

# Cleantech Invention

## Greenhouse dehumidifier

A good dehumidification process in a greenhouse is critical for optimal growing conditions, but very energy consuming. Growers are interested in more efficient dehumidification techniques and system suppliers are anxious to deliver them. The greenhouse dehumidifier of TNO is a technique that not only has improved control over the climate conditions. It is also able to highly regain both sensible and latent heat without excessive electricity use. Since both the heating system and solar irradiation provides this heat, the invention acts as a regain unit and solar collector as well.

### Unique combination of techniques

The dehumidifier will be fully stretched into the greenhouse beyond or along the plant rows. It lets in greenhouse air over its total length. The air passes a combination of a heat recovery unit (HRU) and a cold droplet condensing dryer, respectively regaining sensible and latent heat. Both do have the highest efficiencies for these tasks. Cooling the droplets is done by a heat pump (HP) with high COP. Though the HRU directly redirects its heat regain to the greenhouse, the regain of the HP may be temporarily stored for night use. A heat exchanger, combined with the dehumidifier, redistributes the stored heat on demand. The dry conditioned outlet air is distributed evenly near the plants, at the most moist spots.

### Climate impact

The energy use of greenhouses already has reduced over 55% since 1990. The CO<sub>2</sub>-emission reduced with 28% (compare with 4% total in NL) to a total of 4.9 Mton/a. This is already 15% down the 2020 goal. The dehumidifier has a CO<sub>2</sub>-reduction potential of up to 30%. Depending on the storage capacity this may rise to over 50%.

### Target market

The primary market are greenhouses, though efficient dehumidification is a topic in many other branches. TNO offers its R&D capacity together with industrial design skills to develop a ready to sell product.

### Who is Greenhouse Dehumidifier looking for?

Greenhouse Dehumidifier very welcomes climate system developers, producers and installers with an entrepreneurial mind.

### What does Greenhouse Dehumidifier have to offer?

TNO will assist the entrepreneurial team in setting up the functional requirements, making the industrial design and a test model, performing tests, improving the design, in prototyping and production process, dissemination of results (assist in PR).

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