AGAM Greenhouse Energy Systems

Maintain a Perfect Greenhouse's ***dry-Air Conditioning*** *All* ***Day****, Every* ***Day***™

Microclimate **challenges** for greenhouses

- ✓ Heating and cooling systems.
- ✓ Maintaining **desirable** Relative Humidity (RH) control
- ✓ Keeping environment clean from **air-borne diseases**.

Microclimate **challenges** for greenhouses

- ✓ Sustaining even **air flow** in and around the plants.
- ✓ Reducing **crop loss**
- ✓ Spending as little as possible **energy**

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Commonly-used Microclimate controls

- ✓ Air or water-based **AC** or **heating systems.**
- ✓ Regulating **Relative Humidity (RH)** control
- ✓ Combating **diseases.**
- ✓ Using **Thermal screens** and windows.

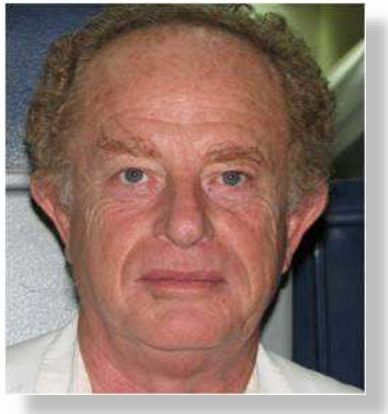
All of the above was true until 10 years ago with the arrival of

AGAM Greenhouse Energy Systems

Ventilated Latent Heat Converter (VLHC) System

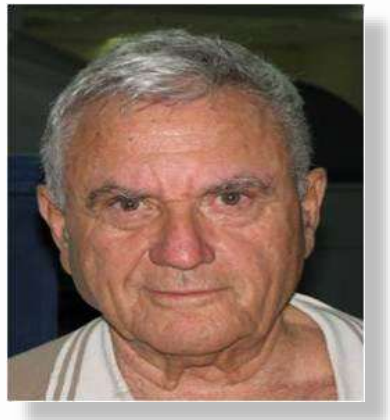
VLHC 1020S
-2019-

Founded by industry veterans



Col. (Ret.)Moshe Maroko

With over 86 combined years of experience, we **develop and build innovative –** microclimate **energy- conserving,** environment friendly, **dehumidification**, cooling and heating systems for the advanced greenhouse industry.



Dr. Gad Asaf

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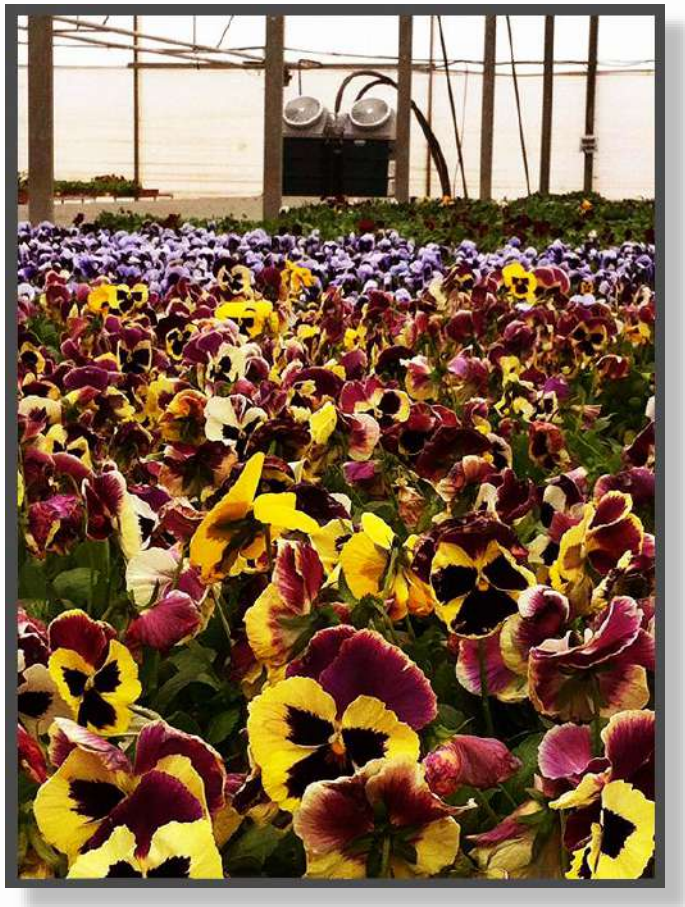
The Principal

Patented **revolutionary, hygroscopic system** of heat - exchange technology is highly **cost-effective for dehumifications, heating** and field proven for saving 40% - 60% of energy expenses.

