

Sensus investigates alternatives for gas

THE COMPANY INVESTIGATES FIVE SCENARIOS

Sensus, part of Cosun, has set themselves the target to produce 100% CO₂-neutral by 2050. In cooperation with the province Overijssel and Bilfinger Tebodin, the company investigated a sustainable alternative for gas. This showed green power from biomass to be a good and sustainable alternative.

Text Egbert van Heijningen

Sensus has two different production locations. At the location in Zwolle, a number of the most energy-intensive processes are carried out such as drying and evaporating. The juice that is extracted in Roosendaal from the chicory roots are concentrated here and dried into powder. Natural gas plays a central role in driving the existing installations: the drying towers are indirectly fired with natural gas burners and natural gas is the fuel with which steam is produced for other processes. While striving to achieve a more sustainable production, Sensus is investigating the possibility to move away from using natural gas. The alternative must be economically viable, have a high energy efficiency and contribute to 100% CO₂ neutral production by 2050.

Investigation of sustainable options

"The installations at our location at Zwolle are among the major gas consumers of Sensus", Frans Franssen, plant manager of the Zwolle location tells. "We are going to replace the burner of one of the towers shortly, choosing the most sustainable option possible. In line with this, the present study into the sustainability of the entire location has been started. In 2018, we commissioned Bilfinger Tebodin to analyse the options." The results of this will follow in December. Energy specialist Roel Tolle of Bilfinger Tebodin:

"In 5 scenarios, we have looked at the technical and economic feasibility of various combinations of sustainable electricity production and electrification. Within the production facility,

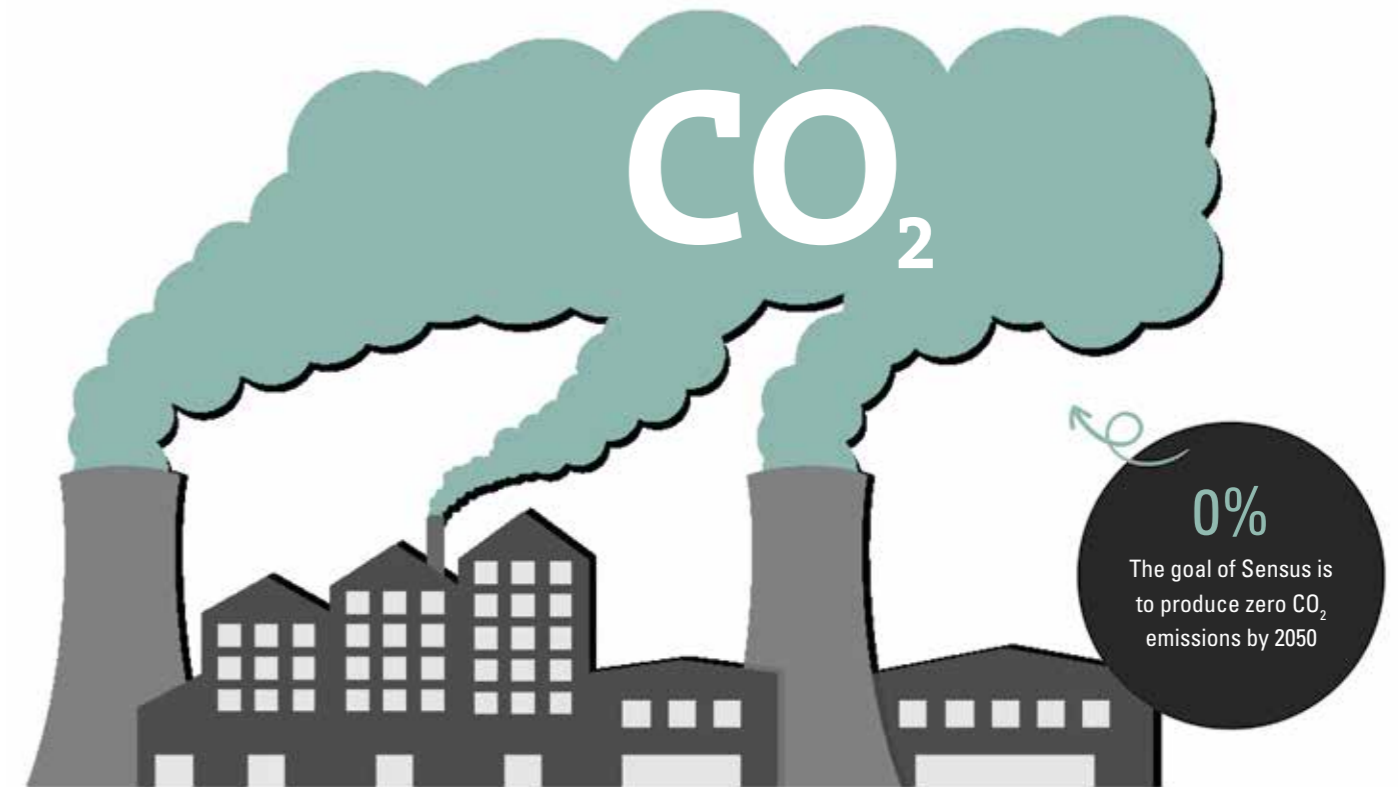
various processes take place which require heat or steam. The determining consumers of heat are the drying towers, evaporators, pasteurisers, CIP installations and the HVAC system. The drying towers use indirectly heated natural gas burners, the other consumers derive heat energy from steam."

