



ROADMAP FOR SUSTAINABLE CEMENT PRODUCTION IN DENMARK

THE PLAN FOR A 30%+ CO₂ REDUCTION BY 2030
AND CO₂-NEUTRAL PRODUCTION BY 2050

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AN INTEGRAL PART OF THE SOLUTION

Cement is an indispensable material. It is the most important constituent in concrete, which is the most widely used building material in construction and infrastructure. Cement binds the world together, as we say at Aalborg Portland.

But cement production emits also a large amount of CO₂. That is no secret. The good news is that it is actually possible to do something about it.

Aalborg Portland's vision is that it will be able to supply CO₂-neutral cement by 2030, and that all cement production in Denmark will be CO₂-neutral by 2050. This is an ambitious vision that can reduce our CO₂ emissions by 70% and potentially 100%.

In fact, we can become CO₂-negative if we reduce our emissions by 100% and at the same time supply surplus heat to the citizens of Aalborg.

Such a far-reaching vision of CO₂-negative cement can make Aalborg Portland's otherwise very energy-intensive production one of the most sustainable cement productions in the world.

However, this vision is fundamentally dependent on a number of political framework conditions and decisions.

We have therefore set ourselves a CO₂ reduction target of 30% for 2030, which we can achieve with certainty with the current conditions and with the measures that we ourselves can initiate.

But it does not stop there. Because Aalborg Portland and cement production are not only about cement and CO₂. We can make a decisive contribution to the green transformation of Denmark:

- Our surplus heat can heat 75,000 households and help the city of Aalborg achieve its climate vision.
- The cold water from our chalk pit will supply cooling for Aalborg's new university hospital and can provide air conditioning for several other locations in the city.
- Our CO₂ can be used for Power-to-X and production of green fuels for the transport sector. It will thereby become a valuable resource.
- We recycle more than 600,000 tonnes of non-recyclable waste as fuel instead of using new raw materials. This is an example of circular economy,

So in the big picture, Aalborg Portland is inseparable from the rest of the transformation which Denmark will undergo. We are an integral part of the solution.



FOUR POLITICAL STEPS TO SUSTAINABLE CEMENT PRODUCTION

Aalborg Portland has itself initiated a dedicated and targeted plan to ensure a CO₂ reduction of 30%, but if we are to lower our emissions further, towards a reduction of 70% and potentially realise even greater reductions, the framework conditions and the political decisions have to be right.

We can point to four areas where the political framework conditions can make the necessary difference:

CO₂-NEUTRAL FUELS

With a high-temperature production process which cannot be electrified, access to gas as a stepping stone to biogas at competitive prices is central.

CO₂ CAPTURE

Carbon capture is indispensable for achieving a 70%+ reduction in cement production, but will necessitate investment which we cannot manage by ourselves and which will call for significant state support.

GREEN REQUIREMENTS AND TENDERS

The demand for sustainable solutions must be stimulated by green requirements and tenders. Here, the public sector should take a lead with requirements and budgets for sustainability in infrastructure and buildings.

FINANCIAL SCOPE FOR SUSTAINABLE INVESTMENT

Competitiveness is all-important for the ability to maintain a profitable business with scope for investment in sustainable transformation. Further taxes, such as for example a national CO₂ tax, should therefore not be imposed on Aalborg Portland. We point instead to regulation at EU level.

RESEARCH & INVESTMENT WILL TAKE US TO 2030

For Aalborg Portland, the road to more sustainable production and cement leads by way of prioritised research and a continuous high level of investment.

Our investment in sustainable solutions for the period 2014-2023 amounts to EUR 66m. In addition, net profit for the year is transferred to equity so we can maintain the high level of investment in the period to 2030.

The research department for the whole Cementir Group, which is the owner of Aalborg Portland, is an integrated part of the cement production in Aalborg. Research is a hard and fast part of our business, and we have a longstanding tradition of close partnerships with Danish universities and the rest of the Danish construction industry.

