THE BACKGROUND OF “AGAM.”

The Birth of the company, Who is Chaim?
Agam Greenhouse Energy Systems Ltd. VLHC (Ventilated Latent Heat Converter)
The company

- Agam Greenhouse Energy Systems Ltd was founded as a spin-off of Agam Energy Systems in September 2009
- Tene Investment fund invested in September 2009 and April 2010
- Ariel Karaso invested in April 2010
Ventilate Latent Heat Converter (VLHC)

THE MAIN ADVANTAGES

Suitable for cold and mild climate conditions

• Reduce significantly humidity hazards

  Diseases

  Reduce spores population

  Reduce chemical use

• Reduce Energy Expenses
LONG LIST OF CROP’S HEALTH PROBLEMS BECAUSE OF THE OVER HUMIDITY:

BUTRUTIS, ERVINIA. MORE

COST OF THE CHEMICALS MIGHT BE 600 Euro - 700 per 1000 SQM per a year.

The price is for QUALITY yield.
Botrytis Aspects

- Increase quality and production
- Less use of chemicals.
- meet market need- (Seedling Nurseries In Israel)
- Higher Quality.
- Higher Yield.
THE BUTYTIS DAMAGE.

Tomato
FLOWERS
THE BUTRYTIS DAMAGE LOOK

The Cost of Chemical - The Quality - For Organic Vegetable.
Energy Saving

- Eliminate ventilation at low light (in the morning) conditions for humidity removal
- Saving on heating costs and investment
- **It keep 1000m² greenhouse 18 C above ambient and reduces energy consumption by- up to 60%**
- In moderate climate the VLHC replaces the conventional heating systems
THE WAY THE TECHNOLOGY WORKS
The More Simple Explanation
HIGH QUALITY COMPONENTS.

The Heat Exchanger.
Components

Emphasizing on Quality and long life.
The Metritz Quality.

Working whole season with the Brine.
TERMS AND NUMBERS ABOUT ENERGY INSIDE THE GREENHOUSE.
THE IMPORTANCE OF THERMAL SCREEN USED.
Energy: K- Values

- The relevant units for heat conductivity are the heat conductivity - W/°C/m² (k values)
- The most common values are:
  - Modern glass house (without plants) = 5 (W/°C/m² )
  - Plant elevate the k value of close glass house to 11 W/°C/m²
  - VLHC reduces heat conductivity of close glass house to k=5.5 W/°C/m²
  - Thermal screen with plants reduces heat conductivity to k= 5.5 W/°C/m²
  - The k value for glass house + plants + thermal screen +VLHC=2 W/°C/m²
Interaction screen & VLHC (van Leer Tests)

Close screen save 56% energy (fuel consumption reduces to 44%) RH increase to 93%

1.5 cm - screen opening reduces RH to 85% and fuel consumption is elevated from 44% to 74%.

Thus screen opening reduces humidity and elevate fuel consumption by
74/44=1.68 which is 68%.

Application of VLHC reduces RH to 75%-85% with a close screen. Energy saving is 75% as compare with glass house with screen opening and 60% as compared with glass house with close screen and high humidity.
VLHC energy consumption

1000m² Greenhouse temp - (ΔT =18 ) R H = 85%

• Required - 25-45 kW (with-without the extra heating to heat (by hot water)

+2.5 kW of electricity to power VLHC

• Total of 27-47 kW.

• Condensation of 10-20 L/hour for RH at 75%-90%

• Total saving effect of 70 kW.
THE BEGINNING OF THE MARKETING IN EUROPE-COUNTRIES:
The energy advantages by using
the VLHC- Italy
Flowers pots greenhouse in north Italy April 2005

Comparison between the VLHC and hot water pipes heating in a glass greenhouse:

Heat Conductivity with water pipes = 5.6 W/ m² * °C.

Heat Conductivity with VLHC = 2 W/ m² * °C.

* Saving of 64%! 

- Comparison between the VLHC and hot water pipes heating in a glass greenhouse:

  - Heat Conductivity with water pipes = 5.6 W/ m² * °C.

