PASSIVE REFRIGERATION SOLUTIONS

AOK® 产业

JOINT VENTURE

PRESENTS

PASSIVE REFRIGERATION

FOR UNINTERRUPTED MULTIMODAL FRESH LOGISTICS

FROM IN-FIELD POSTHARVEST TO MARKETS

NAPLES SHIPPING WEEK
JUNE 29, 2016

Passive Refrigeration

EXISTING PROBLEMS IN FRESH PRODUCT LOGISTICS

- Continuously dependent on energy supply
- Insufficient quality of preservation on long distance transports of highly perishable products
- Complicated infrastructures with large investments
- High energy consumption
- High CO_2 production

Passive Refrigeration

The environment and user friendly cost effective multimodal uninterrupted fresh chain from in-field postharvest pull down to markets is based on the physical principle of thermal accumulation provided by the heat of fusion of eutectics previously frozen by circulating cold refrigeration fluid when power from mains and/or solar has competitive prices and/or is available.

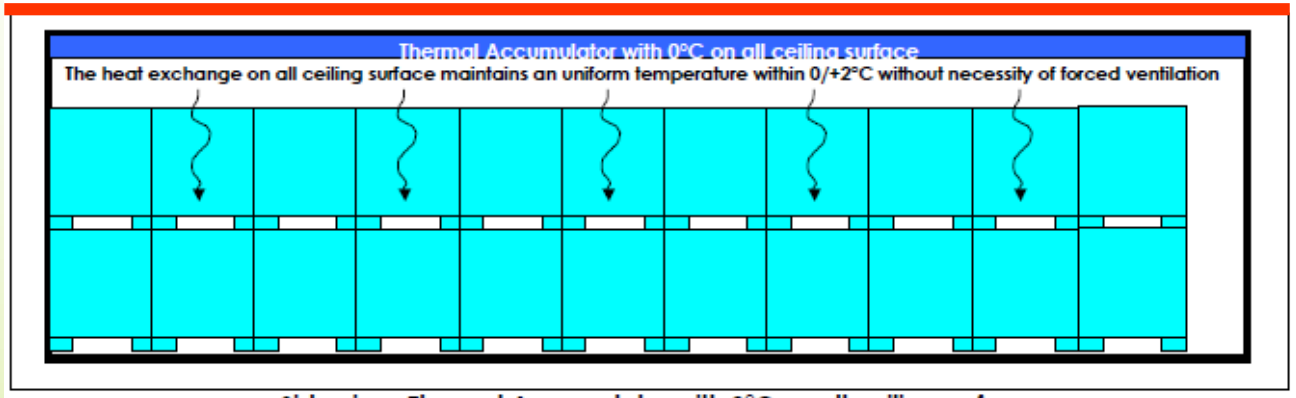
The “Thermal Autonomy” covers up to 30 days without further use of energy

competitive advantages

- Quality of preservation
- Un-plugged operation
- Door-to-door transport cost reduction
- Reduction of investments
- Energy saving

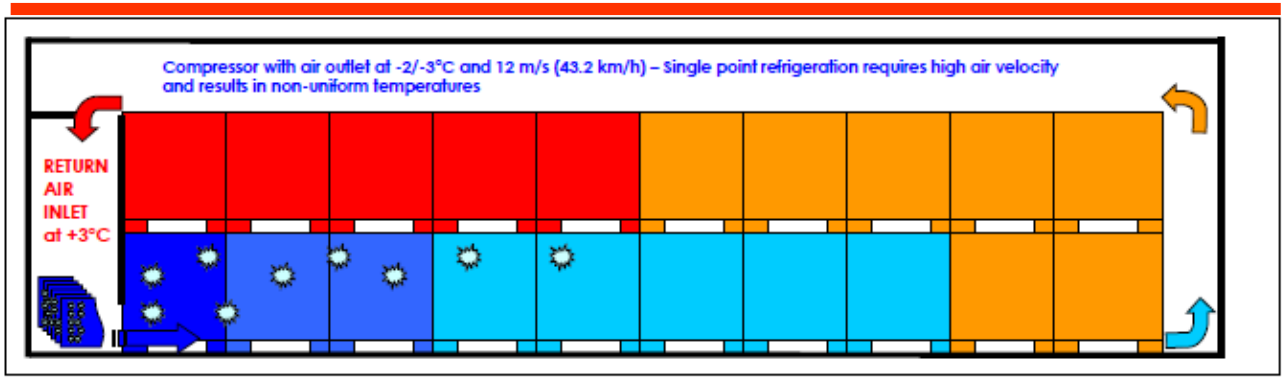
competitive advantages

TEMPERATURE DISTRIBUTION INSIDE A PASSIVE REFRIGERATION CONTAINER



Side view: Thermal Accumulator with 0°C on all ceiling surface

TEMPERATURE DISTRIBUTION INSIDE A CONVENTIONAL CONTAINER



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marine containers

Thermal Charge of several containers in parallel

Charging on board: in any position without plug-in

Maintenance and operation costs: similar to dry

Upstream: from in-field postharvest pull down to intermodal transportation as dry units

