environmental levies:

EURm	2014	2015	2016	2017	2018
PSO levy	4.2	4.8	5.2	2.3	1.8
NO_X levy	1.9	2.4	2.1	1.8	1.7
Waste levy	0.1	0.2	0.3	0.3	0.5
Electricity levy	0.1	0.1	0.2	0.2	0.2
Energy levy	0.8	0.7	0.7	0.7	0.5
Raw materials levy	0.5	0.6	0.7	0.8	0.7
Sulphur levy	0.3	0.7	0.8	0.9	0.7
Total	**7.9**	**9.5**	**10.0**	**7.0**	**6.1**

Society 31%
Employees 21%
Interest on loan capital 3%
Transferred to equity 45%

Measurement and calculation of material flows

The information used in compiling this Environmental Report was derived from Aalborg Portland's environmental database (SAP EnvDB) which receives raw data from a variety of recording systems.

The methods of measurement used in conjunction with data capture are described below:

- Raw materials, recyclables and fuels are determined by flow meters and weighing devices installed in the production process.
- Water consumption is measured by water meters.
- Electricity consumption is measured by kWh meters.
- Packaging is calculated from inventory statements.
- CO_2 emission is determined according to the approved CO_2 plan for Aalborg Portland and verified externally.
- NO_X, SO_2, CO, HCl, NH_3 and dust emissions from kilns are determined by continuous metering in exhaust stacks. The same applies to dust concentrations in discharges from cement and coal mills, while air volumes from these sources are based on sampling.
- Hg quantity is calculated by continuous measurement of kiln air volumes and Hg concentration samples from yearly performance measurements. This does not apply to Kiln 87 where continuous measurement of Hg concentration was established in 2014.
- Products are determined by weighing and calculation.
- District heating production is measured by calorimeter.
- Wastes are determined by weighbridge and annual statements from external waste receivers.
- Cooling water is calculated on the "water balance principle" in which flow-metered outputs (water vapour, groundwater lowering at Kiln 76 and waste water, i.e. sanitation water and washing water) are deducted from measured inputs (water consumption, groundwater lowering and water content in materials and fuels).
- Combustion air is calculated indirectly by deducting the input side of the materials flow from the output side.
- Work accidents and time lost are determined from data reported to the Working Environment Authority.
- Noise calculation is performed by an accredited external firm based on measurement at source and subsequent computation.

Continuous emission and flow gauges and also weighbridges are subject to regular inspection and calibration by DANAK-accredited companies.

Environmental verifier's report and EMAS registration

The environmental verifier of Bureau Veritas Certification (accreditation no. 6002) has reviewed the part of the Environmental Report dealing with external environment and issued the statement shown below. Based on this statement the Danish Environmental Protection Agency has issued a Certificate of EMAS Registration and endorsed the Environmental Report.

Health & Safety, financial accounting data and social contribution are not covered by the verification.

BUREAU VERITAS Certification

MILJØVERIFIKATORS ERKLÆRING OM FORETAGET VERIFIKATION OG VALIDERING

Bureau Veritas Certification Denmark A/S

Aalborg Portland A/S

Rørdalsvej 44, 9220 Aalborg

DANAK

Certifikat for EMAS-registrering

Certificate of EMAS-Registration

EMAS VERIFICERET MILJØLEDELSE

Aalborg Portland A/S

Rørdalsvej 44, DK-9220-Aalborg Øst

Registreringsnummer
Registration Number
DK-000132

Registreret første gang
Date of first registration
02-03-2000

Certifikatet er gyldigt indtil
This certificate is valid until
01-06-2020

Udstedelsesdato
Date of issue
12-06-2019

Denne organisation har indført et miljøledelsessystem, og udarbejdet en miljøredegørelse i henhold til forordning (EF) nr. 1221/2009 med det formål at fremme en løbende forbedring af organisationens miljøindsats og resultater, og informere offentligheden herom. Miljøledelsessystemet og miljøredegørelsen er verificeret af en uafhængig tredjepart.

