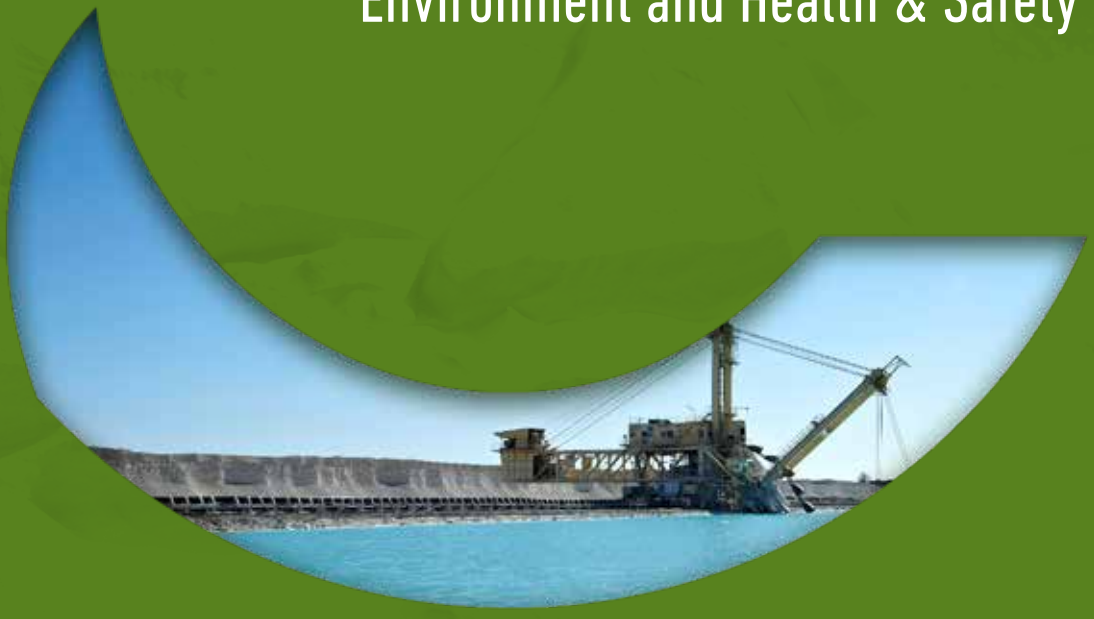


ENVIRONMENTAL REPORT 2017

Environment and Health & Safety

aalborgportland

CEMENTIR HOLDING

CONTENTS

The Great Belt Bridge, Denmark

Environmental Report 2017
Environment and Health & Safety

Aalborg Portland A/S
The company has been manufacturing cement at the Aalborg factory for more than 125 years and is the sole producer of cement in Denmark. The development towards sustainable production began in the 1970s when the energy crisis meant closure of three competing Danish cement plants. Improved energy efficiency came into focus, and in 1988 Kiln 87 entered service equipped with an efficient semi-dry production process for grey cement.

Further energy and environmental initiatives have been developed subsequently, and sustainable production remains of major importance for employment, technology development and export.

Some of these initiatives – both implemented solutions and planned sustainable measures – are described in the section "Sustainable production".

Formal details relating to Aalborg Portland A/S appear in the section "General information" – see also www.aalborgportland.dk.

Environmental Report 2017 – target group
Aalborg Portland's Environmental Report 2017 is intended to provide stakeholders with easy access to the company's principal environmental impacts as well as initiatives on health & 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.

Environmental Report 2017 covers the Aalborg Portland cement factory situated at Rørdalsvej 44, 9220 Aalborg Øst, Denmark.

One of Denmark's leading industrial companies, Aalborg Portland, owns 1,200 hectares in the Rørdal area. In addition to the cement factory the site contains a variety of nature and agricultural land as well as a chalk pit.

The cement 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 has 334 employees. A number of external personnel from subcontractors also work there, corresponding to approx. 1½ man-years for each employee – in all approx. 835 people.

This Environmental Report covers the period 1 January - 31 December 2017.

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.

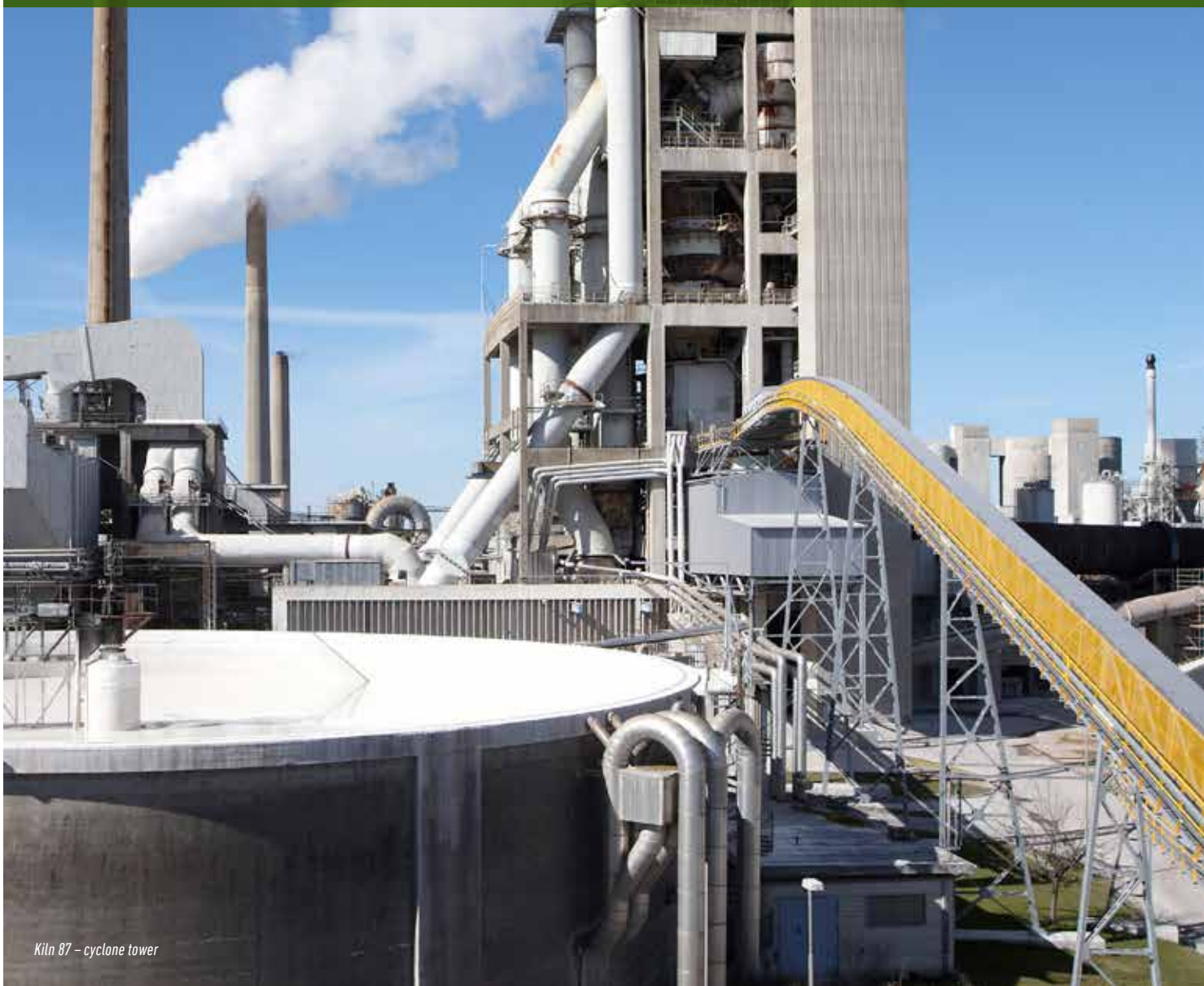
Aalborg Portland is certified in accordance with the following standards:

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

ENVIRONMENT, ENERGY AND HEALTH & SAFETY IN 2017

Aalborg Portland's Environmental Report 2017 is the Management's review of the year's most significant environmental, energy and health & safety activities relating to Aalborg Portland's Danish cement production.



Kiln 87 – cyclone tower

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

In 2017 we carried out a very extensive renovation of Kiln 87, which is our largest production line for grey cement. The investment in an improved design for the kiln calciners amounted to EUR 10.3m and has resulted in more stable, efficient and, not least, greener cement production. The upgrade of the calciners for Kiln 87 is reducing the dust emissions in production and also enabling us to increase the proportion of alternative fuel. In 2017, alternative fuel accounted for more than 44% of the kiln's fuel energy.

Ambitious investments

Our stated goal is eventually to use alternative fuels to replace 60% of the fuel energy in grey cement production and 20% in white cement production, which will contribute to reduced CO_2 emission. We will achieve this by continuing to think alternatively and by carrying out ongoing investments, and in the period 2013-2017 we have invested approx. EUR 35.3m in a number of technology improvement projects for the benefit of nature, the environment and the community.

Going forward, we will continue our investments and therefore improvements in environment, energy and health & safety and thereby support the sustainable development of the company. However, a long-term and stable environmental and energy policy in which anti-competitive Danish levies are reduced remains a decisive prerequisite. Despite foreign ownership and global business activities, the Aalborg Portland Holding Group, to which Aalborg Portland A/S belongs, is one of Denmark's largest corporate taxpayers contributing with approx. EUR 16.1m annually. Our ambition is to strengthen our presence in Denmark to our mutual benefit.

In symbiosis with the outside world

One of Aalborg Portland's focal areas within sustainable production is circular economy and the use of alternative fuels and raw materials, and we are constantly looking for new opportunities to engage in industrial symbioses with other areas of production for the benefit of the community, the environment and Danish businesses.

In 2017, Aalborg Portland utilised nearly 470,000 tonnes of alternative raw materials and 165,000 tonnes of alternative fuels, replacing equivalent volumes of non-renewable raw materials and fuels. We have the capacity to use 700,000 tonnes of alternative fuels and raw materials annually, and we therefore remain focused on further optimising our production in a sustainable and resource-efficient direction.

In 2017, wastes (RDF) and homogeneous industrial by-products utilised by Aalborg Portland as alternative fuels included meat and bone meal and dried sewage sludge from the City of Aalborg. Alternative raw materials recycled in cement production included fly ash from power stations, bottom ash from Studstrup power station near Aarhus, FGD gypsum from North Jutland power station, and sand from dredging of the Limfjord at Hals Barre.

Deep-excavator in the chalk pit

Heat recovery and energy efficiency
As an important part of the circular economic mindset, we also seek to utilise the alternative resources and residues generated in our own production. For example, we recover the surplus heat from our cement production for supply as district heating to the citizens of Aalborg. In 2017, the volume of heat supplied corresponded to the annual heat consumption of 24,000 households. Going forward, we will work to increase this utilisation, as our factory has the capacity to deliver district heating corresponding to the annual heat consumption of 36,000 households.

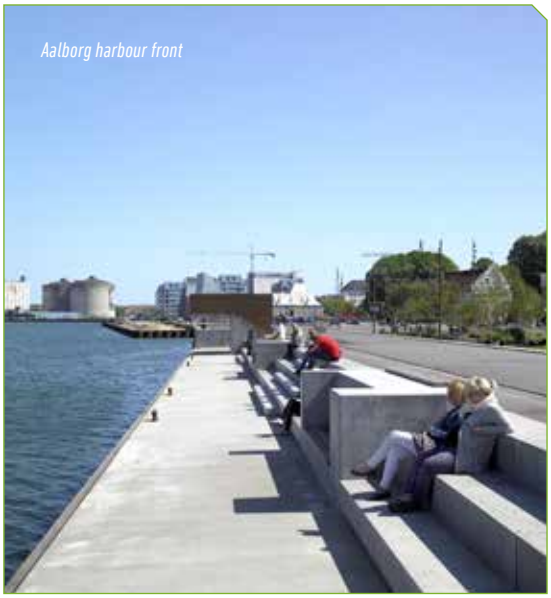
In 2017 we also began examining the possibility of utilising the cold water from our chalk lake to supply district cooling to the future super hospital in Aalborg. The cold water from the lake could constitute an energy-efficient and sustainable alternative to the conventional electrical cooling installations for the hospital's comfort cooling and process cooling.

At Aalborg Portland we are constantly focused on improving our energy consumption efficiency by optimising production and utilising electricity and fuel to the full. The overall consumption of electricity and fuel will vary according to the annual product mix and current operating conditions, and our work will not necessarily manifest itself by a saving in total energy consumption, but will be reflected in the respective productions.

Overall, energy savings and switch to alternative fuels have led to a reduction of 8% in the relative emission of CO_2 in the period 2000-2017. In order to contribute further to the green transition in Denmark, our plans include setting up five wind turbines on our own land.

Work environment
At Aalborg Portland employees are our most important resource. It is their competencies, ideas and commitment which continuously ensure the development of the company through improvements in routines, equipment and processes. This makes strong demands on both the individual employee and the individual manager.

Work environment, well-being and safety are therefore high on the agenda. With a strong health & safety organisation and managers, and with employees who are aware, we have the potential to make Aalborg Portland one of the best and safest workplaces in heavy industry. The work which is performed at Aalborg Portland must at all times


Aalborg harbour front

be performed safely, and any accident – small or serious - is regarded as an accident too many. This demands clear guidelines - and consequences, if these guidelines are not complied with. Accordingly, in 2016 we launched the project "Safe Workplace", which consists of a three-year plan focused on further strengthening our safety culture through a clarification and implementation of the guidelines.

In 2017, the Cementir Group developed a framework for our corporate identity consisting of a mission, a vision, shared values, a slogan, and a common Leadership Competency Model. These elements constitute the compass which, through a common frame of reference for the behaviour of all employees and managers, must set the direction that we must take in our professional journey and daily activities.

At Aalborg Portland we furthermore take a responsibility for bringing forward the next generation of talented employees. In 2017 we therefore launched a new graduate programme for seven young, newly qualified engineers, economists, etc. and we have at all times more than 20 qualified apprentices and interns at the factory in Aalborg. We will need skilled and able people also in the future. We therefore take responsibility for ensuring apprenticeships for young people in a good working environment.

Michael Lundgaard Thomsen
Managing Director, Aalborg Portland A/S
June 2018

Conveyor belt for waste fuels to Kiln 87

Our stated goal is eventually to use alternative fuels to replace 60% of the fuel energy in grey cement production and 20% in white cement production, which will contribute to reduced CO_2 emission.