The Principal (2)

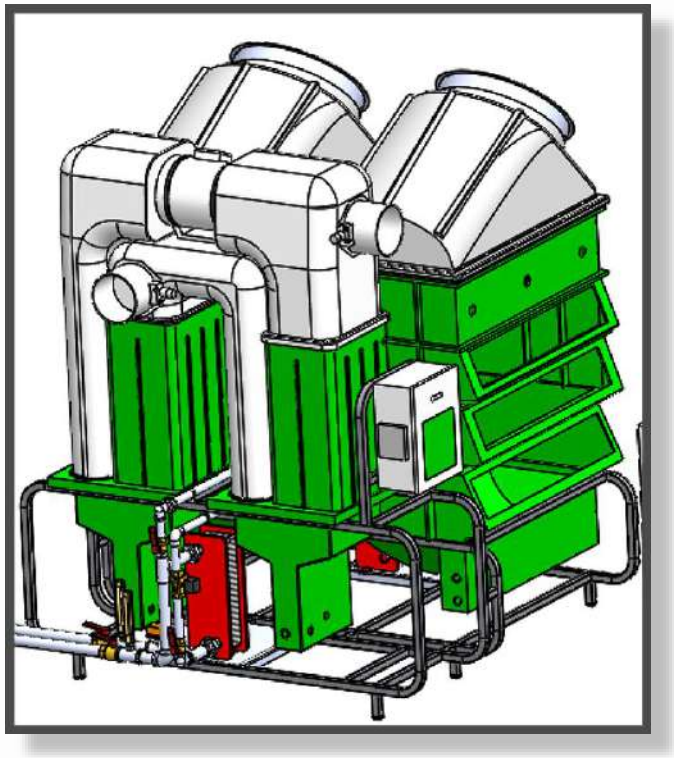
By converting humid to dry air, the system **reduces** humidity and air borne diseases. Air passes through the **hygroscopic brine solution** spores are destroyed.



The results:

Both conditions prevent the **propagation of diseases**, improve yield per square meter, quality, significantly **reduce crop loss** and save money on **fungicides** and **agrochemicals.**

With fewer mechanical components, AGAM systems are **more reliable**. Brine solution design to remain in place for **over 10 years** even with 90% utilization. Since AGAM system is **self-sustaining**, regular, related maintenance labor **drastically reduced.**



However, before we dive into AGAM machine's inside, some terms must be clarified!

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* Feedback Phenomenon

Effect of climate change on horticultural crops

Abnormality in climate patterns, heating the greenhouse creates effect of ***accelerated catchment-specific hydrologic cycle.***

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* Delta T “ΔT”

A value to show the difference between two measured temperatures.

In the greenhouse industry it refers to the difference between greenhouse exterior temperature and the creates microclimate temperate created inside the greenhouse.

