

Reference Custers' Farm

# Condensation drying: drying and storing onions independently of the outside air



## Request from Custers

To design a method that we can use to dry and store onions with no loss of quality

Onions and cheese now have something in common: condensation drying. Custers asked ENGIE Refrigeration to adapt the storage technology in the cheese sector and make it suitable for another application: drying and storing onions, independently of the weather conditions.

### Controlling the air humidity

As soon as onions are harvested, they must be dried straight away. The faster the neck of the onion dries, the less chance that moulds and bacteria will grow in the onion. During the drying and storing process, farmers are dependent on the outside air. But the conditions are almost never ideal for drying the onions quickly. Periods of drought and rain alternate with each other and result in huge discrepancies.



To solve this problem, the outside air is heated with gas stoves so that the air can absorb more moisture and the temperature in the space remains constant. This requires a huge amount of gas, with the added disadvantage that 1.6 kilos of moisture is released for every kilo of propane gas that is burned. In addition, 10% extra gas is needed to remove that moisture.

This method for drying and storing onions costs a lot of money. Moreover, a top-quality onion needs a stable ambient temperature and heating the air does not contribute to this. Due to alternating outside air conditions, the onion is less healthy and the quality deteriorates. Time for a change, decided Roger Custers, owner of Custers' Farm. 'I wanted to have control over the air humidity during both the drying process and the storage process. A method that I can use to dry and store onions with no loss of quality.'

### Heating and refrigeration system in one

ENGIE's experience with condensation drying in the cheese sector gave Custers the necessary confidence. In the new shed, he can store three times 1,000 tons of onions in three cold stores. His new condensation drying system is a heat-pump system that he can use to dry the onions after the harvest, warm them up and store them in refrigerated conditions. The system guarantees optimal conditions in the cold stores and can be managed using a smartphone, tablet and/or PC.

Marcel Bennink, Project Manager at ENGIE: 'The condensation drying system is a heating and refrigeration system in one that makes outside air and gas stoves unnecessary. It brings the air in the shed to under the condensation point, and enables Custers to convey away 24,000 litres of moisture per day and dry the onions. The heat released during the refrigeration process is re-used to keep the onions at a constant temperature. In addition, the system is fitted with a heat pump so that consignments of onions can be heated in order to combat diseases.'

The natural refrigerant ammonia (NH<sub>3</sub>) in the system guarantees the highest possible yield and the lowest possible energy consumption. Moreover, this made Custers eligible for the Energy Investment Deduction (EIA), a tax benefit that means he can deduct a large part of the investment from his taxable income. Moreover, this natural refrigerant is very compatible with the farm's organic cultivation method.



### They start rustling within a day

'The condensation drying system gives me exactly the control I wanted', says Custers. 'I can see it in the values on the operating system and in the onion itself. Regardless of how the onions are harvested, they start rustling within a day of being dug up and a few days later the necks are dry. The drying process is twice as fast as in the past, regardless of the weather. Added to that, I can keep drying the onions at a low product temperature during the storage period. With the conventional system, I had to keep the cold stores at an unnecessarily high temperature so that I could dry the onions with outside air. Not very beneficial for the storage life. Thanks to the new system, I can always supply the best quality onions.'

An added advantage: I no longer have to use propane gas, so I also save on those high costs. Custers: 'I only use electricity that I generate myself with solar panels. I recover the residual heat from the system and use it in the office and the machine shop. And when the outside air is the right quality? Then the condensation drying system works together with the outside air to dry the product even faster.'

Roger Custers  
Custers' Farm:

'Now we can dry our onions twice as fast, regardless of the outside air conditions'



ENGIE



ENGIE's solution

A condensation drying system:  
drying and storing onions  
in optimal conditions.

More information?

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