This organisation has established an environmental management system and prepared an environmental statement according to Regulation (EC) No. 1221/2009 to promote the continual improvement of environmental performance and to inform the public hereof. The environmental management system and the environmental statement are verified by an independent third party.

Søren Mørch Andersen
EMAS Koordinator
EMAS Coordinator

Miljø- og Fødevareministeriet

General information

NAME AND ADDRESS
Aalborg Portland A/S
Rørdalsvej 44
9220 Aalborg Øst
Tel +45 98 16 77 77
E-mail: cement@aalborgportland.com
Internet: www.aalborgportland.dk

ENVIRONMENTAL SUPERVISORY AUTHORITY
Danish Ministry of Environment and Food,
Environmental Protection Agency Aarhus.

INDUSTRIAL SECTOR
Raw materials processing.

MAIN ACTIVITY
Production of cement for the domestic and export market.

LIST ITEM
3.1. a) Production of cement clinker in rotary kilns with an output capacity of more than 500 tonnes/day (s).

COMPANY REG. NO.
36 42 81 12

PRODUCTION UNIT NO.
1.019.874.563

NACE CODE
23.51 – Production of cement.

LAND REGISTER TITLE NOS.
1a, 1k, 1l, 1m, 1n, 1p,1o Rørdal, 9a, Ø. Sundby, and 9a, 10g, 11a, 16i, 17l, 21h, Uttrup under Aalborg Jorde.

SIGNIFICANT SECONDARY ACTIVITIES
K212. Facilities for temporary storage of non-hazardous waste prior to recycling or disposal with a waste feed capacity of 30 tonnes per day.

OWNERSHIP
Aalborg Portland A/S is 100% owned by Aalborg Portland Holding A/S, which is 75% owned by Cementir España S.L., Spain and 25% owned by Globo Cem S.L., Spain. The companies are part of Cementir Holding S.p.A, Italy and the ultimate owner is Caltagirone S.p.A., Italy.

Management
Environment, energy, quality and health & safety:

Michael Lundgaard Thomsen, Managing Director

Søren Konstmann Lausen, Plant Director

Henriette Charlotte Nikolajsen, Environment, Energy and QMS Manager

PRINCIPAL ENVIRONMENTAL APPROVALS

2 OCTOBER 2017
Environmental approval for removal of 100,000 tonnes of microfiller-type waste from the "Støvsøen" landfill.

21 MARCH 2017
Licence for recovery of surface water from the clay pit lake for use in the pyrite ash facility at Aalborg Portland.

10 MARCH 2017
Environmental approval and review of Aalborg Portland cement plant.

The environmental approval covers:

- Increased emission limits for Kilns 87, Kiln 76, Kiln 74/78 and Kiln 73/79.
- Change of conditions for receipt of alternative fuels.

The review and enforcement notice cover:

- Changed conditions for the pyrite ash site.
- The company's overall environmental status.

10 MARCH 2017
Review of environmental approval for the "Støvsøen" landfill.

10 MARCH 2017
Review of environmental approval for the "Tippen" landfill.

10 OCTOBER 2012
Recycling of microfiller for rehabilitation of chalk pit.

10 OCTOBER 2012
Licence for extraction of chalk.

29 NOVEMBER 1991
Final licence for water extraction.

29 JUNE 1990
Licence under the Danish Environmental Protection Act to send waste water to the municipal treatment plant.

Aalborg Portland is not covered by the Danish Ministry of Environment and Food's regulations for the safe storage, handling and transport of materials that may give rise to serious environmental hazard in the event of accident.

Terminology

ALKALI
Alkalis used at Aalborg Portland are sodium and potassium compounds.

ALTERNATIVE FUELS
Combustible waste products which replace fossil fuels and consist of a reprocessed fuel product, meat and bone meal and dried sewage sludge.

BAT
Best Available Techniques. EU documents that describe the best available technique within various fields. Used as basis for environmental approvals.

CEMENT CLINKER
Intermediate product that results from the burning of slurry in kilns and is ground to produce cement.

CEMENT MILL
Facility which grinds cement clinker to cement.

CO
Carbon monoxide. A result of incomplete burning of fuel. Converted in the atmosphere to CO_2.