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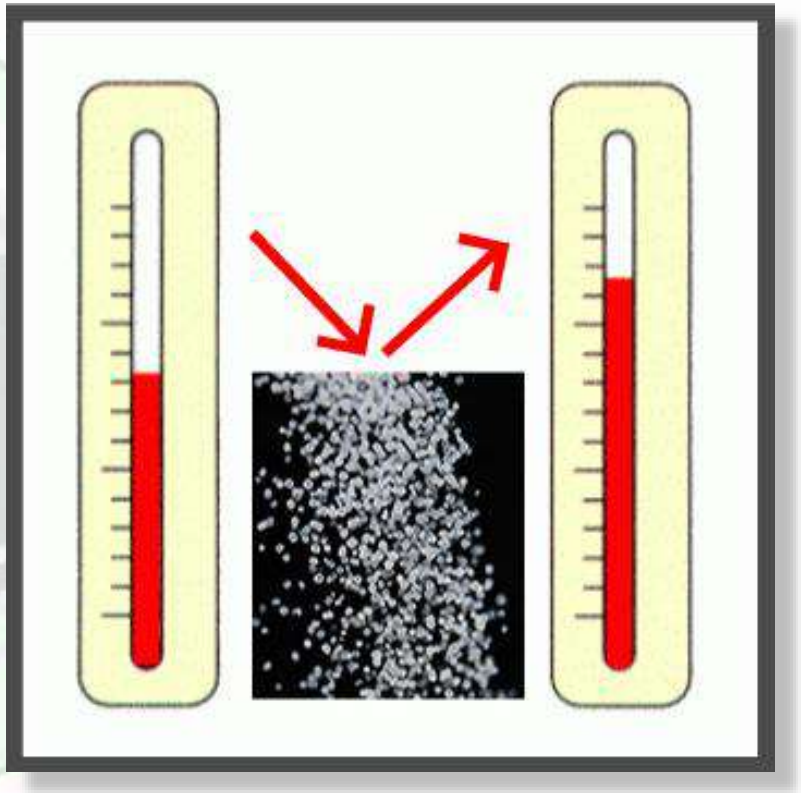
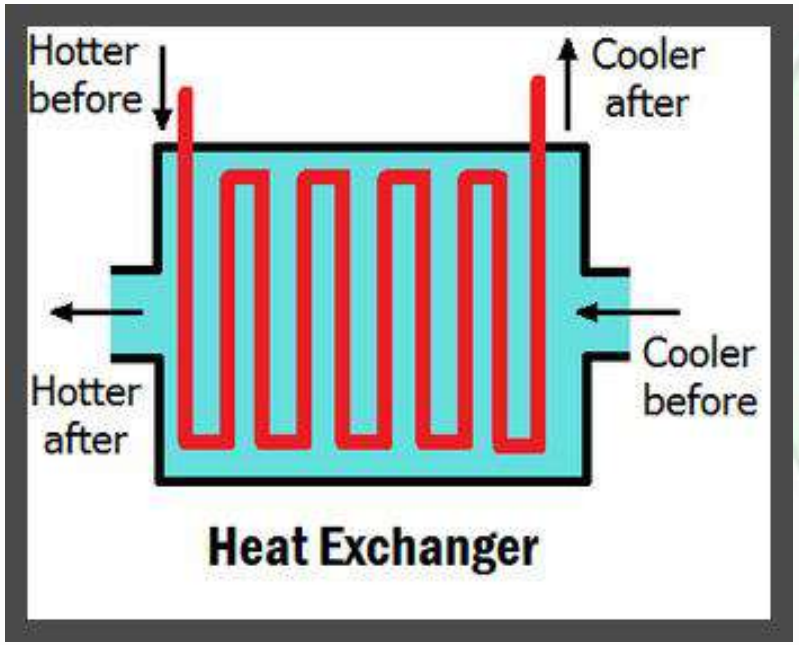
* Latent heat

Heat of transformation

Is a thermal energy released or absorbed, by a body or a thermodynamic system during undergoing a change of state.