  - Heat Conductivity with VLHC = 2 W/ m² * °C.

  * Saving of 64%! 

Agam
Comparison between 2 flower greenhouses in north Italy

Both are glass greenhouse with same thermal screen.

VLHC $k = 2.14 \text{ W/m}^2 \cdot ^\circ\text{C}$

Hot water with screen opening for humidity control $k = 9.17 \text{ W/m}^2 \cdot ^\circ\text{C}$.

Saving of 75%!

In a greenhouse with a good thermal screen, one VLHC system keep 2,000 m$^2$ greenhouse, 10 ºC higher than the ambient.
VLHC in Sweden
Nursery Greenhouse in the center of Israel

First unit sold on winter 2008-2009.

Two other units sold for winter 2009-2010.
Eight VLHC systems in 11,000 m² plant greenhouse- one polyethylene layer, no thermal screen.
* Compare with the same greenhouse heated by hot air (sleeves.)
* RH in VLHC greenhouse= 88%.
* RH in hot air heated greenhouse= 98.4% (fog most of the night).
* Energy saving 50%
  • The temperature in the greenhouse is
  • 6 °C above ambient
  • energy consumption  k=5.6 W/m²/ 0°C
Medical Grass -Israel
Danziger – The leader Cutting Farm - Israel

What They would like to achieve?
VLHC in Romania
System in Poland
Systems in Holland
PROVES & EVIDENCE
Data
VLHC heated at a rate of 40 kW elevate 2000 square meter glass house with screen 10C above ambient. $K = 2 \text{ W/m}^2/\text{0C}$

Outside / Inside GH

Temperature Samplings with VLHC without central heating system working

22 / 23 April 2005
Inside GH Relative Humidity Samplings
22 / 23 April 2005
Experimental test made in R&D Center in winter 2008-2009 comparing Agam’s with hot-water pipe heating

The experiment was made in two equal pepper plants greenhouses. The two greenhouses used thermal screens. The tested greenhouse used Agam VLHC dehumidifying system. The reference greenhouse used hot-water pipes along the plants. Both systems use gas heater. The Calorimeter measurements were made in the nights when both greenhouses were in the same conditions. The energy consumption results are given in \( \text{W/m}^2/\text{°C} \).
Energy consumption and saving between the two greenhouses

Energy Consumption in Agam Greenhouse and Hot Water Greenhouse

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Agam System- Energy saving by % compare with Hot-Water Heating

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Compare Relative humidity between the two greenhouses

Max. night %RH on January to March 2009

Average night %RH on January to March 2009
Summary

The VLHC is effective new technology to reduces humidity and heating the greenhouses in cold and mild climate.

- It function in a sealed greenhouses and may enhance dehumidification with fresh air inflow.
- one system is suitable to prevent excessive humidity in 1,000 m² of tomatoes greenhouses, 1500 m² of flowers greenhouses.
- The heat conductivity with the VLHC in a greenhouse with a screen or with inflated PE roof 2 W/ m² °C and 5.5 W/ m² °C, with one layer roof.
- When operate as the only heating element in close greenhouse with thermal screen, it keep temperature 18 °C above ambient and energy saving of 60%-80%.
- The energy saving for simple seal greenhouse 1 layer roof is 50%.
- There is no need to spray against botrytis and there is a reduction of spraying against other diseases.

- ROI in most cold countries 2-3 years!
BARRIERS FOR MARKETING THE TECHNOLOGY -2011

- New “old” idea - latent heat.
- AGAM - the only one by the integrative system - Patent written.
- The needs of additional heating.
- Why only 1000-1500 SQM - per one machine? When are we able to use less units?
WHO MIGHT BE THE CANDIDATE FOR DISTRIBUTORSHIP?

- Greenhouse Manufacturer.
- Heating Installation Company.
- Thermal Screen Installation.
- Projects for Greenhouse - when the heating is part of the budget. (Needs Territory Proves)

- AGAM attitude for developing distributorship.
THANKS!