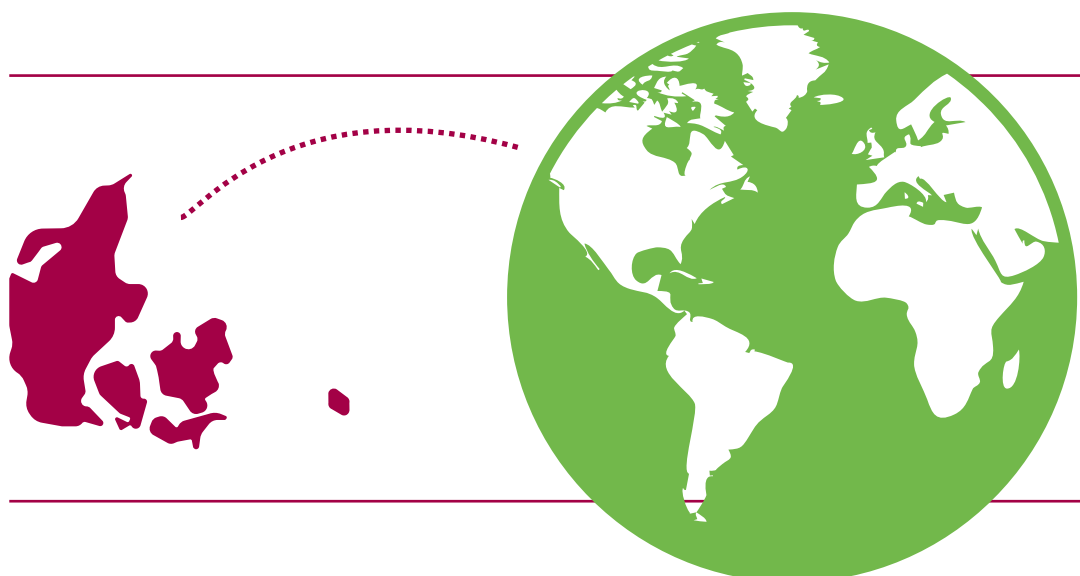
This focus has given us a position of global leadership in both grey and white cement.

We currently employ an expert in life cycle analysis tasked with securing valid documentation of environmental impact, and we have hired a further Ph.D. to assist in examining the possibilities for CO₂ capture.

On the subject of CO₂ capture, we have in close partnership with Aalborg University and several other parties been awarded EUDP funding to explore the technical and economic feasibility of CO₂ capture, storage and use.

Last but not least, we will soon be launching a research project aimed at improving use of our new green cement - FutureCem – and making it even more sustainable. The ambition is to increase CO₂ reduction with FutureCem from 30% to 50%.

Innovation in Aalborg – with global impact





CEMENT BINDS THE WORLD TOGETHER

It may sound a grandiose claim, but cement does actually bind concrete - and therefore the world - together. It is simply impossible to envisage a modern society without concrete.

We store our clean water in concrete, and we remove our waste water in concrete pipes and send it to concrete treatment plants. All infrastructure – sidewalks, squares, roads, bridges and tunnels, harbours and airports, climate adaptations and storm defences – requires concrete. And without concrete, whether for foundations or whole structures, there are no houses.

This is due to the many diverse properties of concrete, to which no alternatives have been found.

Not least because concrete has such high strength that it can be used for the most extreme purposes and subjected to very high loads. But also, for the simple reason that cement and concrete consist of the very same minerals and raw materials as the world itself.

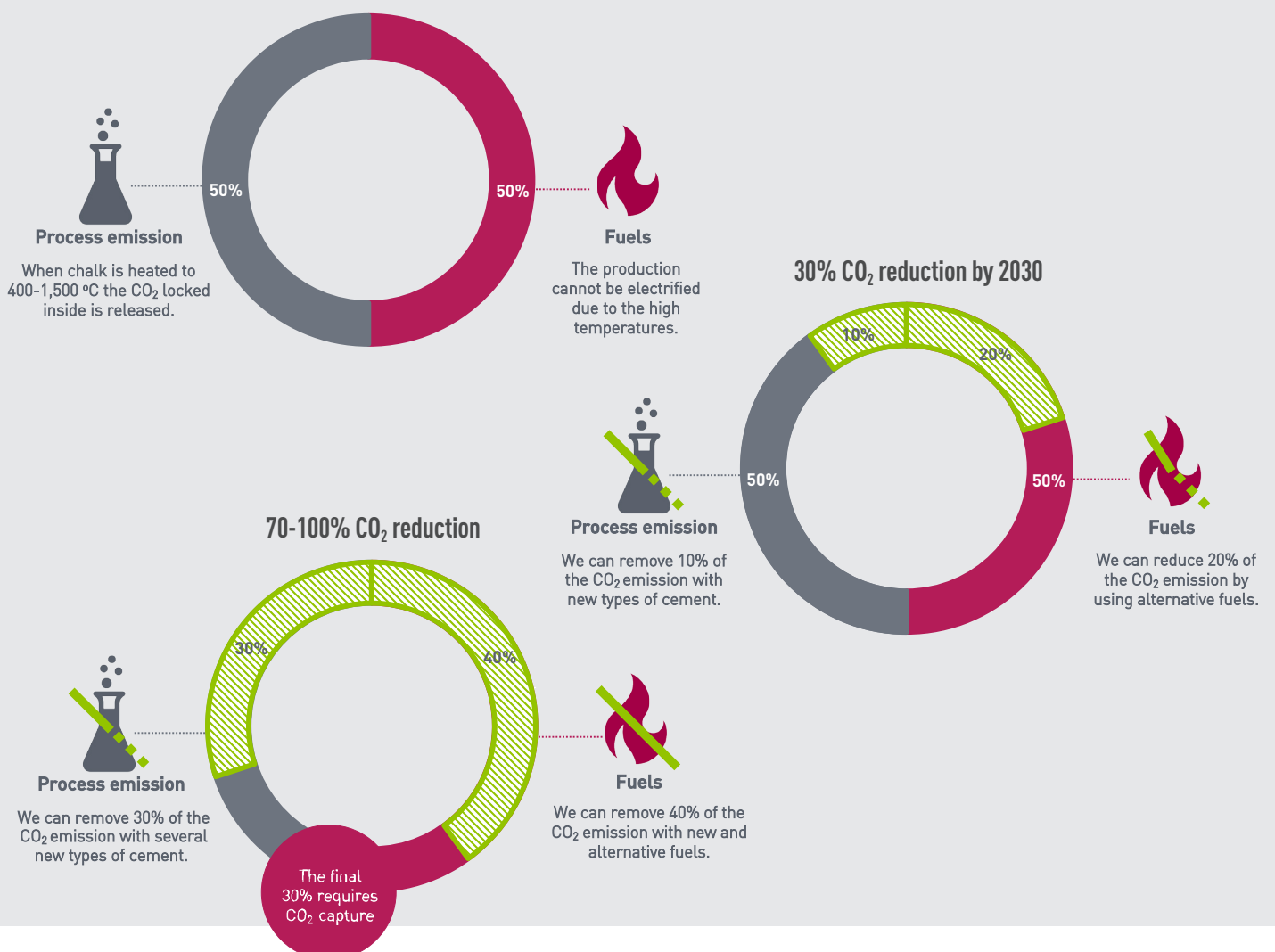
So there are many advantages of cement and concrete, but there is also an impact on climate and environment in the form of emissions and extraction of raw materials. This impact is something of which we are very mindful, and we take responsibility for dealing with the problems. Some of the solutions are contained in our 2030 roadmap.