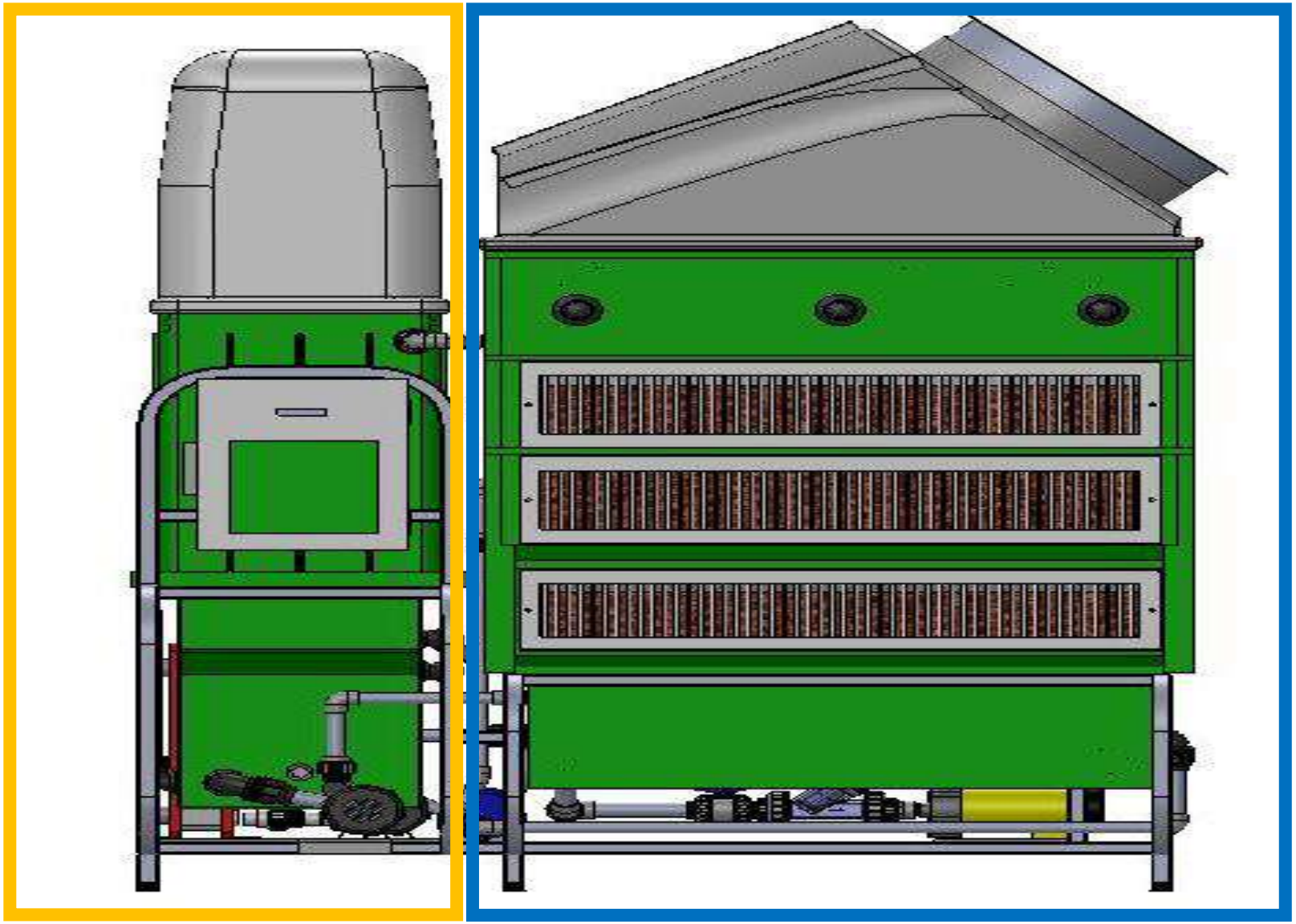


* Heat Exchanger



A device used to transfer heat between two or more fluids. Used in both cooling and heating processes. The fluids may be separated by a solid wall to prevent mixing.

