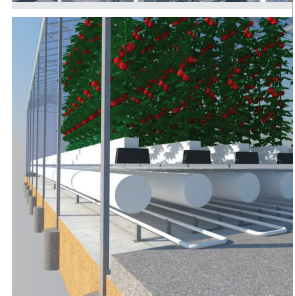
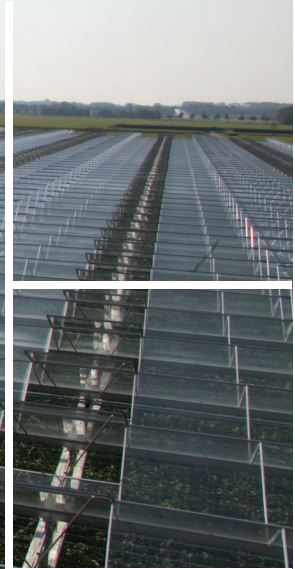




# Air & Energy



## Introduction Air & Energy Concept

**These days a great deal of attention is being paid to 'the new way of growing', where the focus is on the plant and growing techniques and which enables significant energy savings to be made.**

The key areas that deliver the most energy savings in 'the new way of growing' in all cases are:

- Intensive insulation with thermal screen(s). In this case, intensive insulation means screening for more hours with a thermal screen with a high energy saving potential, or even screening for more hours with a double thermal screen with twice the energy saving potential.
- The aim is to be able to more or less stop dehumidifying using the minimum pipe rail system and with air vents slightly open. Humidity and other undesirable substances are removed by a controlled supply of dry outdoor air.
- Controlled air movement improves horizontal temperature and moisture distribution, which reduces the risk of fungal infections.

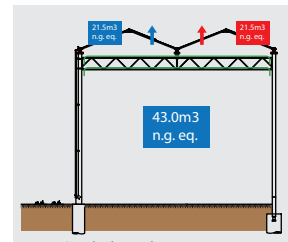
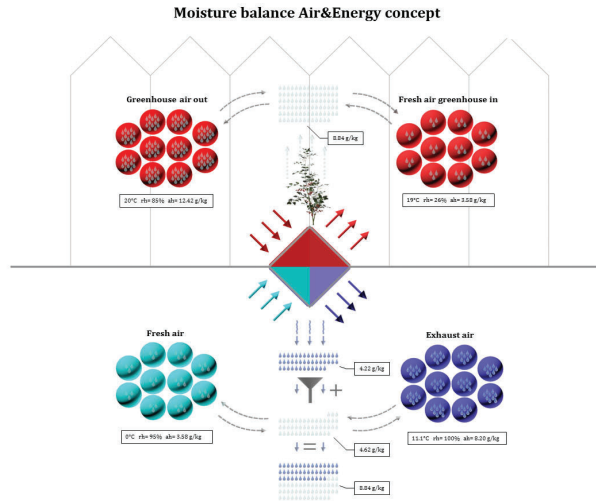
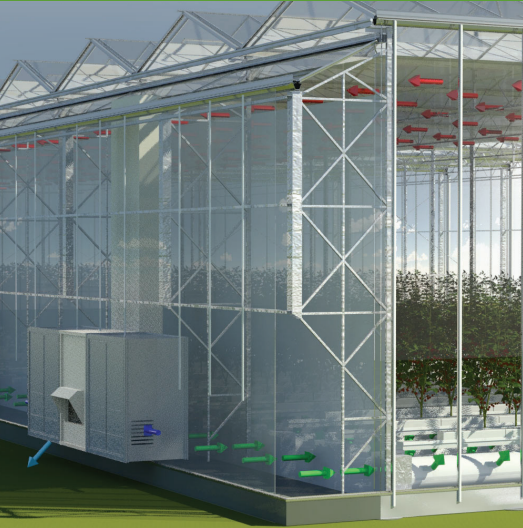
The market is being flooded with different ventilation systems designed to achieve the kind of energy savings advocated by 'the new way of growing'. With so many suppliers of ventilation equipment on the market, there is a lot of information but unfortunately also a lot of misinformation in circulation.

The information provided here looks at the how and why of a ventilation system and demonstrates what such a system can generally do.

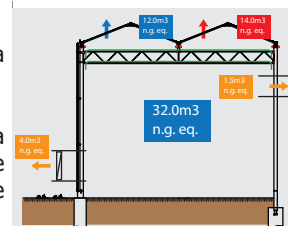
Air & Energy concept is a well-designed total ventilation concept with top quality, proven technology in a setting that is kept as simple and as effective as possible. So Air & Energy delivers both extreme energy efficiency and absolute reliability!



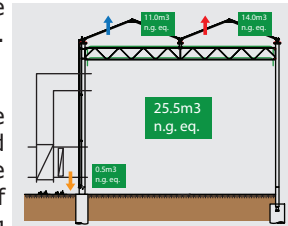
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A. Standard Greenhouse Problem: with closed screens no ventilations



B. Greenhouse with double screening installation. Ventilation system with (only) heated units



C. Air & Energy Greenhouse with double screening installation

↑ = lost of energy by proces per 1 year per m3  
↑ = lost of energy by construction per 1 year per m3

**Moist balance with Air & Energy system**

An example for the moist balance of the Air & Energy system in a common situation:

Outside air is taken in, and in the heat exchanger heated up to a temperature of 19°C, with warmth from the air that has to be blown off. The absolute humidity doesn't change, but the relative humidity drops from 95% to 26% (at 20°C).

The crop evaporates water and the absolute humidity in the greenhouse raises from 3.58 g/kg to 12.42 g/kg. The corresponding relative humidity raises from 26% to 85% (at 20°C). Every kg of air in the greenhouse absorbs 8.84 g water.

During the ventilation process fresh air goes into the greenhouse while saturated air is extracted from the greenhouse. The extracted air leaves the greenhouse via the heat exchanger, and will be cooled down from a temperature of 20.0°C to a temperature of 11.1°C. During this process condensation will occur and every kg of air brings 8.84 g water out of the greenhouse; 4.22 g visible as water that comes from the ventilation unit, and 4.62 g invisible as vapour in the 100% saturated air that is blown off.

**Overview temperatures using Air & Energy**

At a greenhouse with a temperature of 20 °C is the top always warmer. With a suction temperature from above of 20.8 °C is the fresh air already heated to the inside temperature of 20 °C. The Temperature of the blown air amounts 13.2 °C at an outside temperature of 0 °C.

There will be a transmission needed from the sensible heat to bring the temperature at the level of the greenhouse. What is not needed is drained out. The moisture deficit widens on site of the air supply opening (it's dryer). The recirculation unit divided this dry air back into the greenhouse.

**Options at the Air & Energy concept**

Depending on the situation, the Air & Energy concept can be extended with various options including:

- the Air & Energy system with TopAir
- the Air & Energy system with LT heating via hoses
- the Air & Energy system with overpressure unit



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