TWO SOURCES OF CO₂ EMISSION FROM CEMENT PRODUCTION

Cement is produced by extracting, processing and heating primarily chalk. The big challenge with sustainable transformation of cement production is that around half the emissions come from are the mineralogical process, i.e. from the chalk itself when heated to 1,500 °C. The rest of the Scope 1 emissions come from the use of fuels.

Aalborg Portland is therefore focusing both on changing its fuels and changing its chalk-based cement. But even with 100% CO₂-neutral fuels we cannot fully reach our target without CO₂ capture.

Two sources of CO₂ emission from cement production





FOCUS ON EMISSIONS FROM SCOPE 1, 2 AND 3

At Aalborg Portland we focus on three categories of emissions, which are calculated according to the official methods:

Scope 1:

Direct emissions from production, i.e. what is discharged from the chimney.

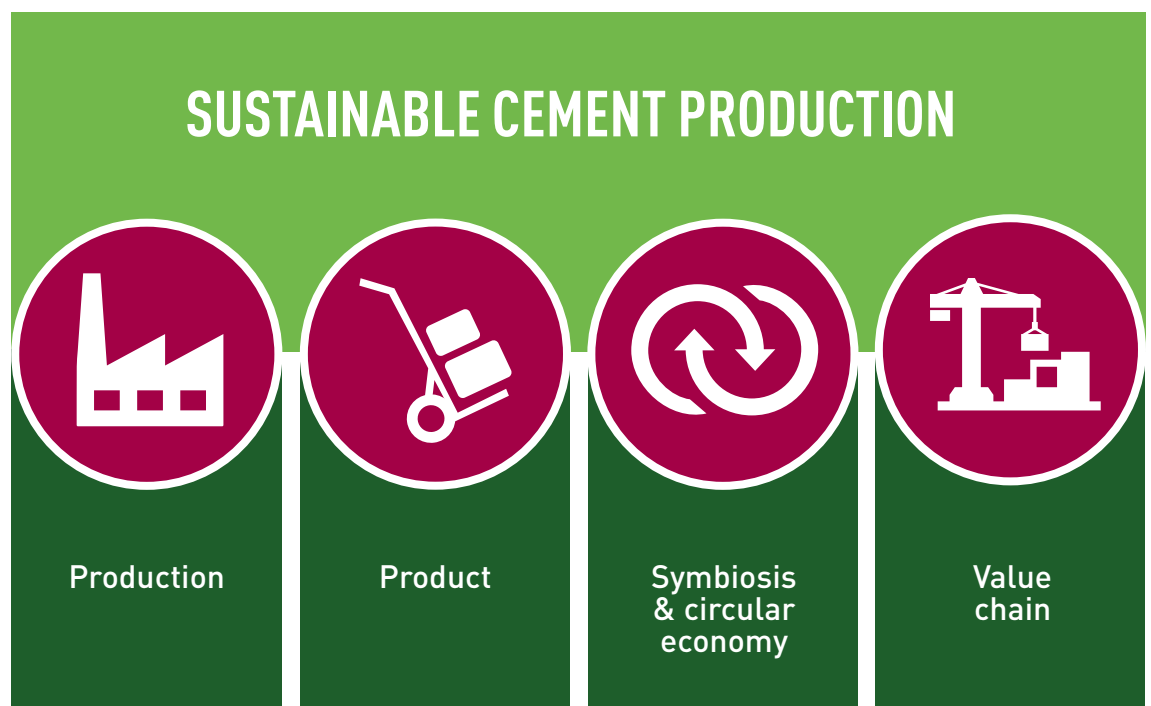
Scope 2:

Indirect emissions from procured and utilised energy.

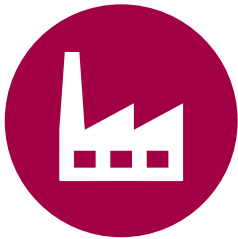
Scope 3:

Indirect emissions from the external value chain, e.g. distribution.

Scope 1 and 2 relate to our production and products, Scope 2 relates to our industrial symbiosis and circular economy, while Scope 3 deals with the rest of the value chain linked to our production.



PRODUCTION (SCOPE 1)



In cement production very high temperatures are needed - up to 1.500 °C. The process is one which cannot be electrified and accounts for 50% of our emissions.

Transitioning to alternative and CO₂-neutral fuels is therefore essential for reducing our emissions.

We already use biofuels and waste extensively instead of fossil fuels. We are searching intensively for new waste fractions, such as textile and chemical wastes, which can be of use to us but would otherwise be non-recyclable. We are also investigating the possibility of supplementing with natural gas - and potentially biogas at competitive prices.

Furthermore, we continue to focus on streamlining and optimising our operation so that we can reduce our energy consumption and avoid breakdowns that cost unnecessary additional energy.

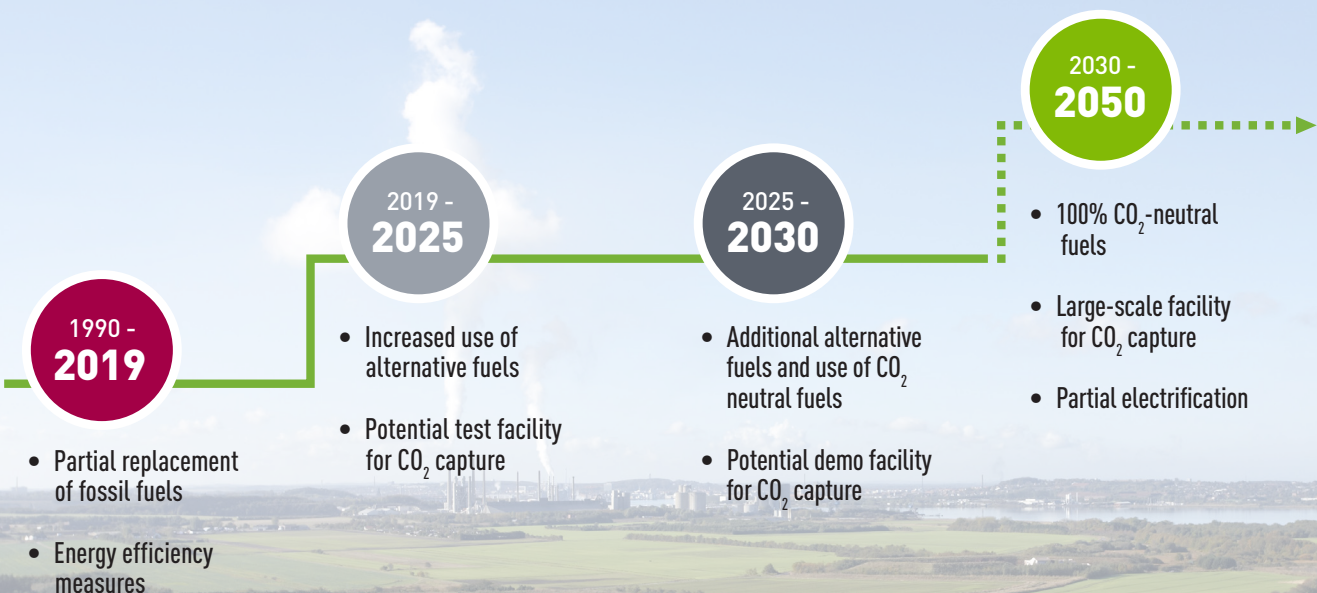
Finally, we are committed to exploring the possibilities for CO₂ capture. This is still a novel and development-intensive technology that is associated with high cost and will require political prioritisation and public support if it is to be realised.