Regenerator



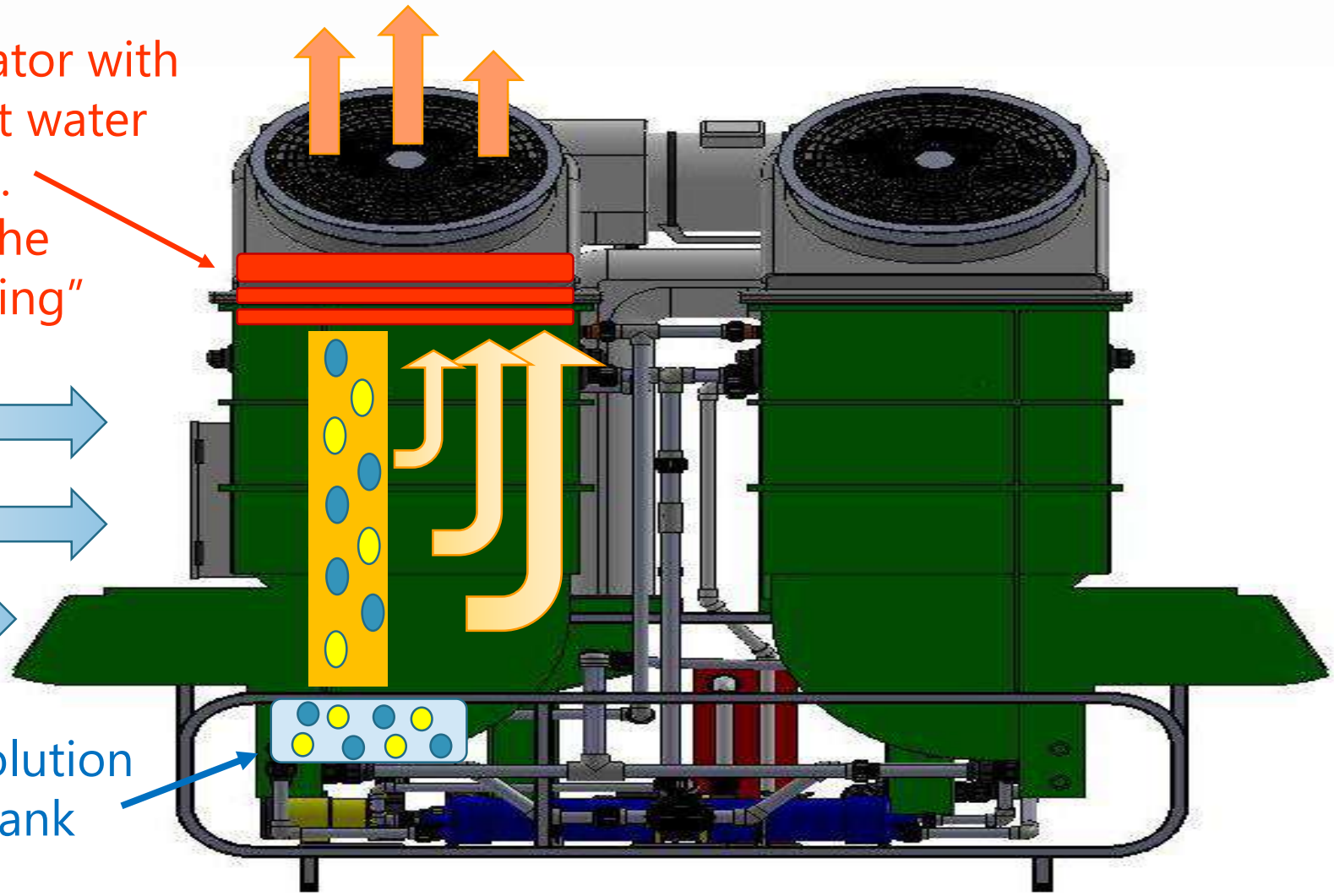
Collector

Collector at work

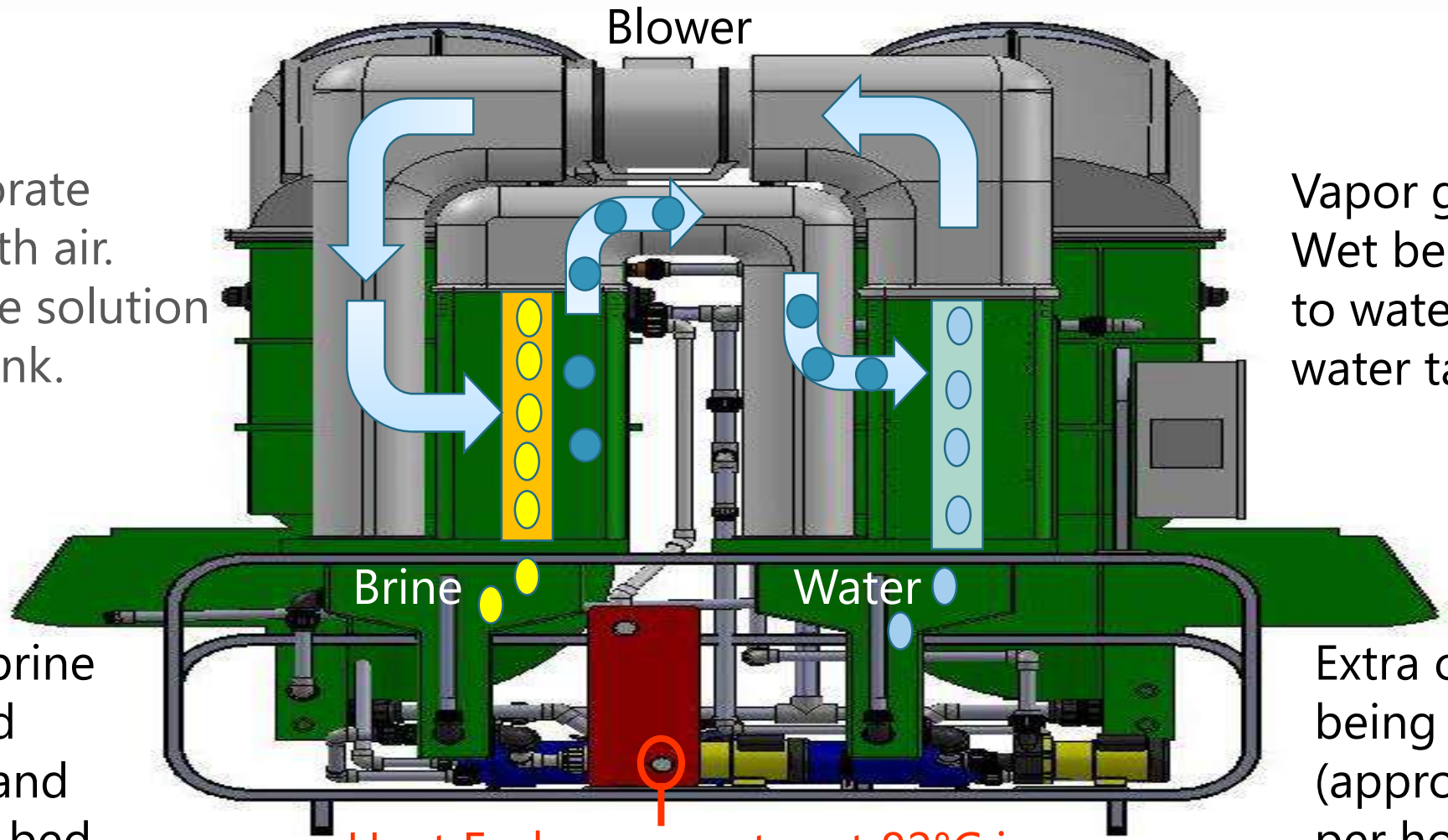
3 tiers radiator with running hot water up to 82° C. Top tier is the "Extra Heating"

Air with moisture suck into unit

Water with brine solution mixes at reservoir tank



Regenerator at work



Water evaporate and blow with air. Heavier brine solution flows into tank.

