

→ Factsheet



About OCAP

Plants grow better and faster by giving them more CO₂. This improves yields and enhances the quality of your crop.

OCAP really believes in meaningfully reusing CO₂ in order to prevent unnecessary emissions and energy consumption. That is why we have been capturing CO₂ at industrial sources since 2005. It is transported to horticultural companies in various greenhouse areas. To them, CO₂ is a valuable nutrient, which would otherwise be obtained by combusting natural gas.

But we can do better

The horticultural greenhouse industry wants to become more sustainable on its way to a climate-friendly undertaking. To achieve this, it is absolutely essential that sufficient external CO₂ is available. Together with trade association LTO Glaskracht, OCAP is therefore currently in the process of unlocking a new, large source. With the help of a seasonal buffer, sufficient CO₂ will then be available for the horticultural greenhouse industry in the delivery area of the OCAP network. This will save an annual combustion of many millions of cubic metres of natural gas and the emission of hundreds of tons of CO₂ with it. This will enable the horticultural greenhouse industry to switch to sustainable heat sources instead of the combustion of natural gas to produce heat.

Pure CO₂
for
greenhouses

OCAP CO₂ B.V.
Havenstraat 1, Postbus 78, 3115 HC Schiedam
T 010 246 12 80
info@ocap.nl, www.ocap.nl

6800.002 (09/18/500)

THE LINDE GROUP

Linde

Introduction

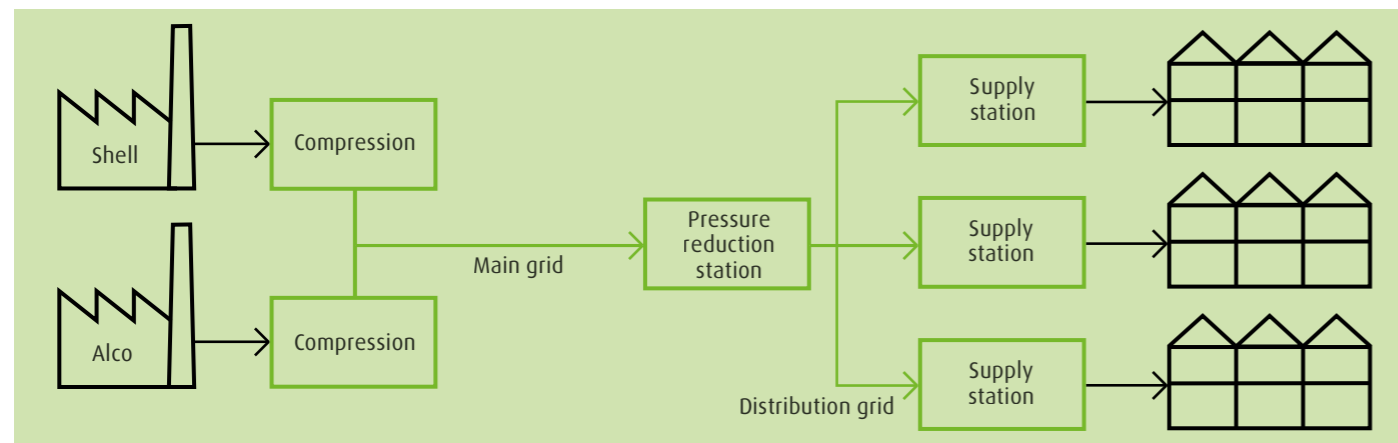
OCAP supplies pure CO₂ to greenhouse entrepreneurs. This CO₂ is released during the production of hydrogen at Shell in the Botlek area, and during the production of bio-ethanol at Alco in Europoort Rotterdam. Alternatively, it would be emitted into the atmosphere. OCAP supplies this CO₂ via a transport pipeline and an extensive distribution network. This enables greenhouse entrepreneurs to save about 140 million cubic metres of natural gas a year. Also, their annual CO₂ emissions are reduced by about 250,000 tons. This generates a unique advantage for both the environment and for greenhouses.

OCAP's mission

'To meet the need for CO₂ in greenhouse horticulture in an environmentally-friendly way through the distribution and delivery of pure CO₂ released by the industry.'