Our focus

- Increase the proportion of alternative fuels
- Potentially switch to natural gas and biogas
- Streamline and optimise
- Examine possibilities for CO₂ capture

What do we need to move forward?

- Gas pipeline to Aalborg Portland
- Gas and biogas in sufficient quantities and at competitive prices
- State support for CO₂ capture



PRODUCT (SCOPE 1)



When chalk is heated to 1,500 °C, CO₂ is released. This process is called calcination. The release of CO₂ is unavoidable when making cement. 50% of our emissions derive from this source. But the emission can

be minimised by replacing some of the chalk with other materials.

Aalborg Portland is the leader in this area and will launch FutureCem, a new type of cement developed with breakthrough technology, later in 2020. The product is partly based on clay and can reduce the CO₂ emission from cement by up to 30%.

We are also researching the possibility of extending the use of FutureCem to all types of concrete and to increasing the reduction in CO₂ emission to up to 50%.

In the period to 2030, FutureCem will be implemented throughout our grey cement portfolio.

At the same time we are looking at the possibilities for using the same technology for white cement. We are also involved in research projects generally and are constantly developing new and optimised cement types.

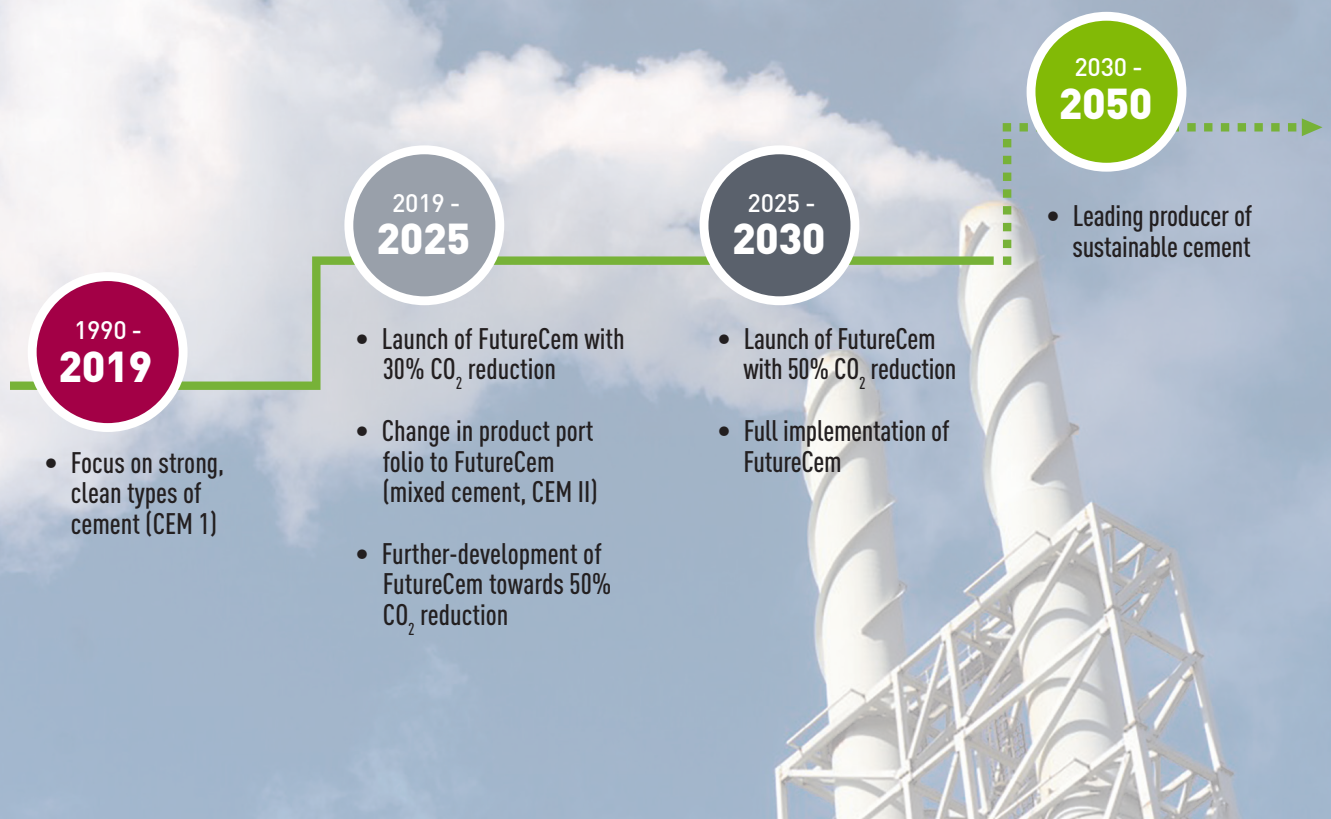
This is an important and indispensable part of our 2030 plans.