Vapor go through Wet bed condensate to water and flow into water tank

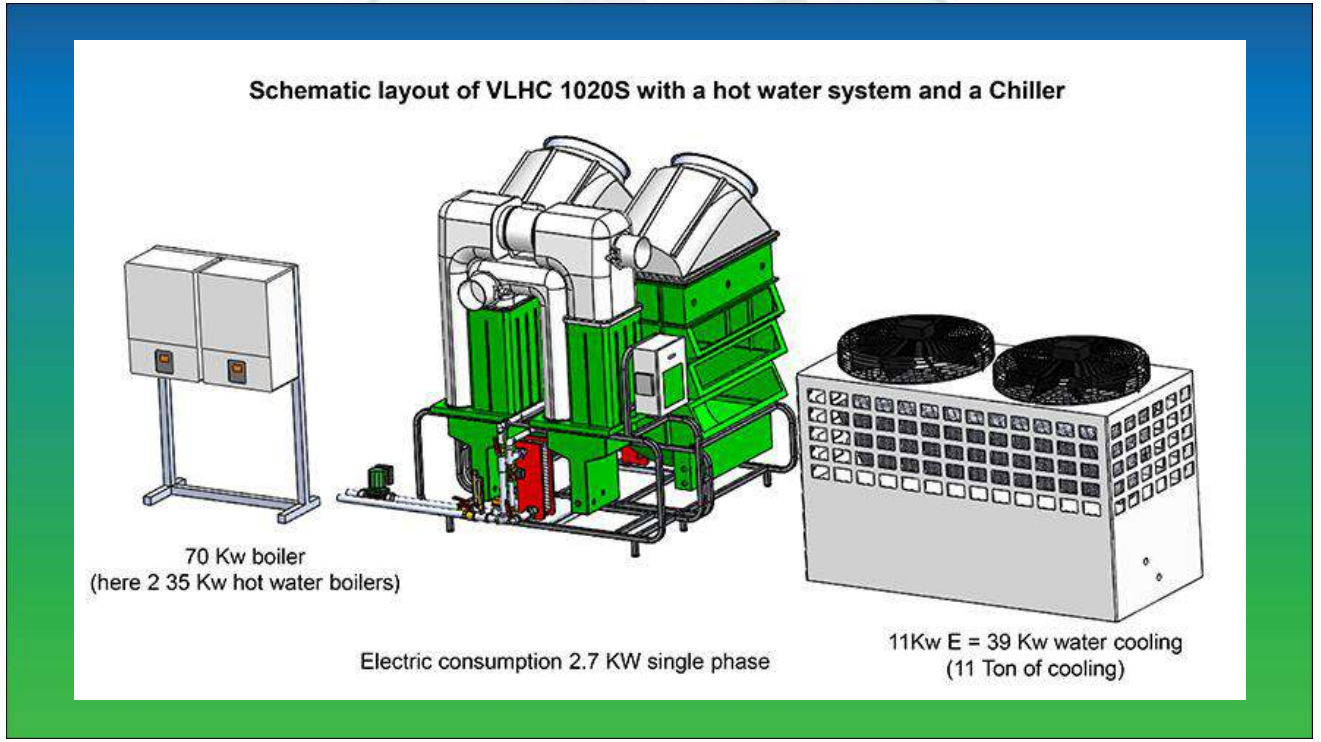
Water from brine tank pumped through HE and drips on wet bed.

Extra clean water being discharged (approx. 18-25 liter per hour).

Connections requirements

- ✓ *Electricity: 2.5 kW*
- ✓ *Hot water Loop*
  65-82°C 70Kw

VLHC with Hot water boiler and a chiller



Hybrid Air-Conditioner (**HAC**)

Cooling and Dehumidification

- ✓Heat Exchange between refrigerant and hygroscopic solution (liquid desiccant).
- ✓Desiccant-air direct-contact heat exchange.
- ✓Solution concentration controls Relative Humidity.