CO₂ in the greenhouse

Plants grow under the influence of light and use water and CO₂ as raw materials (photosynthesis). In the competitive greenhouse market, the use of CO₂ in a greenhouse is considered a key instrument to increase production and quality of the products. In the Netherlands CO₂ requirements are primarily met by using CO₂ in the form of flue gases



from the heating system (boiler or cogeneration). In summer, natural gas is combusted on a large scale in greenhouses. During combustion CO₂ is released. However, the pure CO₂ supplied by OCAP is much better in quality, available in larger quantities and avoids the need to combust natural gas to gain CO₂. This is increasingly important as greenhouse entrepreneurs succeed to reduce or even avoid the use of natural gas by switching to renewable energy such as geothermal energy. These companies haven't got the opportunity to produce CO₂ by themselves with combustion of natural gas. OCAP CO₂ offers them the perfect solution.

Two unique sources of CO₂

Shell & Alco. At the Shell refinery in the Botlek area, (almost) pure CO₂ is emitted into the atmosphere on a large scale. The Shell CO₂ is released during the production of hydrogen, a crucial process in the refinery. Many kilotons of CO₂ are emitted each year. This CO₂ can be used directly in greenhouses. The production of bioethanol in the Alco plant also generates CO₂ of a good quality. This CO₂ is supplied to the greenhouse companies affiliated with OCAP via a transport pipeline.

The OCAP solution

- OCAP is solving two urgent issues:
The greenhouse entrepreneur has access to large amounts of high-quality CO₂ to maintain optimum CO₂ concentration in the greenhouse. The increased production and quality of the products results in a stronger competitive position of the Dutch greenhouse market.
- Simultaneously, the environment benefits of reduced natural gas consumption. This saves about 140 million m³ of natural gas each year, avoiding the emission of 250,000 tons of CO₂. Thus the availability of this CO₂ is an important precondition for the sustainability of the greenhouse market, putting the CO₂ emitted by Shell and Alco to good use. This is a significant contribution to the objectives for CO₂ emission reduction, as laid down in the Paris agreement. The potential reduction amounts to over 500,000 tons of CO₂. The limited availability of useful CO₂ sources inhibits the full use of this potential.

Delivery area

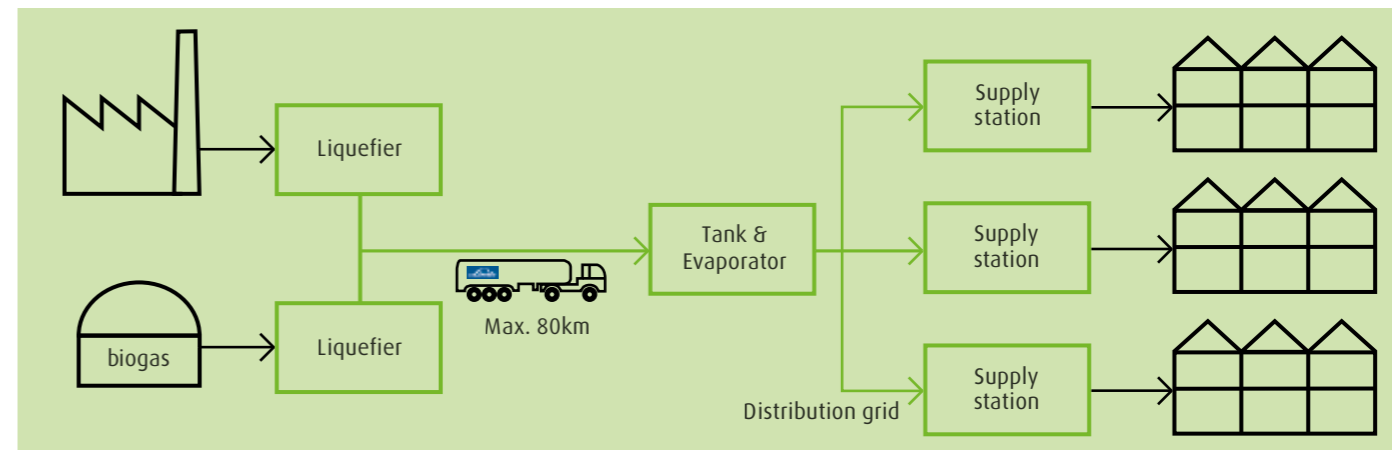
OCAP currently supplies about 500,000 tons of CO₂ per year to approximately 600 greenhouse companies in the western part of the Netherlands. They represent some 2,500 hectares of greenhouses

Transport, distribution, and delivery

OCAP purchases CO₂ from Shell and Alco. The CO₂ is pressurized using a compressor. An existing transport pipeline is used for transport. This pipeline runs from the Rotterdam industrial area along a number of major greenhouse areas to the port of Amsterdam. The greenhouses within the delivery areas are connected to a transport pipeline by a ramified distribution network. Through delivery stations, the CO₂ is brought into the greenhouse.