Our focus

- Full implementation and further development of our FutureCem cement
- Reduce the CO₂ footprint in new types of cements

What do we need to move forward?

- Demand and willingness to pay for sustainable products
- Requirements and budgets for sustainability in public tenders for buildings and infrastructure
- Requirements for CO₂ footprint - based on material-neutral life cycle analyses - from buildings in the Building Regulations



1990 -
2019

- Focus on strong, clean types of cement (CEM 1)

2019 -
2025

- Launch of FutureCem with 30% CO₂ reduction
- Change in product portfolio to FutureCem (mixed cement, CEM II)
- Further-development of FutureCem towards 50% CO₂ reduction

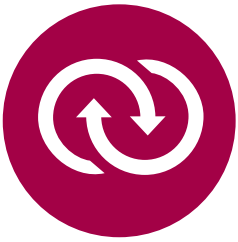
2025 -
2030

- Launch of FutureCem with 50% CO₂ reduction
- Full implementation of FutureCem

2030 -
2050

- Leading producer of sustainable cement

SYMBIOSIS & CIRCULAR ECONOMY (SCOPE 2)



The largest industrial symbiosis in Denmark - and one of the largest in Europe - has Aalborg Portland as its focal point. The potential for this symbiosis is even greater.

our own green electricity.

In addition, we wish to widen our circular economy with the community so we can receive even more than the approx. 700,000 tonnes of waste which we recycle as fuel instead of using new raw materials.

As of 2020, Aalborg Portland supplies surplus heat as CO₂-neutral district heating to 30,000+ households. This corresponds to a CO₂ reduction of 150,000 tonnes and represents a substantial and necessary contribution to the City of Aalborg's 2050 climate ambition. But the potential is at least 75,000+ households.

In partnership with Aalborg Forsyning we supply district cooling from our coldwater chalk lake to the city's new university hospital. This has important perspectives for other Aalborg buildings with cooling needs.

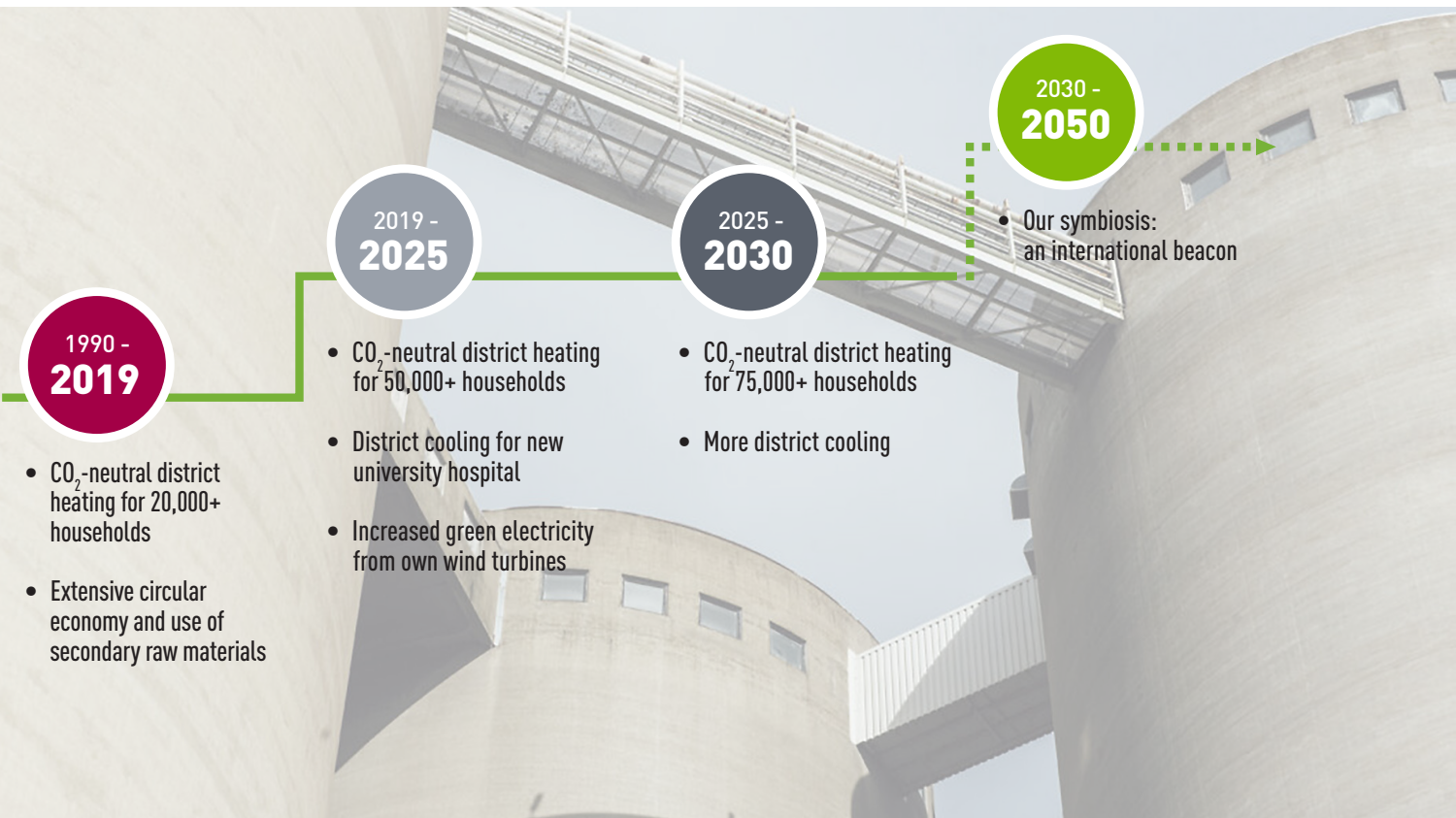
In parallel, we are working on installing large new wind turbines so that we can eventually produce