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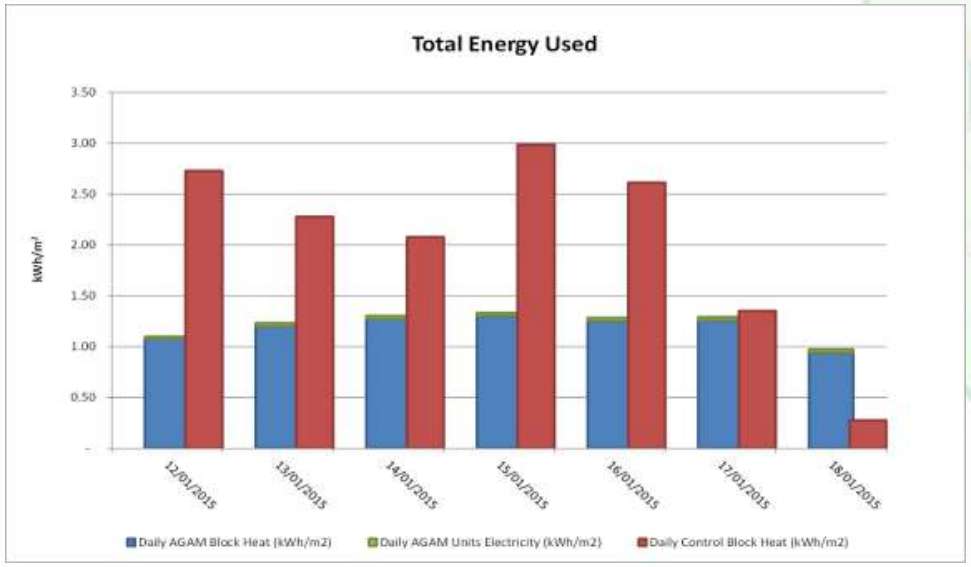
Research and tests results

VLHC test in a hydroponic greenhouse (salad leaves)

England, Autumn 2014

AGAM Energy Report for NP Structures Ltd from 29th of December to 04th of January 2015

This weekly report has been produced by Farm Energy Centre as part of on-going reporting on the benefits of desiccant based dehumidification



- The average heat saving for the week was 46.7%.
- The cumulative cost saving until the end of the week commencing the 29th of December, from the beginning of the trial (October 8th 2014) is £1.82 per square meter.
- This equates to £9464 for the 5200 m2 AGAM Block.

Test results - tomato greenhouse,

Holland, May 2014

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Agam Dehumidifier

Results on Energy savings, fungi removal and energy modulation

8-5-2014

Summary of the tests performed

- Energy losses reduced ~ 60%.
- Fungi removal ~ 75%.
- Heat input reduced (modulation) ~ 75%.

The above results are a part of research and measurements.

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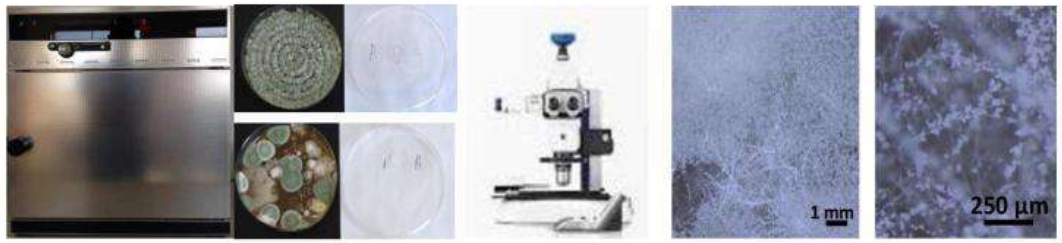
Botrytis tests



Incubator Bacteria Microscope analysis

Dr Ten

12 /

Sweden

December 2012 – January 2013

Linköpings universitet
TEKNISKA HÖGSKOLAN

VLHC is keeping the relative humidity 20% lower than normal, normal is when natural draft from rooftop windows is the source of dehumidification. This comes with the negative effect of big energy losses.

Test results show that nearly 60% of the energy is saved with the use of VLHC. The rooftop windows are closed and more energy is kept in the volume. The model is showing result in the same positive trend and can easily be converted for future commercial use.