OCAP Minigrids

To provide CO₂ to greenhouses who are not within reach of the main OCAP grid, the concept of OCAP minigrids has been developed. A group of greenhouses in a specific area are connected by a ramified distribution network and liquid CO₂ is evaporated from a tank into this distribution network and delivered to the greenhouses.



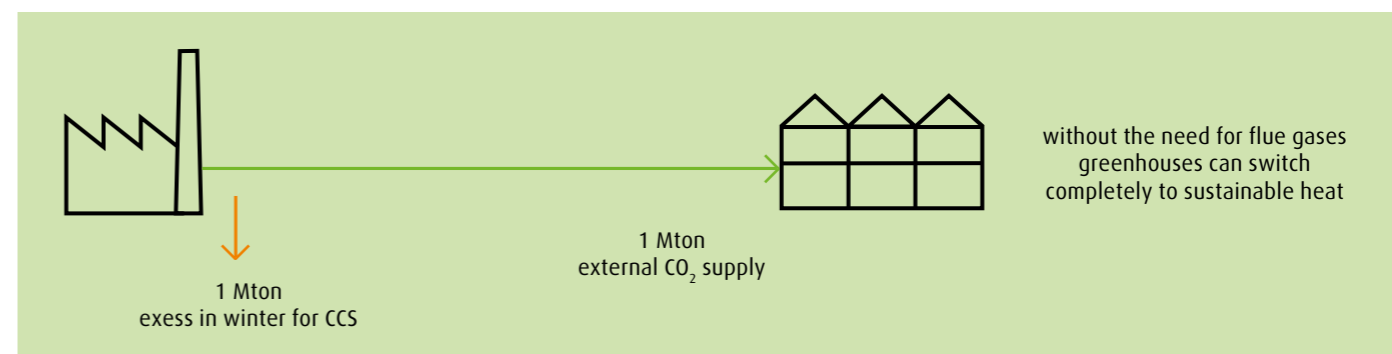
Future objectives

Target greenhouses: climate neutral in 2040 in the Netherlands. OCAP intensively collaborates with different partners to increase the use of pure CO₂ in Dutch greenhouses. Goal is to double the current CO₂ supply of 500,000 tons per year. Greenhouse entrepreneurs are enthusiastic, but more CO₂-sources are needed. OCAP works with

Facts & figures

Greenhouses in the Netherlands

Total area: 10,000 hectares
Total turn-over: € 8,5 billion export value
Number of hectares eligible for OCAP CO₂: approximately 5,000.



organizations, governments and other (sustainable) initiatives to increase the availability of pure CO₂.

CO₂ smartgrid

Since June of 2017 a collective of 25 companies, social organisations, government and knowledge institutions formed the Coalition "CO₂ Smart Grid". During the Rotterdam climate summit they signed an agreement to develop projects with the goal to reduce the emission of CO₂. One of the big projects is a network of pipelines and storage facilities (CCS) throughout the Netherlands. Just have a glance at www.ocap.nl OCAP is one of the leading companies in this collective.

Linde Gas Benelux

Since March 2013 The Linde Group, a leading global company in gases and engineering, is the sole shareholder of the joint venture OCAP. This reinforces the position of Linde in the global energy and environment growth market as one of the leading suppliers of clean technologies and sustainability for its Clean Energy Program.

Transport and distribution network

Transport pipeline (steel): 97 kilometres
Distribution pipeline (HDPE): 250 kilometres.

Levering

- Number of affiliated greenhouse entrepreneurs: approx. 580 (approx. 500 direct en approx. 80 via Eneco)
- Total surface connected: approx. 1,900 hectares (1,650 hectares directly and 250 hectares via Eneco)
- Total supply: approx. 500,000 tons of CO₂ per year.

Annual environmental gains

Realized in 2018

140 million cubic metres natural gas savings
250,000 tons CO₂ emission reduction.

Potential in 2020

280 million cubic metres natural gas savings.