Our focus

- Utilise more surplus heat and district cooling
- Extend circular economy
- Increase production of own green electricity

What do we need to move forward?

- Local agreements for supply of more surplus heat
- Adequate availability of usable waste fractions



1990 - 2019

- CO₂-neutral district heating for 20,000+ households
- Extensive circular economy and use of secondary raw materials

2019 - 2025

- CO₂-neutral district heating for 50,000+ households
- District cooling for new university hospital
- Increased green electricity from own wind turbines

2025 - 2030

- CO₂-neutral district heating for 75,000+ households
- More district cooling

2030 - 2050

- Our symbiosis: an international beacon

VALUE CHAIN (SCOPE 3)



Production of cement is one thing. The use of cement in concrete is another, and an area with significant opportunities for optimisation. Together with the rest of the Danish construction industry, Aalborg Portland has joined the

Sustainable Concrete Initiative, which aims to halve the CO₂ footprint from concrete construction by 2030 compared to 2019. The initiative will dominate the construction industry's project agenda for the next 10 years with Aalborg Portland as an active partner.

Proper documentation is vital for certifying CO₂ reductions in construction. We do this through complete environmental product declarations, which also include the natural CO₂ uptake in the concrete, which actually accounts for 12-14% of the total CO₂ emission from production of cement and concrete.