Installations

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Sweden closed structure

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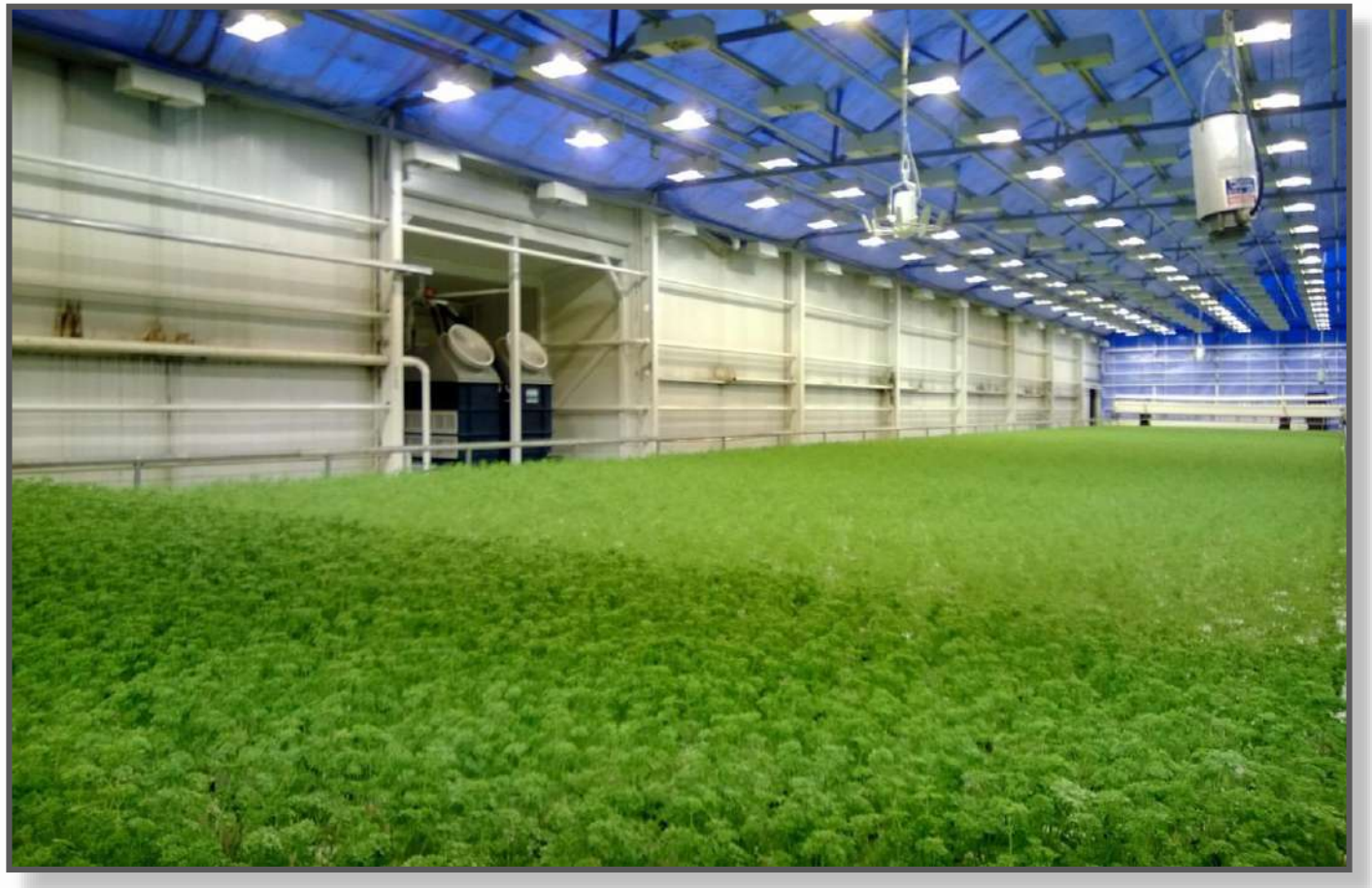
Finland
Pousi
2011



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Germany
VELMANS
2017

Let's talk Medical Cannabis

Agam provides the most comprehensive microclimate solution for the industry

Reputation is with entire growing life cycle

- ✓ *Seeding*
- ✓ *Sprouting*
- ✓ *Young plants*
- ✓ *Pre vegetation*
- ✓ *Mother-Stocking*
- ✓ *Flowering*
- ✓ Drying

*Completed projects, **VLHC** as of 12-2018*

- ✓ Southern Region, Israel
- ✓ Surrey, BC, Canada
- ✓ Chico, CA
- ✓ Santa Cruz, CA
- ✓ Los Gatos, CA
- ✓ Pueblo, CO
- ✓ *Miller, OR*
- ✓ *Sandy, OR*
- ✓ *Arlington, WA*
- ✓ *Port Townsend, WA*
- ✓ *Rochester, WA*
- ✓ *Tweed, Canada*

Cannabis farm USA

Cannabis Farm USA

*Completed projects, **HAC** as 12-2018*

- ✓ Aloha Green-Hawaii
- ✓ Black Truck- Colorado
- ✓ Better- Israel
- ✓ Medisun- Ontario Canada

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Cannabis farm Hawaii, USA

Cannabis farm Hawaii, USA

Planned/under construction projects, as 3-2019

- ✓ Up Cannabis 16 machine
- ✓ Canada's Island Garden 16 machines
- ✓ Alefia 17 machines
- ✓ Sababa Israel 10 machines
- ✓ Projects in Greece, Portugal, Denmark, Uganda, Lesuto

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Israel, cannabis farm construction. Due for planting Summer 2019

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That's all for today
Thank you!