Aalborg Portland – cement factory

Environmental vision, environmental and energy policy

ENVIRONMENTAL VISION

Aalborg Portland shall be a responsible company promoting sustainable development.

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 measures, 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.

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.

Deep-excavator in the chalk pit

Research & Quality Centre

SUSTAINABLE DEVELOPMENT

Aalborg Portland is committed to promoting sustainable development based on the following principles:

- Environment shall be an integral part of the development in the company's activities, including reduction of the environmental footprint.
- Our environmental activities shall be anchored through involvement of all employees and in dialogue with the community.
- Key Performance Indicators shall signal sustainable development.
- Production and economic growth shall take place without relative increase in energy consumption, emissions, use of chemicals, creation of waste, and other consumption of resources for the individual products.
- Resource efficiency shall be promoted i.a. by substitution of non-renewable resources and introduction of new technologies.
- The global perspective shall be invoked – i.a. by CO_2 emissions trading, Joint Implementation and the Clean Development Mechanism.

SUSTAINABLE PRODUCTION

In development and manufacture of Aalborg Portland's cement products there is focus on sustainability and responsibility.


Bucket wheel excavator in the chalk pit


Transport of cement

Aalborg Portland is committed to contributing to socio-economic sustainable development. We strive to improve our environmental and energy performances year on year.

Current initiatives include the following:

CO_2 and alternative fuel
Aalborg Portland focuses on reducing emission of CO_2 by using more waste fuel with biomass, which is CO_2 neutral, as a substitute for fossil coal and petcoke. Use of waste as fuel thereby contributes to reducing global consumption of fossil fuels.

CO_2 and products
In order to reduce our CO_2 emission per tonne of cement produced we have introduced mineralised operation in the manufacture of grey and white cement clinker. This is a less fuel-intensive kiln process and therefore causes less CO_2 emission.

Energy savings and switch to alternative fuels have led to a decrease of 8% in the relative emission of CO_2 in the period 2000-2017. This is despite the fact that more than half of CO_2 cannot be reduced in the kiln process as this part of the CO_2 must be expelled from the raw materials by calcining to create cement.

In order to reduce CO_2 at source, we have also begun production trials with types of cement that have a lower content of cement clinker. These types of cement are less energy-intensive in the production phase and thus cause less CO_2 emission. The work of developing new types of cement extends over a lengthy period as the market also has to accept them afterwards.

Heat recovery and gypsum production
Aalborg Portland's heat recovery and desulphurisation system removes up to 98% of flue gas sulphur. We recover heat from the flue gases for supply to the City of Aalborg's district heating network. We have the capacity to supply district heating corresponding to the annual heat consumption of 36,000 households. FGD gypsum is formed as a by-product from flue gas cleaning, and is recycled in cement production as a substitute for natural gypsum.

NO_X reduction
In the mid-2000s, as measures to reduce NO_X, we introduced i.a. SNCR technology in grey cement production and mixing air technology in white cement production. As a result, the relative NO_X emission has been reduced by 67% in the period 2003-2017.

Water resources
In 2005 we established a water recycling system. Today, this system recycles, for example, the condensate produced in our heat recovery and flue gas desulphurisation. In 2017, the volume of filtrate water exceeded 400,000 m^3. This water was previously released into the Limfjord. The recycling system also saves on extraction of an equivalent volume of water from Aalborg Portland's own wells, thereby helping to conserve local groundwater resources.

Future initiatives
In addition, plans for setting up five wind turbines and examination of the possibility of supplying remote cooling to a new super hospital can also contribute to Denmark's green transition. See more details in the section "Energy".

The resource-efficient partnership

Aalborg Portland converts raw materials, by-products and wastes into cement and district heat. We focus on promoting sustainable development by basing large parts of our cement production on recycling of material flows from society and industry in a resource-efficient partnership. This is consistent with the Danish government's desire that wastes should be used as resources in a circular economy.

For Aalborg Portland, wastes and homogenous residues constitute a resource. We recycle and utilise wastes and homogenous by-products from other industries as fuel and raw materials in production of cement. Waste heat from our production is supplied to the district heating system in Aalborg and the city's consumers.

By recycling and making use of fuels and alternative raw materials in cement production, wastes and by-products are fully utilised. All constituents are consumed and no new residues formed. High temperatures and special process conditions make cement kilns ideal for use of 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 the use does not increase the environmental impact from the factory.

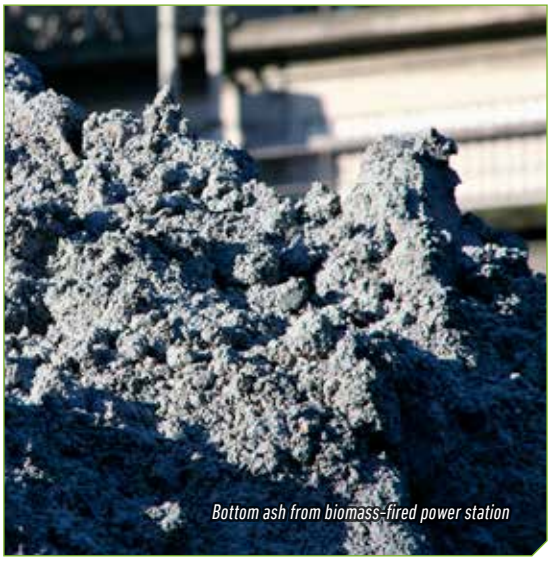
In 2017, nearly 470,000 tonnes of alternative raw materials and 165,000 tonnes of alternative fuels were used by Aalborg Portland, replacing equivalent volumes of raw materials and fuels that would otherwise have had to be sourced in Denmark or imported. Aalborg Portland has the capacity to process 700,000 tonnes of alternative fuels and raw materials annually.

BOTTOM ASH FROM BIOMASS-FIRED POWER STATION

Collaboration on resources

In 2017, Aalborg Portland received bottom ash from Studstrup power station near Aarhus. The ash comes from the burning of wood pellets and is utilised as a waste by-product in Aalborg Portland's cement production.

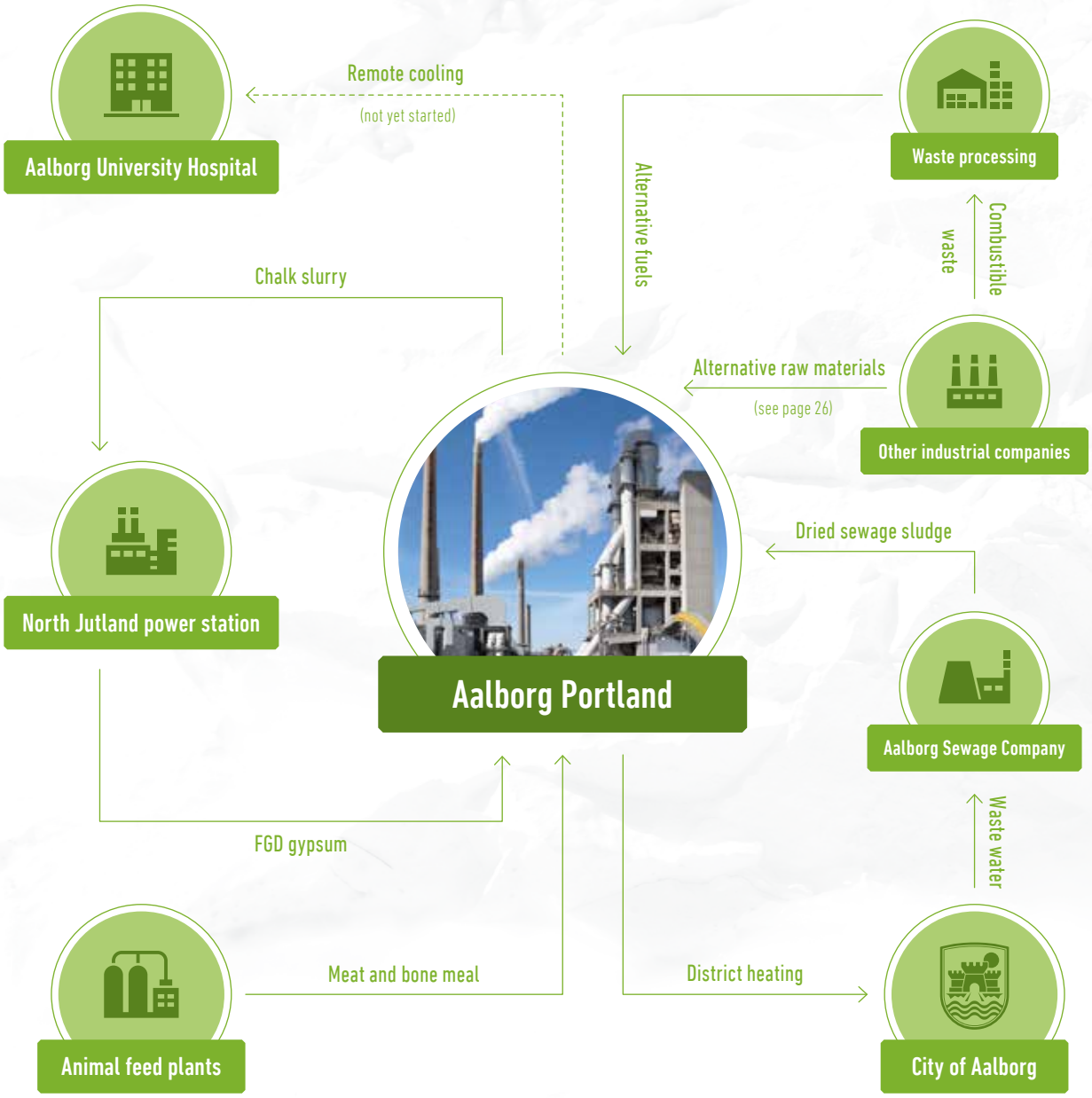
The power company Ørsted (formerly DONG Energy) has ensured that the wood pellets originate from sustainably managed forests in Estonia and USA. Forest owners must be certified participants in the Sustainable Biomass Programme.



Bottom ash from biomass-fired power station

ENERGY AND RAW MATERIALS SYMBIOSIS

To reduce the use of fossil fuels and save on natural resources, 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. Sewage sludge from the City of Aalborg is used in our cement kilns, in return for which the City of Aalborg is 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. The 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.

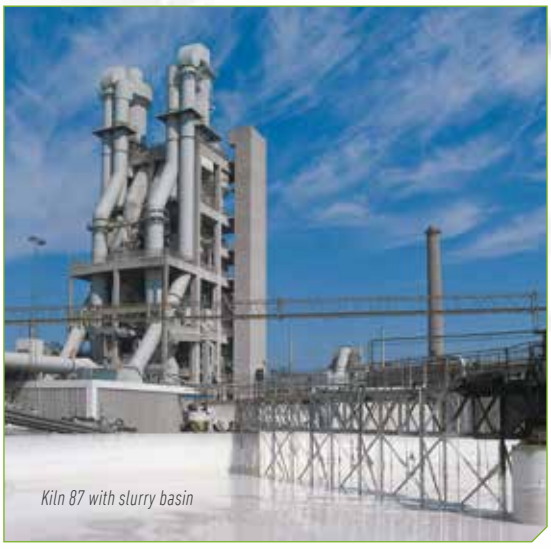
Kiln process (grey cement)
The slurry is injected together with fly ash and pyrite ash into a dryer-crusher where the material is converted with the help of hot flue gases into raw meal. The raw meal is conveyed via a separating cyclone to the cyclone preheaters where it is heated to 750° C.

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
In 2017, heat recovered from the kiln process during production of white cement was used internally in the factory and supplied to the citizens of Aalborg where it was sufficient to meet the heat consumption of 24,000 households.


Central control room – operation and monitoring of production


Kiln 87 with slurry basin

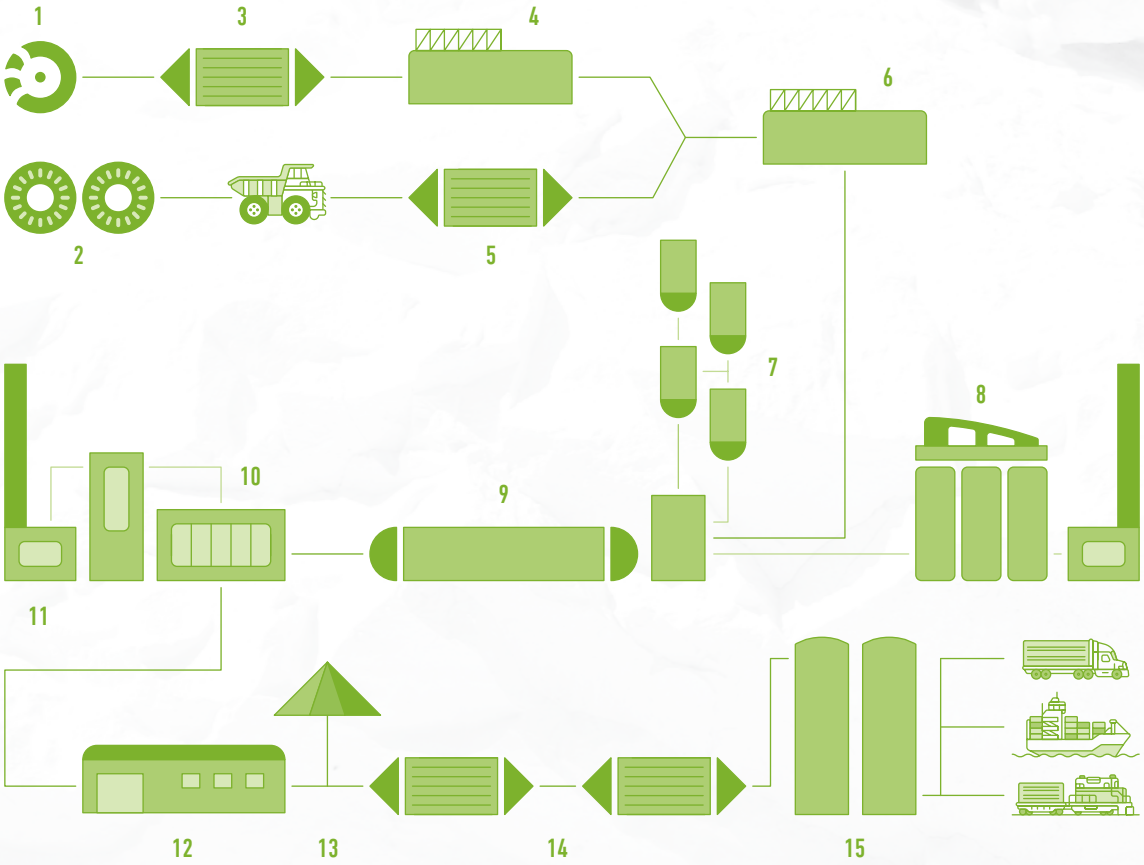
Grinding in cement mill
After stockpiling in the clinker store the clinker is ground in the cement mill to a fine powder to which a small percentage of gypsum is added to produce the types of cement required.