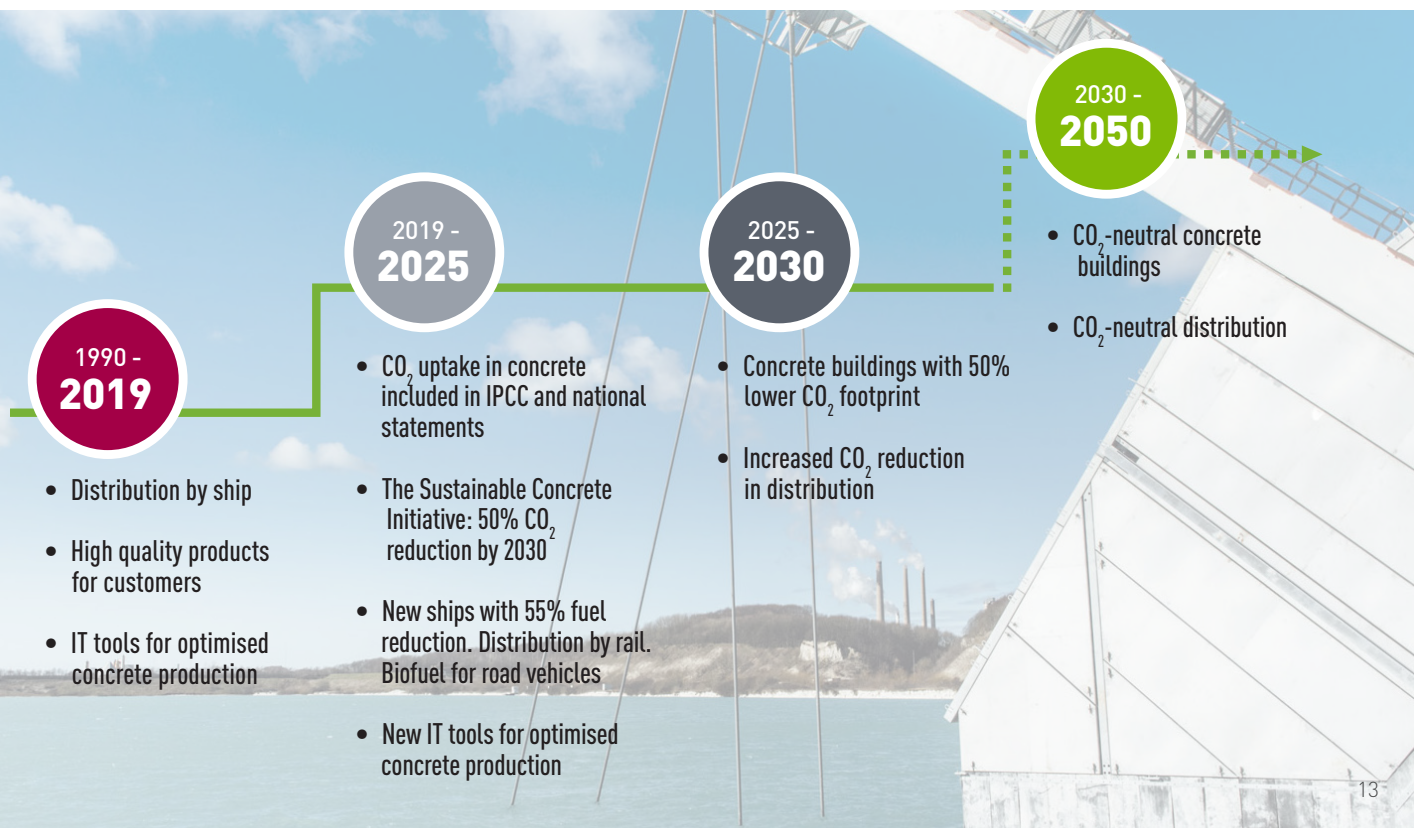
We are committed to working for more sustainable distribution. We want to increase distribution by rail, impose stronger requirements for suppliers, and ensure even more fuel-efficient ships.

Our focus

- Collaboration with the value chain on 50% CO₂ reduction in concrete buildings
- Adequate environmental documentation in environmental product declarations
- Establish requirements for distribution

What do we need to move forward?

- The natural CO₂ uptake (carbonation) must be approved by IPCC and included in the official emission statements
- Alternatives to fossil-based distribution



WE WORK IN CONCERT WITH THE INTERNATIONAL CEMENT INDUSTRY



Our roadmap and political recommendations are in line with the recommendations of the Danish Climate Partnership for Energy-Intensive Industry and the European report of The High Level Expert Group on Energy-Intensive Industries.

The EU Commission acknowledged the recommendations of the High Level Expert Group on Energy-Intensive Industries in its Green Deal proposal, which states that the cement industry is an indispensable supplier to a number of value chains, including the energy and food sector, basic infrastructure and other industries.

The European Cement Association CEMBUREAU launched in 2020 a 2030-2050 roadmap for CO₂-neutral cement production, which is in line with the roadmap for Aalborg Portland.

Aalborg Portland is also committed to the sustainability charter of the Global Cement and Concrete Association and to the UN's 17 global goals, with particular focus on the 10 goals listed above, as verified by Bureau Veritas, which is also the verifier of our annual environmental statement.

Our roadmap is supported by Danish, European and also global initiatives for sustainable industrial production.

FACTS ABOUT AALBORG PORTLAND

Cement has been produced in Aalborg for 130 years. Aalborg Portland is today the sole producer of cement in Denmark.

We produce two types of cement, which are used for different purposes:

- Grey cement, which is primarily used for foundations, sewers, sidewalks, bridges, houses and many other functions, for which raw strength is needed.
- White cement, which is a niche product used for e.g. tile adhesive, cement paint and high-strength concrete.

The grey cement is sold mainly in the domestic and neighbouring markets, while our white cement is primarily exported. In total, 43% of cement production is exported.

There are 340 employees at Aalborg Portland. A number of personnel from external subcontractors also work at the factory. The total number is persons employed corresponds to around 850.

Revenue in 2019 amounted to EUR 259m. Net profit for the year of EUR 53m was transferred to equity for future investments. In addition, EUR 38m went to society in the form of VAT, company taxes, other taxes and employee income tax, while EUR 22m went to the employees in the form of salary and pension.

Aalborg Portland A/S is part of the Aalborg Portland Holding Group, which is owned by the Cementir Group, an international supplier of cement and concrete. The Cementir Group is headquartered in Amsterdam, has a secondary office in Rome and is listed on the Italian Stock Exchange in Milan.



Roadmap for sustainable cement production in Denmark

The plan for a 30%+ reduction by 2030
and CO₂-neutral production by 2050



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