CO_2
Carbon dioxide. Formed by burning of fuel and calcining of chalk. CO_2 emission is calculated according to EU guidelines.

dB(A)
Noise is measured in decibels, dB(A), which is a logarithmic scale. For example, the noise from leaves rustling in the wind is around 20 dB(A). The noise level in an ordinary living room is around 40 dB(A), in offices 60-65 dB(A), on a street with normal traffic 80-85 dB(A) and from a pneumatic drill approximately 100 dB(A).

EMAS
Eco-Management and Audit Scheme. EU scheme for the registration of environmental management systems.

EMISSION
Release of noise or gas. In flue gas emission the volumes released are
metered continuously, except for CO_2 – see under CO_2.

ENVIRONMENTAL IMPACT ASSESSMENT (EIA)
EU directive which prescribes that installations having material potential environmental impact cannot be established until the procedure stated in the directive has been implemented, including preparation of an EIA Report, holding of a public inquiry, etc.

FILTRATE WATER
Waste water formed in heat recovery boilers by condensation of flue gases.

FLUE GAS DESULPHURISATION GYPSUM (FGD)
Gypsum formed by the desulphurisation of flue gases.

FLY ASH
Material produced by cleaning of flue gases in an electrostatic precipitator.

FOSSIL FUEL
Coal, petcoke, oil and natural gas.

GJ
Gigajoule, a unit of energy equal to 1,000 MJ.

HCl
Hydrogen chloride.

Hg
Mercury.

HOUSEHOLD ENERGY CONSUMPTION
Estimated average annual consumption per household. Electricity: 4,000 kWh. Heat (space heat and hot water): 60 GJ

IMMISSION
Level of emissions in outdoor air at 1.5 m above ground.

IRON OXIDES
Iron-containing by-product of sulphuric acid manufacture.

ISO 14001
Standard issued by the International Standards Organisation with guidelines for establishment and maintenance of environmental management systems.

ISO 50001
Standard with guidelines for establishment of energy management systems.

LIFE CYCLE ANALYSIS (LCA)
Method for assessing the environmental and other impacts which a product has on its surroundings from raw material extraction until final product disposal.

MANAGEMENT SYSTEM
Aalborg Portland's internal management system for environment, energy, quality and health & safety. Ensures that all related matters are handled uniformly and in accordance with policies, targets, guidelines and rules.

MATERIAL FLOWS
Description of what resources Aalborg Portland uses in manufacturing cement, how much is produced, and what emissions and discharges the production entails, cf. pages 52-53.

MICROFILLER
Filler material with particle size < 50 µm.

MINERALISED OPERATION
Addition of small amounts of fluoride and alkali, which together with sulphur from fuels form especially reactive cement clinker.

NH_3
Ammonia.

NO_X
Nitrogen oxides. Formed by combustion of fossil fuel. Contributory cause of acid rain.

OHSAS 18001
International guideline for establishment and maintenance of health & safety management systems.

PETCOKE
A low-ash coke by-product from the refining of crude oil into petrol.

PRTR
European Pollutant Release and Transfer Register.

PSO LEVY
Levy charged on electricity purchase and supporting producers of green energy.

PYRITE ASH
See iron oxides.

RAW MEAL
Cement clinker and incompletely burned raw materials. Raw meal may result from e.g. kiln stoppage.

RDF
Refuse Derived Fuel is a waste fuel from which recyclable residues such as glass and metals have been removed.

SAFETY WALK
A safety round of the factory with focus on the employees' health and safety.

SO_2
Sulphur dioxide. Formed by combustion of fossil fuel. Contributory cause of acid rain.

SUBSTITUTION
Replacement of a raw material by a waste product. For example, substitution of clay by fly ash.

tTCE
tonne Total Cement Equivalent. Standard unit for the production obtained by calculation of the equivalent cement tonnage if sales and changes in clinker stocks had been processed into cement. Each type of clinker is therefore multiplied by a factor that expresses addition of other materials for production of cement. Imports of clinker, which are consumed to produce cement, are deducted and are not considered as production.

WA
Workplace Assessment.

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