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

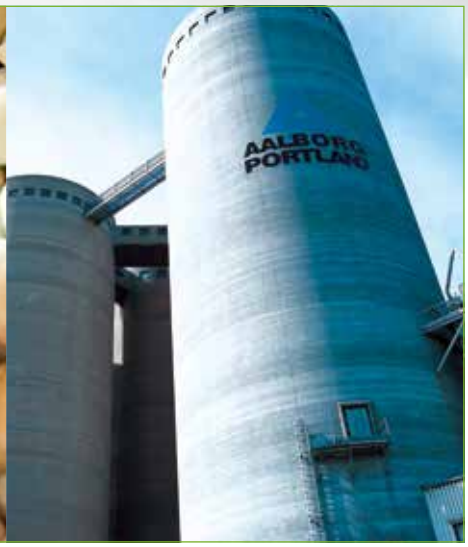
A quality product
The finished cement is ready for use in building projects of all sizes worldwide. It is a quality product which is used in concrete, mortar etc. and which adds strength, stability and long life to buildings and constructions everywhere.

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



Cement clinker



CEMENT CONTRIBUTES WITH CONCRETE RESULTS IN A DYNAMIC WORLD

Cement for a dynamic industry

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, metros, 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.

ARoS Art Museum, Aarhus, Denmark

Aalborg Portland's products

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.

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

Aalborg Portland's products are subject to Bureau Veritas Certification, which verifies that the cements comply with the requirements of product standard EN 197-1, and they therefore bear the CE mark.

Product information
It is important for us as the manufacturer that information about our products is readily accessible. The intended use for each individual product must be stated in the product information and in the technical documentation prepared with view to compliance with relevant legislation.

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 cement name, CE marking and declared properties required in the cement standard.

Safety Data Sheets (SDS)
Safety Data Sheets accompany our 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
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 for identifying the environmental hotspots in our value chain – from extraction of chalk to product packaging.

Cement and concrete of the future

Aalborg Portland is involved in developing a variety of future cements and concretes.

The aim is to create cements and concretes that can be produced with lower energy consumption and lower CO_2 emission.

Bridge project brings green concrete closer

With the use of "green concrete" in the building of a new test bridge, the Innovation Consortium "Green Conversion of Cement and Concrete Production" has taken another important step in the development of more sustainable concretes which are vital for future construction.

The Danish building sector faces a number of future challenges. Particularly with regard to fly ash, which today comes from coal-fired power stations and is used as a binding agent in the manufacture of concrete. Fly ash can partially replace cement in the composition of concrete, and therefore constitutes an important but limited alternative raw material that in future will only become scarcer as Danish coal power is phased out. Combined with an ever-increasing demand for concrete, which is primarily due to a strong growth in housing construction, it is therefore vital that the cement and concrete industry finds sustainable substitutes for fly ash.

Environmental and quality considerations
The Innovation Consortium, often termed Green Concrete Project II, is an R&D project at the Danish Technological Institute's Centre for Green Concrete, which is working to develop concretes for the future consisting of alternative cement materials. Behind the project is Aalborg Portland and a number of partners consisting of companies, public institutions and knowledge centres, all working closely together to create a platform for a transition to green cement and concrete production in Denmark.

The purpose of the project is therefore to identify new ways in which the CO_2 emission from cement production can be further reduced and to find solutions that at the same time can overcome the critical lack of fly ash for concrete production.

Creating new cements and concretes that are still more sustainable, and which at the same time maintain the same high quality standards in terms of strength and durability, is a major challenge. It calls for extensive studies and testing as the slightest change in the composition of raw materials can have decisive importance for the final product - and there can be no compromising on the quality of building materials.

The green composition
The Innovation Consortium has already come a long way in the development of more sustainable future concretes that can be produced with lower CO_2 emission and without use of fly ash. In the green concretes, fly ash has now been substituted by a combination of lime filler and calcined clay, which at the same time means that an even greater part of the cement be replaced in the concrete composition.

Calcined clay can be processed at significantly lower temperatures than conventional cements, and therefore requires much less fuel in the manufacturing process. In addition, the clay also has a lower content of natural CO_2 compared with several of the raw materials used in conventional cements - and this means all in all a significantly lower CO_2 emission in manufacture of concrete.

Convincing bridge construction
Last year, parts of a new road bridge on the motorway between Herning and Holstebro provided the framework for the first major demonstration project for green concrete. At the end of September 2017, the Innovation Consortium then took another important step by using green concrete to construct parts of a new demo bridge in Lolland. And as it is important to give the project partners and the nation's building sector a chance to view the tangible results of the project by documenting its progress in practice, a further demo bridge is also on its way to Lolland.

Green concrete being used to construct part of a new bridge over the E47 motorway near Rødby, Denmark.

It is vitally important to see the new technology in full scale. This is where the concrete must show its worth. Long-term experience from reality is ultimately crucial to whether the new technologies will be implemented and applied.

Heightened environmental demands from customers
It is not only the combination of limited access to fly ash and growing demand which is driving the transition towards green cement and concrete. Another factor is a market development where customers are demanding higher product standards from their suppliers in terms of climate and environmental impact. This is reflected in an increasing number of requests for product environmental declarations - a trend evident from tradesmen and contractors to architects and developers.

The heightened environmental requirements are fully reflected in the development at Aalborg Portland. Over the last five years, more than EUR 35m has been invested in ambitious environmental technology improvements at our cement factory, while a number of research partnerships have also begun with Aalborg University. Support and commitment to the Green Concrete II project is therefore an entirely natural part of Aalborg Portland's overall environmental activities.

The Green Concrete II project is supported by the Danish Innovation Fund and has a total budget of EUR 3.9m. The project term is 2014-2018. However, it is hoped to be able to extend it until 2019 when the Technological University of Denmark (DTU), which is among the project participants, is due to commence the construction of a new materials testing laboratory in which green concrete would constitute an appropriate building material.

During the year ahead a PhD student recruited in 2016 to Aalborg Portland's Supply Chain Management function will continue researching the use of alternative fuels. The work will continue to be focused on finding the optimal alternative fuels for minimising CO_2 emission.

ABOUT THE INNOVATION CONSORTIUM

The Innovation Consortium "Green Conversion of Cement and Concrete Production" was launched on 1 March 2014. It is co-financed 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 focus is on environmental and energy factors.

The principal factors are covered in pages 26-39 under the following headings: Raw materials – Energy – Emission to atmosphere – Noise – Water – Waste – Land use – and Sustainable distribution.

Aalborg Portland has introduced an environmental and energy Management System to serve as a control framework. We focus on ongoing improvements by working with environmental and energy goals. Our activities and results are shown in pages 22-23.

Transport of alternative fuels to Kiln 87

Environmental management

Aalborg Portland operates with an integrated environmental Management System that also covers quality, CO_2, energy, and health & safety. The system is an integral part of our everyday life, is instrumental in maintaining our focus on key factors, and helps to make our policies a reality.

The system defines requirements, goals and action plans, so that we can constantly improve our performance in the areas covered, cf. the section "Environmental and energy targets – activities and results".

Aalborg Portland is certified according to the following standards: ISO 14001, EMAS III, ISO 50001, OHSAS 18001 and Danish Working Environment Authority Order No. 1191, ISO 9001, NF 002, DS/INF 135, DS/EN 197-1/-2 concerning product quality of cement with right to CE marking, EN 12620+A1:2008 and EN 13043:2002+AC2004 with right to CE marking of concrete filler and asphalt filler, Danish Maritime Authority Regulation No. 6 of 9 October 2002 on bulk carriers, ISPS regulations on security of port facilities against terrorism, and the Danish Safety Technology Authority quality management system for electrical and installation work.

Principal environmental impacts
Cement manufacture involves input of energy and raw materials, and therefore gives rise to environmental impacts in the form of emission of flue gases, wastes, noise, effluent, etc. In addition, there are environmental impacts relating for example to product distribution, extraction of raw materials and reprocessing of fuels.

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

Burner zone in a rotary kiln with cement clinker

In our environmental and energy work the primary direct and indirect environmental impacts have been mapped and chosen according to the following criteria:

- Spread of substances along with 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 production of cement and concrete.
- Biodiversity.

Environmental approval

Environmental impacts 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 a review of Aalborg Portland's environmental status by making a decision on revision of terms in existing environmental approvals.

Prior to this, Aalborg Portland had revised its environmental technical description and noise, emission and immission calculations, and had completed a basic status study for soil and groundwater. A BAT statement had also been prepared for atmospheric emission with technical, economic and environmental assessment against best available technology for the cement industry.

The current environmental approvals stipulate terms for operation, including:

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

Environmental performance

As follow-up to our environmental and energy work, key performance indicators have been chosen for grey and white cement production, cf. table below. Key performance indicators are relative values, where input and emission are set in relation to production. The section “Material flows” shows the development in the past five years for overall production.

Minor increases can occur in certain key performance indicators from year to year, as from 2016-2017, due to technical issues or changed technical conditions in production. Most importantly, however, Aalborg Portland has reduced both CO_2 and NO_X emissions as well as energy consumption significantly since year 2000, and continuously implements new environmental improvement measures, including investments.

The Opera House, Oslo, Norway

Research & Quality Centre

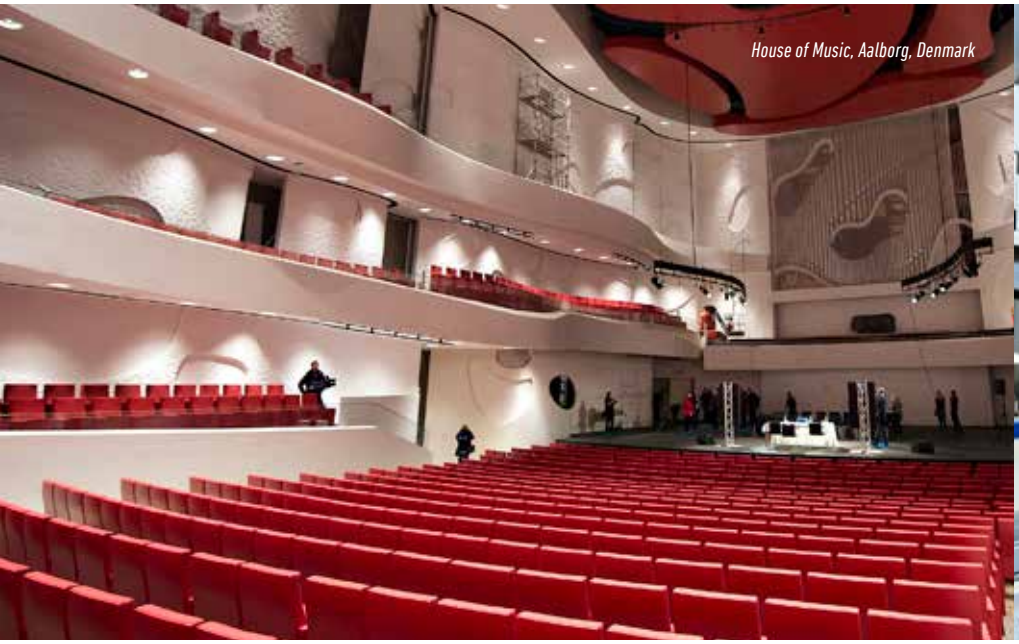
KEY PERFOMANCE INDICATORS	Unit	Base year 2010	2011	2012	2013	2014	2015	2016	2017
Grey cement production									
Energy	GJ per tTCE	5.07	4.61	4.29	4.28	4.50	4.45	4.31	4.41[a]
CO_2	kg per tTCE	809	792	764	761	781	761	756	764[a]
NO_X	kg per tTCE	0.97	0.64	0.63	0.58	0.62	0.70	0.63	0.76[b]
White cement production									
Energy *	GJ per tTCE	7.12	6.96	6.59	6.48	6.74	6.82	6.89	6.98[c]
CO_2 *	kg per tTCE	1,124	1,154	1,139	1,124	1,144	1,155	1,173	1,180[c]
NO_X *	kg per tTCE	2.42	2.11	1.54	1.25	1.39	1.51	1.69	1.71[b]

* Adjusted for heat recovered and supplied to the City of Aalborg's district heating network.
The adjustment concerning 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] KPIs in grey cement production have increased as a total shutdown on Kiln 87, with upgrade to two new calciners, made it necessary at the start of 2017 to implement grey cement production campaigns on a white cement kiln, which has higher KPIs than in grey cement production.

[b] In grey cement production, increase in NO_X is due to a setpoint error for NO_X reduction. In white cement production, increase in NO_X is due to adjustment of mixing air system in order to reduce dust in the employee environment at kiln burner stations.

[c] In white cement production, the adjusted energy consumption and CO_2 have increased due to less efficient heat transfer from the kilns' preheater and chain systems. Preheaters and chains will be renewed at main shutdown in 2018.