The sustainable alternatives for steam production which have been investigated:

1. high pressure steam (HP steam) produced with biomass;
2. low pressure steam (LP steam) produced with a high temperature heat pump (HT heat pump) from residual heat from own processes;
3. LP steam produced with a HT heat pump from residual heat from the Zwolle city heating (90°C);
4. steam production by means of electrically powered steam boilers;
5. application of mechanical vapour recompression (MVR) instead of thermal vapour recompression (TVR) for the evaporators.

Steam from biomass

Tolle on the results of the investigation: "Both Sensus and the researchers come to the conclusion that switching to externally produced steam from biomass is an option. In the technical sense, the HP steam can be used, with the necessary adaptations, in both the new drying tower and in the other installations. The sustainability aspect is realised through the choice of the raw material in the



power plant. From an economic point of view, it must be clear that green electricity can be offered at a favourable price. This is being investigated further at the moment."

In comparison to the option of steam from biomass, the other alternatives had various disadvantages. Partly because of the necessary expenses - increased electricity consumption and investment in the adaptation of installations - but also because of technical reasons. Tolle: "For applications with heat pumps, Sensus would, for example, need to be able to rely on a constant supply of water with a very high temperature. With the evaporators, replacing TVR technology by MVR technology leads to too little advantage. The existing installations are, in comparison to older TVR systems, already very efficient and compared to MVR systems, the difference in efficiency does not weigh up against the investment costs."

Optimistic about the next steps

Besides Sensus, the province Overijssel was commissioned the broad investigation into sustainable solutions. This is due to the fact that the province wants to support businesses in Overijssel in the energy transition and wants to guide namely the major consumers of the gas from Groningen in making choices other than a relatively straightforward switch to high-caloric gas.

How and when the switch will depend on the current investigation into the most appropriate location for a steam plant and the most suitable fuel for that plant. Sensus has approached external parties to prepare quotations for this. Whether the desired price level for the steam supplied is achieved, also depends on the profitability of the plant to be built.

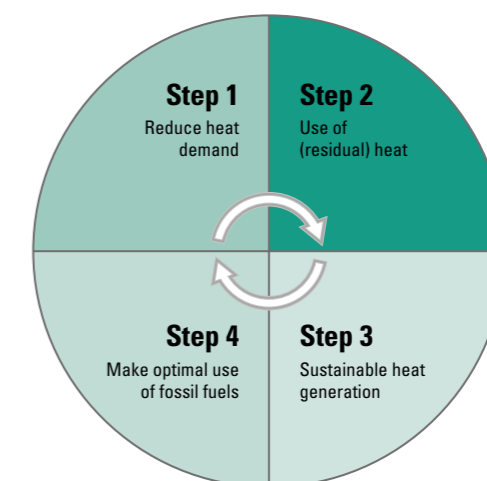
This can be influenced positively when there are more consumers in the direct vicinity who can be supplied. On this, discussions are ongoing with surrounding businesses including the manufacturer of foodstuffs and health products, Abbott.

"We are optimistic about the next steps", Frans Franssen of Sensus says. "The cooperation with all parties involved is running smoothly. Bilfinger Tebodin plays a coordinating role in this. We can now take further steps with which we work towards an even more sustainable production in the future." •

Various processes demand heat or steam.

Fossil-free in 4 steps

With a contribution of on average 85 PJ per year, the energy consumption in the food and stimulant industry is approximately 6% of the total energy consumption within the industry sector (CBS, 2016). Especially the demand for heat makes a major contribution, with an average of 55 PJ per year, approximately 65%.



To reduce the use of fossil energy, a strategic approach in 4 steps can be used (figure). In the investigation described here, especially the adjustments of the Sensus processes was elaborated as well as the possibilities for using residual heat (step 2) and the implementation of sustainable heat production, in this case steam (step 3). A maximum reduction of the steam demand was also assumed (step 1), for example by insulating pipelines and fittings and by a regular inspection of steam traps and optimisation of the process temperatures.

Sensus
Just as SuikerUnie and Aviko, Sensus is a part of the agro-industrial Royal Cosun group. In Roosendaal and Zwolle (the Netherlands), chicory roots are processed into pre-biotic fibres such as inuline and oligo-fructose. These semi-finished products are used as sugar or fat replacements in products.