House of Music, Aalborg, Denmark

Environmental and energy targets – activities and results

TARGETS 2017	STATUS 2017	TARGETS 2018
ELECTRICITY SAVINGS		
Continued focus on reducing base power load and on power-saving measures.		Continued focus on reducing base power load and on power-saving measures.
In 2017 the target was to implement power-saving measures, including for baseload equipment, to achieve annual power savings of 1,130 MWh. Implement following projects: • Optimise boiler operation after Kiln 79 by replacing two boilers with one of new design (approx. 700 MWh). • Change to LED lighting in Kiln 87 cyclone tower and grey cement mill dept. (approx. 180 MWh). • Replace DC equipment (motors) on Kiln 87 (approx. 250 MWh). • Implement five special studies to identify potential power savings.	Target achieved with annual saving of 1,545 MWh by the following implemented projects: • Optimised boiler operation after Kiln 79 by replacing two boilers with one of new design (1,140 MWh). • Change to LED lighting in Kiln 87 cyclone tower and grey cement mill dept. (180 MWh). • DC motors replaced by five AC motors for conveying, ventilation and separator (261 MWh). • Five special studies implemented to identify potential power savings. • Plus: Prøvestenen silo project, Copenhagen: Change to energy-efficient air compressor (188 MWh). (outside EMAS verification)	In 2018 the target is to implement power-saving measures, including for baseload equipment. Implement following special studies: • Reduction of power consumption by transfer of hot air from Kiln 87 clinker cooler to Kiln 76. • Installation of frequency converter on Kiln 87 cooler fans.
Maintain the specific variable power consumption of 108 kWh per tTCE.	Target achieved. Specific variable power consumption reduced to 107.9 kWh per tTCE, equal to 8.6%, against 118 kWh per tTCE for base year 2010.	Maintain the specific variable power consumption of 108 kWh per tTCE.
WIND TURBINES		
Replace 18% of power consumption relative to 2014 with renewable energy from five wind turbines on Aalborg Portland land. In 2017, the approval of the local planning addendum by Aalborg City Council is awaiting for installation of five wind turbines on Aalborg Portland land.	Target not achieved. Aalborg City Council approved the proposed local planning addendum of 15 December 2014 for installation of five wind turbines at Bredhage. Objections from the 2015 public inquiry are being processed by the City of Aalborg. It has been agreed between the parties to seek dispensation from the overall noise picture in the local area to enable Aalborg Portland to set up wind turbines at Bredhage. Final approval of the addendum by Aalborg City Council is pending.	2018: Aalborg City Council's approval of the local planning addendum to set up five wind turbines on Aalborg Portland land is pending.
FUEL SAVINGS		
In 2017 the target was to implement measures to achieve the 2016 goal of an annual indirect fuel saving of 8,528 MWh by the following project. • Increase heat recovery from the flue gases for district heating, corresponding to coal-fired production of district heating.	Target not achieved. It was planned to install an additional centrifuge and a pipeline for filtrate water from the heat recovery system to buffer tanks. The project was not realised as the utility (Aalborg Forsyning) needed heat to be supplied with a generally higher flow temperature. Instead, with installation of the new-design calciners for Kiln 87, it became possible to implement an 820 MWh energy optimisation project by transferring gypsum slurry from the heat recovery system to Kiln 87 rather than flash-drying FGD gypsum with fuel gas oil.	In 2018 the target is to carry out a project study to obtain an annual fuel saving of 6,750 MWH by: • Using surplus heat from Kiln 87 clinker cooler as hot primary air for Kiln 76.

* "The cement and concrete of the future" is discussed on page 16 and included in research projects promoting sustainable development.

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

In 2017, five out of ten environmental and energy targets were achieved.

Target achieved Target not achieved

TARGETS 2017	STATUS 2017	TARGETS 2018
ALTERNATIVE FUEL		
The eventual objective is to replace min. 60% and 20% respectively of the fuel energy for grey and white cement production by alternative fuel, reducing CO_2 emission.		The eventual objective is to replace min. 60% and 20% respectively of the fuel energy for grey and white cement production by alternative fuel, reducing CO_2 emission.
In 2017 the target was to replace 43% of the fuel energy in grey cement production.	Target achieved for Kiln 87 – 44.3% of fuel energy replaced.	In 2018 the target is to replace 52% of the fuel energy in grey cement production.
The target for the white cement kilns was to replace 2.6% of the fuel energy.	Target achieved for white cement kilns – 3.9% of fuel energy replaced.	The 2018 target for the white cement kilns is to replace 3.2% of the fuel energy, which is less than achieved in 2017 as supplies of meat and bone meal are expected to decrease. To reach the 20% target we continue to examine suitable waste fuels which do not change the cement quality. A promising alternative fuel is being tested, incl. to determine handling/storage/conveying/ feed equipment issues, and also scale of investment.
CO_2 REDUCTION		
Continued focus on reducing CO_2 emission via increased bio-fuel input, and eventual development of new cement types*.		Continued focus on reducing CO_2 emission via increased bio-fuel input and eventual development of new cement types*.
Target unchanged: Reduce CO_2 emission from grey cement production by 3% against 764 kg CO_2 per tTCE in 2012.	Target not achieved. KPIs in grey cement production increased as total shutdown on Kiln 87 and upgrade to two new calciners made it necessary at the start of 2017 to carry out grey cement production campaigns on a white cement kiln which has higher KPIs than in grey cement production.	Target unchanged: Reduce CO_2 emission from grey cement production by 3% against 764 kg CO_2 per tTCE in 2012.
Target unchanged: Reduce CO_2 emission** from white cement production by 2% against 1,139 kg CO_2 per tTCE in 2012.	Target not achieved. CO_2 emission** from white cement production increased to 1,180 kg CO_2 per tTCE, equal to 3.6%. This was due to rising fuel consumption at less efficient heat transfer in kiln preheater and chain systems as a result of technical operating issues.	Target unchanged: Reduce CO_2 emission** from white cement production by 2% against 1,139 kg CO_2 per tTCE in 2012.
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 consideration has been given to reducing dust in the work environment and compliance with NH_3 limit.	Target not achieved. The specific NO_X emission was 1.07 kg per tTCE and 9% above the normal range, which was due to a setpoint error for NO_X reduction in grey cement production.	The target is 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 consideration has been given to reducing dust in the work environment and compliance with NH_3 limit. For more details, see page 20, note b.
WASTE		
Recycle 40,000 tonnes of landfilled filler materials for rehabilitation in the chalk pit.	Target achieved. In 2017, 40,010 tonnes were removed from the landfill for recycling purposes in the chalk pit.	The target in 2018 is to recycle 40,000 tonnes of landfilled filler materials for rehabilitation in the chalk pit.

Environmental dialogue

Aalborg Portland is a part of the community – locally, regionally, nationally and internationally.

It is vital for us to have contact with our stakeholders in all areas, and to deliver and strengthen this contact we pursue a number of important activities:

- In 2017, Aalborg Portland was host to approx. 100 visits and approx. 2,000 guests. Visitors received an environmental briefing and had opportunity to ask questions.
- Employees of Aalborg Portland address external courses and meetings.
- Inclusion of environmental information from suppliers via supply contracts covering environment.
- Ongoing contact is maintained with Danish and EU environmental authorities due to emergence of new legislation and regulations that will affect the company.

Also in 2017, Aalborg Portland hosted a well-attended meeting with neighbours at where excavation and rehabilitation plans for Rørdal chalk pit were discussed, along with initiatives and results in the areas of environment and energy.

The Aalborg Portland Environmental Report is distributed to numerous 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 optimal commitment and dialogue with our internal and external stakeholders regarding our environmental activities, we would urge all parties to voice opinions and suggest improvements concerning our reporting.

Complaints from the public
Aalborg Portland received 40 complaints in 2017, 30 about dust.

Many of the complaints about dust related to handling of outdoor clinker. Storage indoors in intermediate stores reduced the number of complaints in the second half of 2017.

Furthermore, installation of two new calciners for Kiln 87 has also contributed to fewer neighbour complaints by producing more stable operation, leading to fewer precipitator dropouts for dedusting.

In 2017 there were five separate discharges of chalk slurry into the Limfjord. One was due to a basin overflow and another was caused by a loose seal.

There were also four complaints about noise from quarry operations. A meeting was held with the complainants and a study was initiated into possible noise reduction. As part of this study, a collaboration was begun with a cement plant in Belgium using similar excavating methods.

Number of emissions resulting in complaints

	2013	2014	2015	2016	2017
Dust	19	21	33	39	30
Noise	0	1	1	1	4
Limfjorden	2	1	1	1	5
Other	0	1	0	0	1

Demands on suppliers
Aalborg Portland makes demands on its suppliers. Each year, strategic suppliers are invited to an evaluation meeting at which Aalborg Portland and the respective supplier review the cooperation in a quality, environment, energy, and health & safety perspective.

As part of the three-year plan targeting a further improvement in safety culture at Aalborg Portland, a Health & Safety Driving Licence has been developed which authorises the performance of specific safety-oriented tasks at the factory. In 2017, focus was placed on developing an electronic version of the driving licence with e-learning and an associated test.

Aalborg Portland has presented Aalborg Portland Park with a new landmark – a copy of Aalborg's famous Cimbrian Bull statue with red and white AaB stripes.

SUPPORT FOR SPORTING AND CULTURAL ACTIVITIES

Aalborg Portland supports local sporting and cultural activities, with zoo, theatre, art museum, handball, football and other sponsorships.

In 2017, Aalborg Portland widened its involvement by signing a three-year sponsorship with Aalborg-based football club AaB. The club's stadium, which can accommodate around 14,000 spectators, has been renamed Aalborg Portland Park. This sponsorship, together with the other sporting and cultural activities which Aalborg offers as the regional capital, will increase Aalborg Portland's visibility both locally and nationally and strengthen the company's potential to attract qualified people.

VISIT FROM CHINA

Focus on heat recovery for district heating

Denmark has been improving efficiency in the district heating sector and industry for decades. In September 2017, the Danish Energy Agency invited a Chinese delegation to Denmark to view these developments. As part of this invitation, Aalborg Portland was visited by a 17-strong delegation from the National Development and Reform Commission (NDRC) – the Chinese planning ministry - and China's National Energy Conservation Centre (NECC).

China is the world's largest energy and coal consumer, and as the country's industry is primarily based on coal the potential for CO_2 reductions through efficiency improvements is enormous. A significant part of this potential lies in using surplus heat from industry for district heating. Besides a tour of our factory and chalk pit, focus was also placed on Aalborg Portland's experience with the supply of heat recovered from flue gases in cement production to the City of Aalborg's district heating network.

Raw materials

Cement is manufactured using raw materials, including chalk, sand and gypsum, from natural resources.

To limit the impact on natural reserves of these materials, Aalborg Portland in 2017 replaced 10% with alternative raw materials in the form of by-products and wastes from other industries and society. These by-products and wastes are therefore utilised as a resource.

Aalborg Portland began using fly ash – a power station by-product – almost 40 years ago. Since then it has been joined by several other alternative raw materials.

Sand from dredging
Sand dredgers keep navigation channels at Hals Barre and in the Limfjord open for the passage of ships, a community interest to which Aalborg Portland contributes. The dredged sand replaces sand that would otherwise have to be sourced from quarries and the Kattegat, thereby impacting both the landscape and the marine environment. At the same time, Aalborg Portland's position beside the Limfjord offers an effective logistical solution as the dredgers can pump their sand directly into drainage basins ashore.

Desulphurisation gypsum
Gypsum from flue gas desulphurisation is used as an additive in cement manufacturing. This gypsum comes both from Aalborg Portland itself and the local North Jutland power station, and 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.

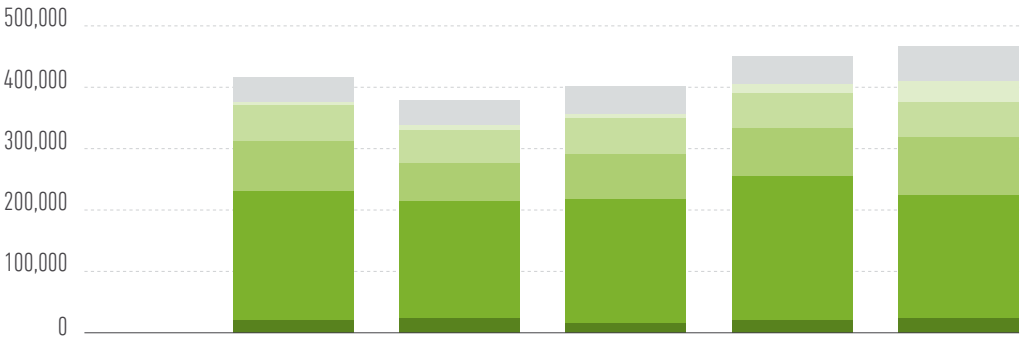
Iron oxide
Iron oxide (pyrite ash) is a by-product of the manufacture of sulphuric acid and is a necessary source of iron for production of grey cement.

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


Kiln 87 – cyclone tower

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

ALTERNATIVE RAW MATERIALS – tonnes



	2013	2014	2015	2016	2017
Iron oxide	41,769	39,102	42,763	45,154	55,617
Oxiton	3,323	7,328	7,643	12,413	33,888
FGD gypsum	58,680	53,490	56,961	57,203	58,172
Sand	79,980	64,314	75,410	79,239	92,913
Fly ash	213,176	189,339	201,406	235,031	202,801
Other	19,761	24,608	16,107	21,313	23,882
Total	**416,689**	**378,181**	**400,290**	**450,353**	**467,273**

In 2017, the volume of alternative raw materials used at Aalborg Portland is nearly 470,000 tonnes. Usage of sand and oxiton particularly increased, compensating for falling supplies of fly ash for the production of grey cement clinker.

Sand from navigation channels pumped from dredgers to drainage basins ashore

Energy

Replacement of fossil fuels, such as coal and petcoke, by alternative fuels is an area of activity that began in the early 1990s. In 2017, input of these combustible wastes represented more than 44% of the energy used in grey cement production.

Waste is energy
Recycling of wastes contributes to a resource-efficient society. In cement production, wastes are recycled as a resource by replacing coal and petcoke. Waste fuels are instrumental in reducing emissions of CO_2, NO_X, SO_2 etc. in kiln flue gases, and biomass content is recycled, benefiting global climate efforts. By way of example, meat and bone meal are considered wholly carbon-neutral, and in wastes from industry the fraction of biomass carbon is typically 30-40% when replacing fossil fuels.

Dried sewage sludge
Aalborg Portland receives dried sewage sludge from the City of Aalborg as a CO_2 neutral biofuel replacement for coal and other fossil raw materials.

Heat recovery from kiln fuel
The Aalborg Portland cement factory supplies surplus heat from production in the form of district heating to the residents of Aalborg. In 2017, this surplus heat corresponded to the annual heat consumption of approx. 24,000 households.

Electricity
Electricity is key to operating a cement plant. Aalborg Portland's power consumption in 2017 was almost 310,000 MWh. The distribution of power consumption is shown in the graph on the next page. The largest power users are the kilns and cement mills. Consumption of power consists of a factory base load and a variable component that depends on the volume of production on primary equipment. In 2017, the relative overall power consumption was approx. 5% lower than in 2015, chiefly due to greater utilisation of plant capacity in the past two years with better market sales for cement. Relative overall consumption was no less than 14% lower than base year 2010, when the key performance indicator for electricity was larger as the base power load was high in relation to a low production figure.

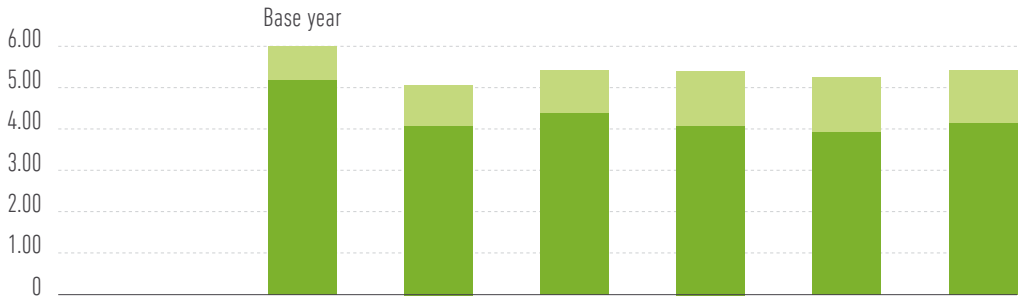
Energy saving
Aalborg Portland has made determined efforts over many years to identify energy savings in the factory's electricity and fuel consumption. Activities in more recent years, with heightened focus on improved energy efficiency in the existing production installations, have led to projects in the period 2011-2017 that provide an energy saving (electricity and fuel) relative to base year 2010 for each tonne of grey and white cement produced, cf. table of key performance indicators on page 20. In the case of fuel, the total relative fuel consumption for grey and white cement production has fallen by 11% against base year 2010. At the same time, fossil fuels like coal and petcoke have been replaced by waste fuels, which have increased from 15% to 23% of total fuel consumption.

Future initiatives

Wind turbines – green energy
Aalborg Portland has plans to install five wind turbines on company land close to the cement factory. This will lead to the use of even more green energy for cement production. In 2017, more than half the energy used in Danish cement production came from renewable energy sources such as wind power, solar power and from biofuel which is considered CO_2 neutral. Setting up wind turbines at Aalborg Portland will reduce CO_2 emissions related to electricity consumption by 12%.

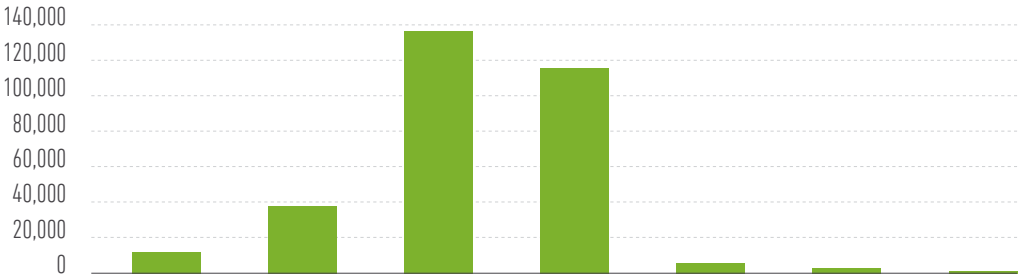
Energy saving from remote cooling
Aalborg Portland is committed to sustainable development in partnership with the community. Sustainable development contains a host of possibilities. Aalborg Portland owns a large lake with cold water that could supply district cooling to the future new Aalborg hospital as an energy-efficient alternative to provision of comfort and process cooling by the use of conventional electrical cooling equipment. District cooling is the cooling equivalent of district heating. Cold water is pumped through a closed piping network 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.

CONSUMPTION OF FOSSIL AND ALTERNATIVE FUEL – GJ per tCE



	2010	2013	2014	2015	2016	2017
Alternative fuel	0.90	0.97	1.01	1.31	1.30	1.26
Fossil fuel	5.14	4.05	4.36	4.06	3.93	4.12

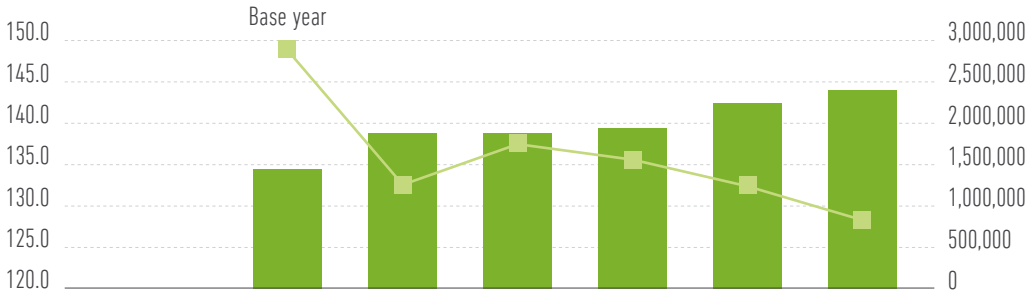
DISTRIBUTION OF ELECTRICITY IN 2017 BY CONSUMPTION POINTS – MWh



Excavation in chalk pit	Slurry preparation	Kilns	Cement mills	Packing plant and dock	Workshops and lab	Admini-stration
12,113	37,794	136,414	115,150	6,225	1,466	418

ELECTRICITY CONSUMPTION – kWh per tCE

PRODUCTION – tCE



	2010	2013	2014	2015	2016	2017
Electricity – kWh per tCE	148.8	132.5	137.4	135.5	132.6	128.1
Production – tCE	1,454,043	1,825,146	1,819,341	1,902,072	2,202,472	2,415,907

Emission to the atmosphere

There are a number of sources of atmospheric emission at Aalborg 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 is performed by an independently accredited laboratory.

Flue gases

CO_2
Relative CO_2 emission increased by 1% overall against 2016 due to increasing specific fuel consumption, but remains 3.5% below base year 2010. The change in fuel consumption was due to less efficient heat transfer from the preheater and chain systems of the white cement kilns, caused by technical issues. Repair, which will include chain replacement, is scheduled for a major shutdown in 2018. CO_2 increased in absolute terms as a result of increased production volume.

NO_X
NO_X cleaning equipment was developed and installed on all kilns in the period 2004-2007. As a result of this the relative NO_X emission in 2017 has fallen 67% from 2003 when it was 3.26 kg per tTCE. In absolute quantities, NO_X has decreased from 8,138 tonnes in 2003 to 2,586 tonnes in 2017. The increase in recent years in absolute terms is attributable to a larger production volume. Against the background of optimised NO_X cleaning in 2013 and subsequent adjustment of the mixing air technology used for NO_X reduction on the white cement kilns, a normal range of 0.77-0.98 kg per tTCE has been achieved. Here, consideration has been given to the employee work environment in the form of dust limitation at burner stations. In 2017, NO_X increased by 9% from 0.98 to 1.07 kg per tTCE due to a setpoint error for NO_X reduction in grey cement production. In the grey cement kilns, NO_X is reduced by injecting aqueous ammonia, which since 2012 has led to increased release of ammonia (NH_3). Compliance exists with the limits specified in our environmental approval.

SO_2
Relative SO_2 emission has increased approx. 5% from 0.43 to 0.45 kg per tTCE. This is primarily because the scrubber system operated with full clinker production from both kilns throughout 2017. The scrubber is dimensioned for flue gases from two kilns, but production in previous years was smaller and flue gases from only one kiln enabled greater scrubbing efficiency. The SO_2 limits specified in our environmental approval are complied with.

CO
Relative CO emission has increased by 6% against 2015, from 0.84 to 1.32 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. The CO limits specified in our environmental approval are complied with.

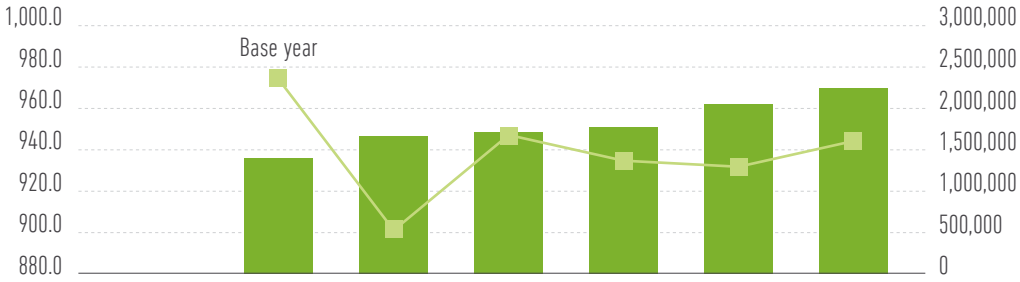
Dust
The relative emission has fallen 20% from 0.05 to 0.04 kg per tTCE as increased stability has been achieved on Kiln 87, resulting in fewer dust releases. Complaints arising from dust emissions due to operating issues are described on page 24.

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 2017, emission limits for SO_2, NO_X, CO and dust were exceeded 18 times. These incidents were immediately notified to the Danish Environmental Protection Agency in Aarhus, and preventive measures to avoid repetitions were disclosed in the monthly reporting.

The table on the next page shows the five 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 are in 2017 generally below the required values, wherein the operators' 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

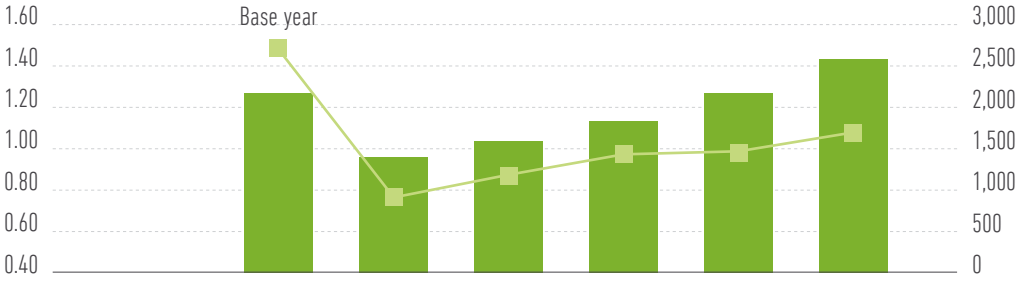
CO_2 – ABSOLUTE FIGURES – tonnes



	2010	2013	2014	2015	2016	2017
CO_2 – kg per tTCE	976.6	902.5	944.3	936.1	933.0	942.6
CO_2 – tonnes	1,420,067	1,647,199	1,718,011	1,780,564	2,054,900	2,277,214

NO_X – RELATIVE FIGURES – kg per tTCE

NO_X – ABSOLUTE FIGURES – tonnes



	2010	2013	2014	2015	2016	2017
NO_X – kg per tTCE	1.48	0.77	0.87	0.96	0.98	1.07
NO_X – tonnes	2,153	1,401	1,580	1,832	2,164	2,586

LIMITS AND LEVELS DURING OPERATION – THE FIVE MAIN SOURCES

	NO_X		SO_2		Dust	
	Limit *	Average level 2017 **	Limit *	Average level 2017 **	Limit *	Average level 2017 **
Heat recovery Kiln 73/79	500	360	400	211	20	2
Heat recovery Kiln 74/78	500	291	400	263	20	0.1
Heat recovery Kiln 76	500	208	400	150	20	1.4
Kiln 85	500	797 ***	400	71 ***	20	11 ***
Kiln 87	400	212	50	0.4	20	7

* Daily average according to enviromental approval valid at 31.12.2017.

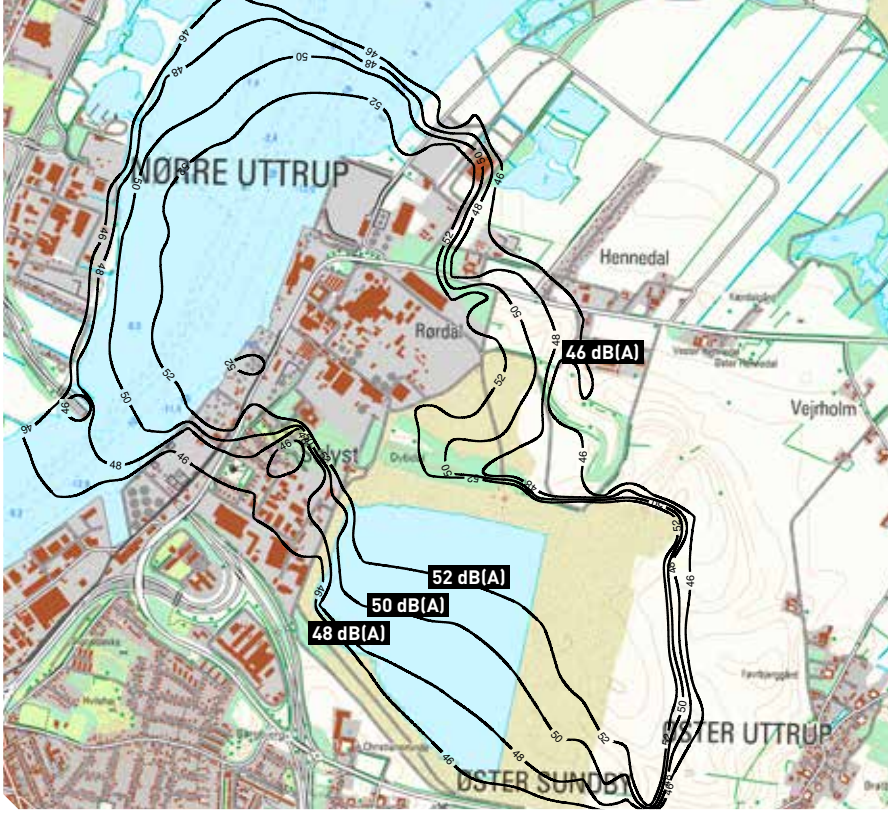
All values are stated in mg/Nm³ dry flue gas at 10% oxygen content.

** Daily average over the year.

*** The data relate to 2009, where the kiln was in operation, and the limit value for NO_X was 800 mg/Nm³.

Noise

Aalborg Portland's noise emission is attributable to a large number of stationary sources, both indoors and outdoors, as well as internal factory traffic.



Noise map in dB(A) – evening conditions

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

Aalborg Portland has a noise map which is continuously updated, most recently 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.

The next general noise calculation with the abatement initiatives introduced is scheduled for end-2018.

Thereafter, calculation will be performed annually to determine progress on the action plan.

In 2017, noise abatement measures were implemented, including installation of noise suppression devices on vents from dedusting filters on top of silos and roofs and from Cement Mills 8 and 9, and extraction from the central filter for clinker transport. Noise screens were also erected around two cooler fans on the RQC laboratory roof.

In 2018, factory noise abatement will be continued. 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. In addition, focus will be placed on specific measures to reduce noise from the deep-excavator.

NOISE ABATEMENT

Noise source measurement

Noise levels have been measured at source after installation of noise abatement on dedusting filters on top of silos.

The check was performed by noise consultants Sweco, and forms part of the overall noise survey for Aalborg Portland and the updated noise calculations at selected reference points around the factory.

Noise measurement


Water meter

Water

Water is used in the various processes involved in cement manufacture and for cooling of production plant.

Aalborg Portland obtains technical water for production purposes from on-site wells in a limestone aquifer situated outside designated drinking water areas. Aalborg Portland is licensed to extract a total of 5.2 million m^3 annually. In 2017, almost 4.7 million m^3 was extracted. This includes approx. 1.3 million m^3 of water from chalk recovered below the water table by deep-excavator in the chalk pit. The remaining 3.4 million m^3 includes 2.4 million m^3 sourced from 15 on-site wells on company land close by the cement factory, and 1.0 million m^3 from groundwater lowering around Kilns 76 and 85. The relative water consumption fell by 6% against 2016. This was because baseload consumption for equipment cooling was spread over a larger cement production. A variety of projects have been implemented to reduce water consumption 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. Approx. 790,000 m^3 of the water is also recycled for cooling the factory's compressor plant. This water would otherwise have to be obtained from Aalborg Portland's own water resources.

Split water system
Following bacterial contamination of drinking water in 1998 the supply system was split into two parts - one for drinking water and one for technical water used for production purposes. In 2017, Aalborg Portland still received its drinking water from the City of Aalborg's municipal supply as some years ago pesticide residues were found in the 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. At the same time, the permitted limit for extraction of water - 5.2 million m^3 - was close to being reached due to high level of production. The effective solution was, and still is, to recycle filtrate water in cement production. In 2017 approx. 430,000 m^3 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
In 2017, Aalborg Portland was granted a renewed licence 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 be drained. The drainage 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 approx. 26,000 m^3 of groundwater annually.

Capture of surface water
In 2017, approx. 22,000 m^3 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.

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 development, 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 system 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 super hospital could be provided by cold water from Aalborg Portland's chalk lake. See the section "Energy" for more information.

Waste and by-products

Waste is sorted close to the source and deposited in containers and oil and chemical receivers located around the factory.

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

In 2017, more than 99% of waste at Aalborg Portland was non-hazardous. The remainder was characterised as hazardous - oil and chemical waste for recycling and mixed waste for landfilling externally.

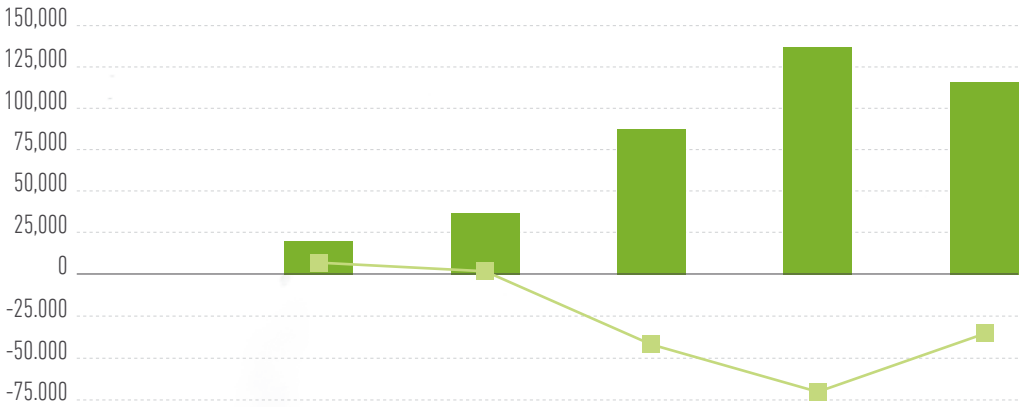
Waste strategy implemented
Since 2013 a significant shift from landfill to increased recycling has taken place at Aalborg Portland. Recycled waste has thus increased by more than 97,000 tonnes compared with 2013.

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 37-38.

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

Container site for waste sorting

WASTE – FROM LANDFILL TO RECYCLING – tonnes



	2013	2014	2015	2016	2017
Landfill *	7,210	2,522	-40,809	-71,759	-34,702
Recycling	20,113	34,815	86,448	133,933	117,632

* In 2015 - 2017 more waste was removed from landfill for recycling than was sent to landfill.

Cement factory and chalk pit by the Limfjord

WASTE – amount in tonnes	2013	2014	2015	2016	2017
TOTAL WASTE	**28,052**	**38,260**	**46,904**	**62,773**	**83,874**
UTILISED NON-HAZARDOUS WASTE	**20,307**	**35,132**	**87,605**	**134,365**	**118,420**
Recycling	**20,113**	**34,815**	**86,448**	**133,933**	**117,632**
Microfiller from kilns	16,235	27,399	78,371	119,142	103,082
Sweepings	1,403	1,683	824	2,776	3,142
Sand and grate material	235	377	48	3	21
Building waste	92	1,191	1,060	1,850	1,818
Metals	555	414	736	741	1,200
Paper and cardboard	13	14	9	16	14
Glass	0	1	0.5	0.3	0.5
Plastics	703	649	746	620	669
Electronic scrap	0	1	0.3	4.4	2.4
Other recyclables	876	3,087	4,653	8,780	7,683
Incineration	**194**	**317**	**1,157**	**431**	**788**
Mixed combustible	180	301	1,139	415	771
Municipal collection	14	16	18	17	17
UTILISED HAZARDOUS WASTE	**62**	**229**	**30**	**77**	**85**
Oil	55	216	26.7	74.0	77.6
Chemicals	7	13	2.8	2.6	7.4
DISPOSAL OF NON-HAZARDOUS WASTE					
On-site landfill *	7,210	2,522	-40,809	-71,759	-34,702
DISPOSAL OF HAZARDOUS WASTE					
Off-site landfill	473	377	78	90	71

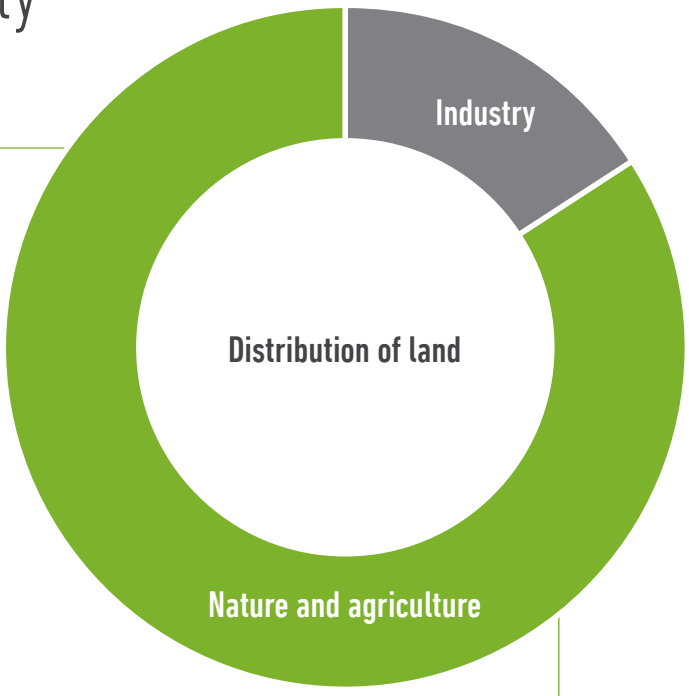
* In 2015 - 2017 more waste was removed from landfill for recycling than was sent to landfill.

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.

The distribution of land use is as follows:

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**



Nature and agriculture · 190 hectares · 84%

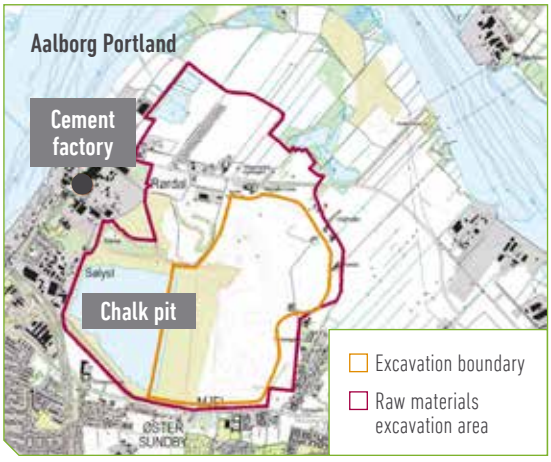
Industry · 1,101 hectares · 16%

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 when quarrying is expected to be finished.

Chalk pit rehabilitation plan – Rørdal Lake Park
The concept of the chalk pit rehabilitation plan is to develop the chalk pit as "Rørdal 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 hang-gliding, mountain-biking, jogging, walking and similar pursuits.



The basic principle of the rehabilitation plan is to create a scenic space with steep, exposed slopes, soft green hills, and opportunities for walking and leisure.

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

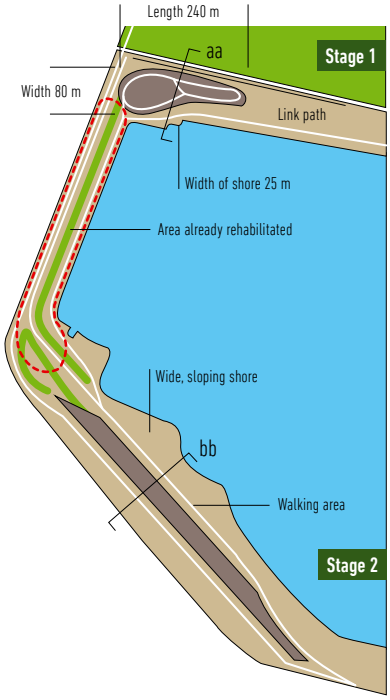
Stage 1 is now in place, while Stage 2 is under construction and Stage 3 is on the drawing board.

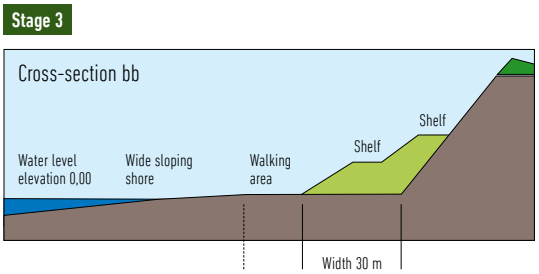
Stage 1
The embankment is intended to create a natural transition between the area at the transfer station and the lakeside. It will also screen the factory from view and act as a partial noise barrier between the factory and the public access area planned for the northern and western parts of the chalk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

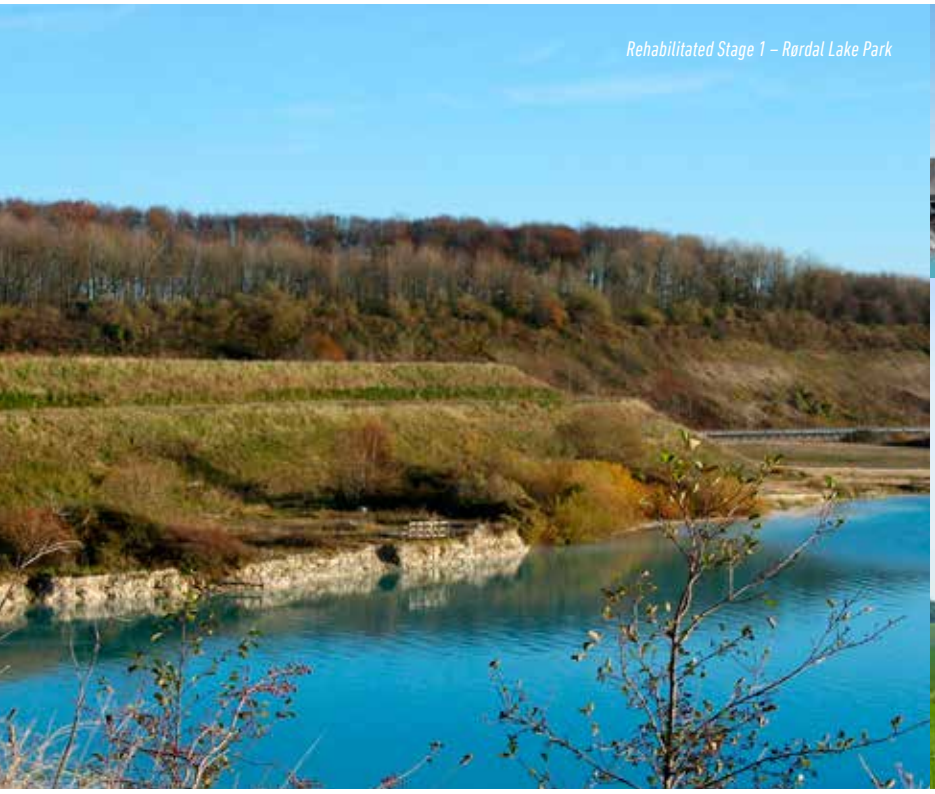
Stage 2
Establishment of terraces in the western part of the chalk pit.

The terraces will be used for a variety of sporting activities, such as mountain-biking, jogging and hang-gliding. A path system and public spaces are also planned.

Stage 3
Planned as an extension of Stage 2.






Rehabilitated Stage 1 – Rørdal Lake Park


Deep-excavator in the chalk pit

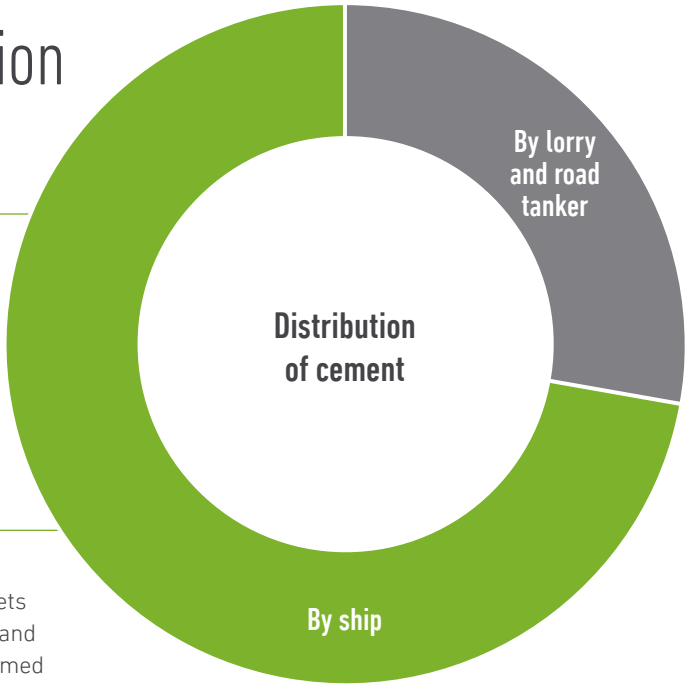

Aalborg Portland – cement factory

Transport of cement

Aalborg Portland's harbour

Sustainable distribution

In 2017, 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.



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

In 2017, 69% of cement was distributed by ship and 31% 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.

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.

Cement distributed by lorry and road tanker 31%

Cement distributed by ship 69%

Material flows

Key performance indicators 2017 – 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 *				
	2013	2014	2015	2016	2017	2013	2014	2015	2016	2017
COMBUSTION AIR										
(02, N etc.)	543,819	593,783	592,568	676,406	751,904	298,0	326.4	311.5	307.1	311.2
RAW MATERIALS										
Chalk	2,963,408	3,064,648	3,173,982	3,649,362	4,003,719	1,623.7	1,684.5	1,668.7	1,656.9	1,657.2
Water	2,782,798	2,881,522	3,170,668	3,499,229	3,584,351	1,524.7	1,583.8	1,667.0	1,588.8	1,483.6
Sand	107,246	129,488	129,595	152,484	192,502	58.8	71.2	68.1	69.2	79.7
Gypsum	29,778	32,126	42,373	56,557	60,302	16.3	17.7	22.3	25.7	25.0
Other	27,013	24,536	33,290	35,394	35,763	14.8	13.5	17.5	16.1	14.8
Packaging	1,027	1,129	1,305	1,018	887	0.6	0.6	0.7	0.5	0.4
RECYCLABLES										
Fly ash	213,176	189,339	201,406	235,031	202,801	116.8	104.1	105.9	106.7	83.9
Sand	79,980	64,314	75,410	79,239	92,913	43.8	35.4	39.6	36.0	38.5
FGD gypsum	58,680	53,490	56,961	57,203	58,172	32.2	29.4	29.9	26.0	24.1
Oxiton	3,323	7,328	7,643	12,413	33,888	1.8	4.0	4.0	5.6	14.0
Iron oxide	41,769	39,102	42,763	45,154	55,617	22.9	21.5	22.5	20.5	23.0
Other	19,761	24,608	16,107	21,313	23,882	10.8	13.5	8.5	9.7	9.9
Total	**416,689**	**378,181**	**400,290**	**450,353**	**467,273**	**228.3**	**207.9**	**210.4**	**204.5**	**193.4**
FUELS										
Coal	46,265	44,820	49,456	60,189	74,670	25.3	24.6	26.0	27.3	30.9
Petcoke	191,767	207,863	201,429	223,584	243,938	105.1	114.3	105.9	101.5	101.0
Fuel oil	4,689	4,447	4,637	4,831	5,031	2.6	2.4	2.4	2.2	2.1
Alternative fuel	97,250	100,817	126,618	149,491	164,746	53.3	55.4	66.6	67.9	68.2
Total	**339,971**	**357,947**	**382,140**	**438,095**	**488,385**	**186.3**	**196.7**	**200.9**	**198.9**	**202.2**
	(MWh)	(MWh)	(MWh)	(MWh)	(MWh)	(kWh per tTCE)	(kWh per tTCE)	(kWh per tTCE)	(kWh per tTCE)	(kWh per tTCE)
ELECTRICITY	**241,742**	**250,048**	**257,703**	**291,953**	**309,580**	**132.5**	**137.4**	**135.5**	**132.6**	**128.1**
INTERNAL RECIRCULATION										
Microfiller	115,816	109,429	100,549	116,082	114,316	63.5	60.1	52.9	52.7	47.3
Water	1,146,864	1,237,969	1,195,258	1,192,066	1,218,148	629.4	680.4	628.4	541.2	504.2
Own FGD gypsum	29,641	28,439	27,591	33,012	33,231	16.2	15.6	14.5	15.0	13.8
Recycling of clinker/raw meal	21,287	37,081	19,418	30,810	27,260	11.7	20.4	10.2	14.0	11.3
Recycling of cement from silo cleaning	753	1,505	4,054	216	393	0.4	0.8	2.1	0.1	0.2
	(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

* Determined with water content of materials.

OUTPUT

	Absolute figures – tonnes *					Relative figures – kg per tTCE *				
	2013	**2014**	**2015**	**2016**	**2017**	**2013**	**2014**	**2015**	**2016**	**2017**
FLUE GASES										
CO_2	1,647,199	1,718,011	1,780,564	2,054,900	2,277,214	902.5	944.3	936.1	933.0	942.6
NO_X	1,401	1,580	1,832	2,164	2,586	0.77	0.87	0.96	0.98	1.07
SO_2	587	682	844	948	1,099	0.32	0.37	0.44	0.43	0.45
CO	1,678	1,649	1,601	1,969	3,186	0.92	0.91	0.84	0.89	1.32
Dust	81	91	96	107	90	0.04	0.05	0.05	0.05	0.04
NH_3	38	39	40	46	51	0.02	0.02	0.02	0.02	0.02
HCl	2	6	7	7	9	0.001	0.003	0.004	0.003	0.004
Hg	0,04	0,03	0,03	0,04	0,03	0.000020	0.000014	0.000014	0.000018	0.000011
PRODUCTS										
Cement	1,796,553	1,877,284	1,971,721	2,256,013	2,346,692	984.3	1,031.8	1,036.6	1,024.3	971.4
Clinker **	12,839	-47,969	-60,456	-56,954	44,545	7.0	-26.4	-31.8	-25.9	18.4
Filler **	1,026	1,583	1,373	-2,022	2,539	0.6	0.9	0.7	-0.9	1.1
Chalk slurry to power station	10,109	17,945	8,846	10,893	5,820	5.5	9.9	4.7	4.9	2.4
Total	**1,820,527**	**1,848,843**	**1,921,484**	**2,207,930**	**2,399,595**	**997.4**	**1,016.2**	**1,010.2**	**1,002.6**	**993.2**
Adjustment	-	-	-	-	-	2.6	-16.2	-10.2	-2.6	6.8
Total Cement Equivalent	**1,825,146**	**1,819,341**	**1,902,072**	**2,202,472**	**2,415,907**	**1,000.0**	**1,000.0**	**1,000.0**	**1,000.0**	**1,000.0**
Packaging	1,027	1,129	1,305	1,018	887	0.6	0.6	0.7	0.5	0.4
WATER										
Water vapour	1,371,187	1,361,211	1,407,063	1,880,371	1,998,008	751.3	748.2	739.8	853.8	827.0
Cooling water, incl. Kiln 85 groundwater	2,216,054	2,241,899	2,409,532	2,514,030	2,568,453	1,214.2	1,232.3	1,266.8	1,141.5	1,063.1
Groundwater lowering (Kiln 76)	96,102	221,125	313,543	201,436	213,265	52.7	121.5	164.8	91.5	88.3
Waste water	27,813	28,835	41,396	31,200	36,769	15.2	15.8	21.8	14.2	15.2
HEAT RECOVERY FOR DISTRICT HEATING	(GJ) **1,072,975**	(GJ) **1,152,611**	(GJ) **1,214,257**	(GJ) **1,199,988**	(GJ) **1,449,809**	(MJ per tTCE) **587.9**	(MJ per tTCE) **633.5**	(MJ per tTCE) **638.4**	(MJ per tTCE) **544.8**	(MJ per tTCE) **600.1**
WASTE * **										
Recycling	20,113	34,815	86,448	133,933	117,632	11.0	19.1	45.4	60.8	48.7
Incineration	194	317	1,157	432	788	0.1	0.2	0.6	0.2	0.3
Landfill	7,683	2,899	-40,731	-71,669	-34,631	4.2	1.6	-21.4	-32.5	-14.3
Oil and chemical waste	62	229	30	77	85	0.03	0.13	0.02	0.03	0.04
Total	**28,052**	**38,260**	**46,904**	**62,773**	**83,874**	**15.3**	**21.0**	**24.6**	**28.5**	**34.7**

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

*** Waste volumes are classified as hazardous and non-hazardous wastes on page 35 stating whether the materials are utilised or disposed of.

OUR WORK ENVIRONMENT

Work environment and safety are high on the agenda at Aalborg Portland. Planning, risk assessments, collaboration and dialogue are key to achieving solid and viable solutions. We must help each other and ourselves by ensuring that we have a positive and safe work environment.

Concretely Dynamic

Expectations for the future
Aalborg Portland wishes to have dedicated and ambitious employees. It is namely through our ability to take a focused approach to current and future tasks, and to execute these tasks innovatively and with creativity, that we as a company can remain a good partner for our suppliers and customers.

Managers at Aalborg Portland have a special responsibility for motivating and developing the employees so that we deliver solid results today, but also develop the skills to solve the tasks of tomorrow. Therefore we have a series of management processes that support the key function of ensuring positive dialogue between manager and employee.

Our owner, the Cementir Group, has developed for this purpose a framework for our corporate culture and behaviour. The framework consists of a mission, a vision, shared values, a slogan "Concretely Dynamic" and a common competency model. These elements form the compass that defines the direction to be taken in our professional journey and in our daily activities.

Any accident – small or serious – is an accident too many
A wide range of initiatives have been mobilised to set us on the right course in relation to health and safety.

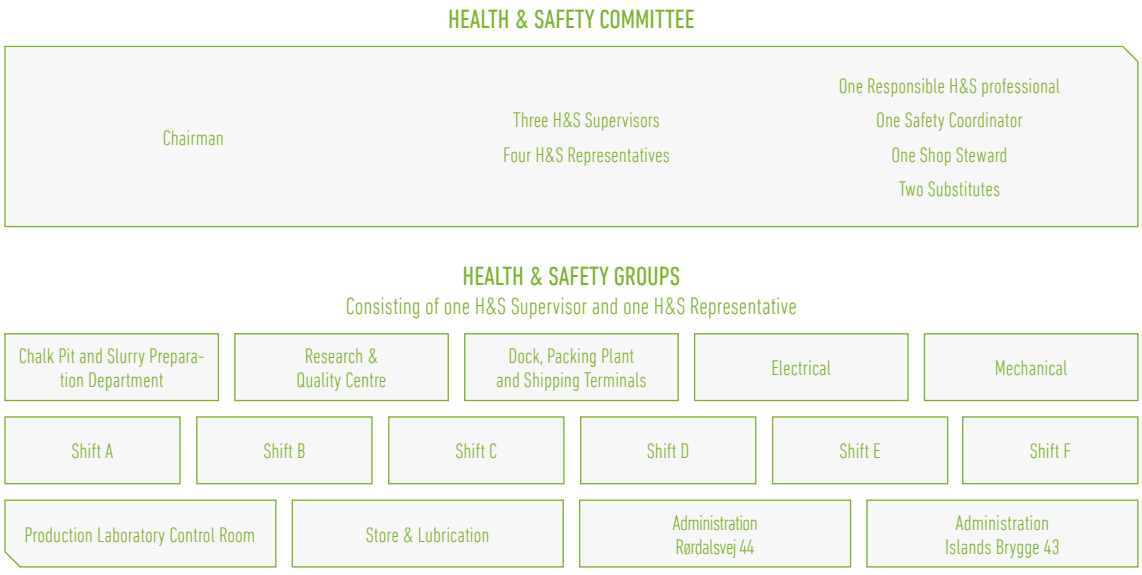
In 2016, the project "Safe Workplace" was launched. This includes a six-point plan, cf. figure below, which consists of individual initiatives for achieving greater safety, fewer accidents, and enhanced health and safety awareness.

Through the tools we have introduced in conjunction with "Safe Workplace" we expect a heightened focus on health and safety that will positively impact our accident statistics, work environment and associated goals. Activities are taking place in parallel in several different areas.

SAFE WORKPLACE

Health & Safety organisation (H&S)
Aalborg Portland Health & Safety organisation plays a central role in the work of implementing "Safe Workplace". We have additional focus on prevention, risk assessments and dialogue.
In 2017, we carried out a review and subsequently restructured our H&S organisation.

HEALTH & SAFETY ORGANISATION



HEALTH & SAFETY POLICY

Aalborg Portland focuses on the production of quality products which conform to customer requirements and expectations. Health & Safety is an integral part of everyday work, and there is constant focus on improvement.

Guidelines
All activities must at all times be performed in accordance with relevant legislation, and in accordance with internal company guidelines which ensure a consistently safe and healthy workplace. 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 framework 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 job.

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

Community
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.

Accidents and prevention

In 2017, among Aalborg Portland's own employees, there were 10 accidents resulting in more than one day's absence from work, and also 19 accidents with no time loss. We have succeeded in decreasing the number of accidents, and we are continuing to focus on reducing the number of incidents. The most common injuries are twists or sprains. In 2017, the accident rate (number of accidents per one million working hours) was 17.9, and the average number of days lost per accident was 3.6.

In 2017, 74 near-accidents were also reported.

We are continuously focused on reducing the number of accidents. A thorough analysis is conducted into the causes, and through dialogue with injured parties and their managers, preventive and corrective action plans are prepared.

	2013	2014	2015	2016	2017
Accidents reported to the Working Environment Authority					
Number of accidents reported	9	14	13	13	10
Number of days lost	30	84	134	48	36
Accident frequency / Time lost – Hourly paid and salaried employees					
Accident frequency*	15.7	26.8	24.9	23.3	17.9
Time lost**	0.4	1.2	1.9	0.6	0.5
Accident frequency / Time lost – Hourly paid employees					
Accident frequency*	36.5	49.2	49.2	46.0	35.4
Accident frequency* – stone, clay and glass industries	20.0	10.0	13.3	9.9	***
Time lost**	0.9	2.3	3.8	1.3	0.9

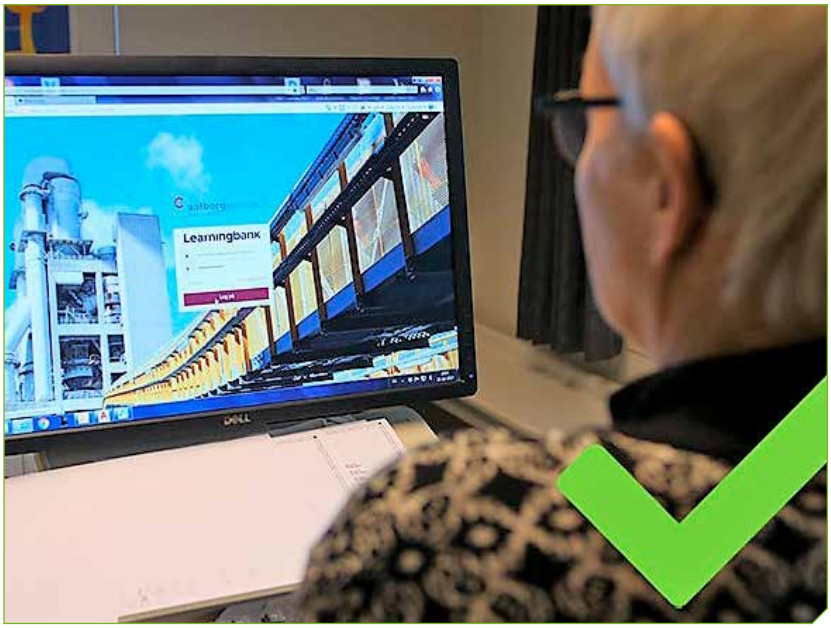
* Number of accidents per one million working hours ** Number of hours lost per 1000 working hours
*** National work accident statistics for 2017 not yet published

Health & safety targets

In 2017 two out of three H&S targets were achieved.

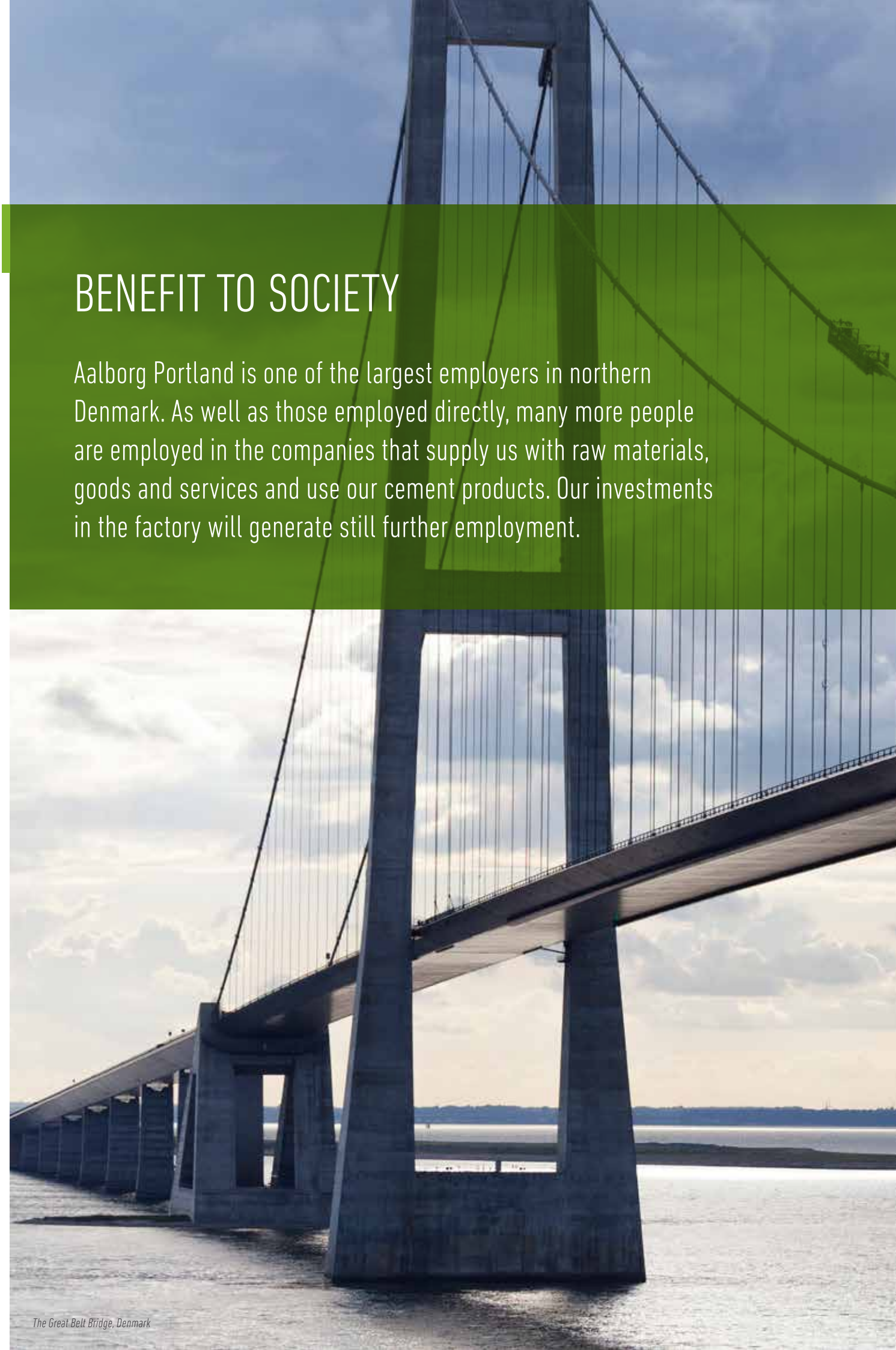
Target achieved Target not achieved

TARGETS 2017	STATUS 2017	TARGETS 2018
ACCIDENTS WITH MORE THAN ONE DAY LOST		
The target for 2017 was fewer than six accidents with more than one day lost.	Target not achieved. 10 accidents with absence were registered in 2017.	Max. seven accidents with absence.
SAFE WORKPLACE		
The target was to make Aalborg Portland a safe workplace thus: • Establish 10 basic safety rules for implementation over a three-year period, six of the rules to be introduced in 2017. • Introduce consequence management for disregarding the rules. • Success will be measurable by the number of accidents, and, in time, by the results of safety walks.	Target partly achieved. • 10 safety rules were defined along with 10 safety requirements for external contractors. Implementation of the respective rules is ongoing. • An e-learning programme for the safety rules has been developed for both internal and external personnel. • In 2017, improvements were made to selected access ways and platforms. This work will continue in 2018.	Continue work according to the three-year plan for implementation as follows: 1. Basic safety rules 2. Helath & Safety driving licence 3. Consequence management 4. Risk assessment / toolboxes 5. Safe traffic – walking and driving 6. Housekeeping / holes in road
COMPETENCE AND AWARENESS		
Increase behavioural awareness to create a safe workplace. All employees must receive a qualified introduction to safe behaviour. The 2017 target is that all internal personnel must have completed the training. The project will be extended in 2018 to external tradesmen who must also have completed the training. Success will be measurable by the number of accidents and, in time, by the results of safety walks.	Target achieved for production personnel.	Target to be continued in 2018 when both internal personnel and external tradesmen must have completed the safe behaviour training. Success will be measurable by the number of accidents and, in time, by the results of safety walks.



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 Great Belt Bridge, 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 2013-2017 a total of EUR 35.3m has been invested in a variety of technology improvement projects of benefit to nature, environment and society.

In 2017, Aalborg Portland invested a total of more than EUR 10.3m in projects with climate and environmental improvements, including energy-saving projects, preventive safety, and health & safety.

This is an increase of more than 86%. The largest investment was on completion of the calciner upgrade for Kiln 87. This has provided more stable operation, enabling increased use of alternative fuel and reduction of CO_2, as well as fewer dust emissions due to precipitator dropouts caused by CO spikes.

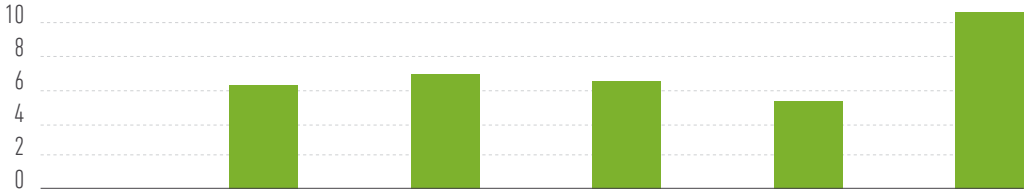
Other investment projects in 2017 included:

- Optimised boiler operation after Kiln 79 by change to boilers of new design.
- Preparation for expansion of recycling facility for chalk pit rehabilitation.
- Upgrade of selected dedusting filters combined with improved noise abatement.
- Preparation for use of surplus heat from Kiln 87 clinker cooler as primary heat for Kiln 76.
- Large-scale trials with white clinker and cement production for specific CO_2 reduction.
- Preventive safety measures for dock facility, and new silo for special white cement.
- Preventive safety by replacement of handrails and gratings.

Investment in environmental technology improvements also includes:

- New input materials in the form of alternative raw materials and fuels, cf. also page 10.
- Environment-friendlier products for use in research projects with universities and other collaboration partners to develop the cements of the future.

INVESTMENTS WITH CLIMATE AND ENVIRONMENTAL IMPROVEMENTS – EURm



	2013	2014	2015	2016	2017
Investments	6.1	6.9	6.6	5.5	10.3

Aalborg Portland continues to plan measures that will reduce consumption and emission levels and have positive environmental effect. These measures are governed by the environmental action plan for which targets, activities and results are stated in pages 22-23.

Preventive maintenance
Maintenance expenditure on production plant amounted to around EUR 5.9m in 2017. 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.

CALCINER – KILN 87

Increased stability

In cement production the CO_2 contained in the raw material must be released, which is done by a process known as calcining. In grey cement production, this process takes place in a vertical calciner at a temperature of more than 900° C. The calciner is a tubular steel construction clad inside with lining bricks.

In recent years Aalborg Portland has experienced challenges with brief-duration dust emissions. To mitigate this problem, the two new-design calciners were installed for Kiln 87. Prior to installation, with specialist assistance, Aalborg Portland analysed what optimum flow through the calciners would look like.

This resulted in two completely new calciners that are narrower but slightly taller than their predecessors. This means that a uniform gas velocity of more than 10 m/s is maintained through the calciner, and ensures that the retention time is sufficient for effective burning.

The new design has given greater stability in production, and dust emission has decreased as the brief-duration precipitator dropouts caused by CO spikes have been reduced by 55%. The investment, amounting to EUR 10.3m, as total for 2016-2017, also enables more alternative fuel to be substituted for fossil fuel and thereby reduce the CO_2 emission.

Financial highlights and social contribution

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.

The company has incurred the following direct environmental levies:

EURm	2013	2014	2015	2016	2017
PSO levy	3.5	4.2	4.8	5.2	2.3
NO_X levy	3.9	1.9	2.4	2.1	1.8
Waste levy	0.4	0.1	0.2	0.3	0.3
Electricity levy	0.7	0.1	0.1	0.2	0.2
Energy levy	0.9	0.8	0.7	0.7	0.7
Raw materials levy	0.5	0.5	0.6	0.7	0.8
Sulphur levy	0.3	0.3	0.7	0.8	0.9
Total	**10.2**	**7.9**	**9.5**	**10.0**	**7.0**

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

In 2017, Aalborg Portland's value added was calculated as EUR 111m. Of this, EUR 33m (30%) went to society in the form of VAT, company tax, other taxes and employee income tax. EUR 24m (22%) went to the employees in the form of wages and pension contributions (after tax). EUR 50m was transferred to the company's equity.

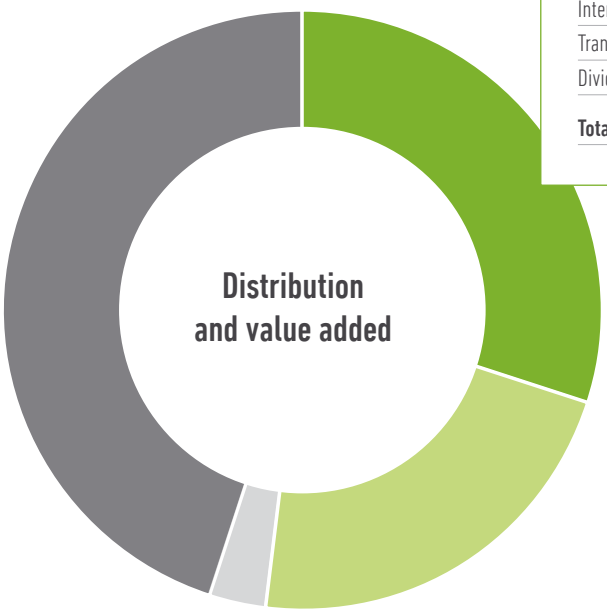
A social contribution is also created through our subcontractors involved in transport, maintenance, facility management, and other activities at Aalborg Portland.

EUR 33m

of the value added went to the public sector

DISTRIBUTION AND VALUE ADDED

EURm	2013	2014	2015	2016	2017
Revenue	188	192	210	232	245
Spent on materials, services, depreciation etc.	107	85	109	117	134
Value added	**81**	**107**	**101**	**115**	**111**
Society	34	35	38	36	33
Employees	18	17	18	22	24
Interest on loan capital	4	5	4	4	4
Transferred to equity	25	50	41	53	50
Dividend to the owner	0	0	0	0	0
Total	**81**	**107**	**101**	**115**	**111**



Society 30%
Employees 22%
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.


Research & Quality Centre

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 emission 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. 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, 9100 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
01-06-2019

Udstedelsesdato
Date of issue
16-05-2018

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
Denmark
Tel..: 98 16 77 77
E-mail: cement@aalborgportland.com
Internet: www.aalborgportland.dk

Environmental supervisory authority
Ministry of the Environment,
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

Philipp Raich, 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 Kiln 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'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
Intermediate product that results from the burning of slurry in kilns and is ground to produce cement.

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 40-41.

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, in which the recyclable residues such as glass and metals are sorted out.

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.

aalborgportland
CEMENTIR HOLDING

Environmental Report 2017
Environment and Health & Safety

Edited and published by
Aalborg Portland A/S
Environment, Energy and Management System

Responsible under Danish press law
Environment, Energy and QMS Manager
Henriette Charlotte Nikolajsen
Tel. +45 99 33 79 33

Design and production
www.hegnet.dk og www.prcsrl.com

Aalborg Portland A/S
Rørdalsvej 44
9220 Aalborg Øst
Denmark
Tel. +45 98 16 77 77
cement@aalborgportland.com
www.aalborgportland.dk