Downstream: use for preservation and intermodal transportation as dry units

Type	Ext. length	Ext. width	Max int. height	Euro pallet (1200*800)
20' HC	20'	8'	2400 mm	10
40' HC	40'	8'	2400 mm	23

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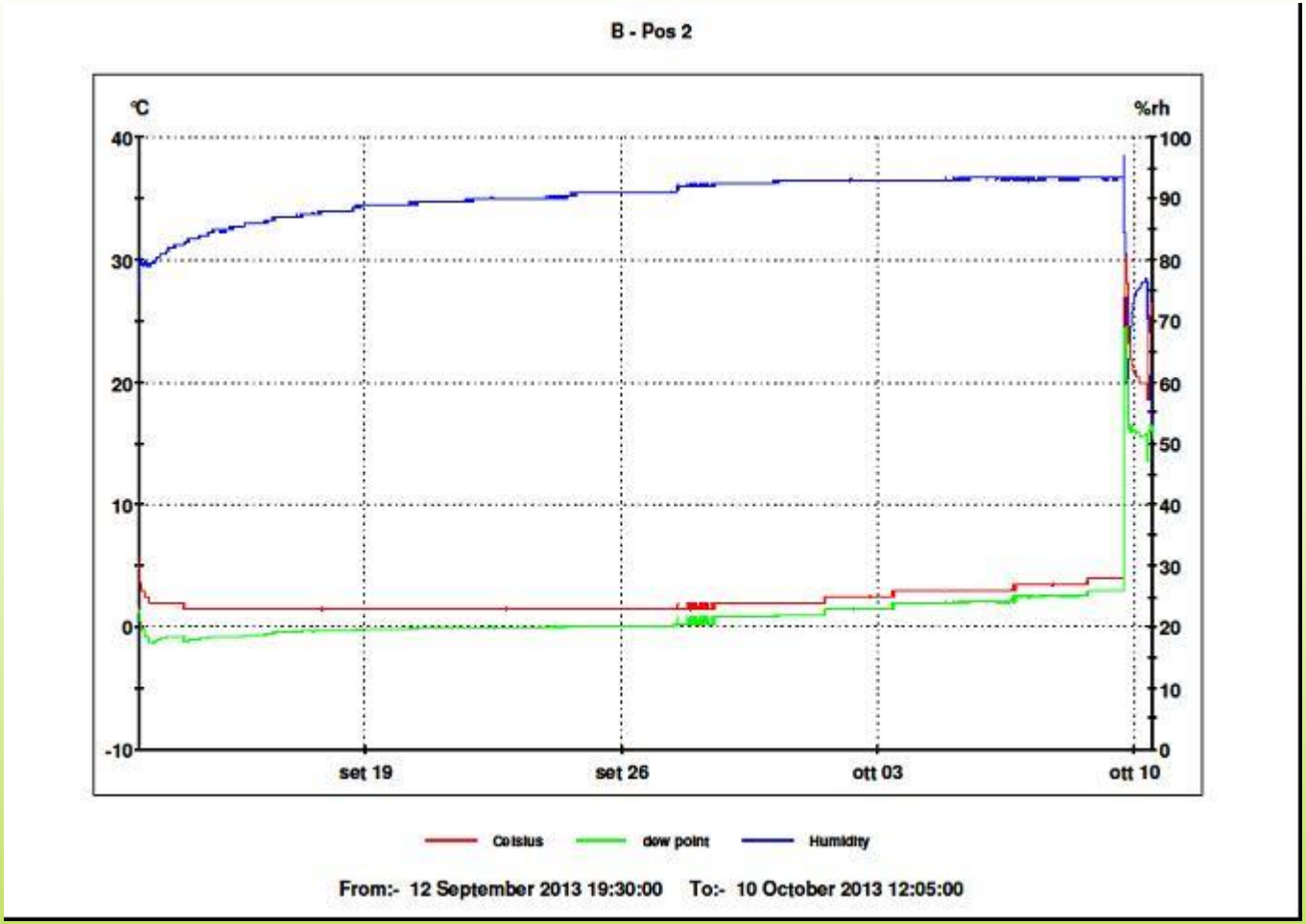
20’ PRS marine container Thermal Autonomy test



Temperature and relative humidity recording made by CIHEAM data logger during 28 day Thermal Autonomy test

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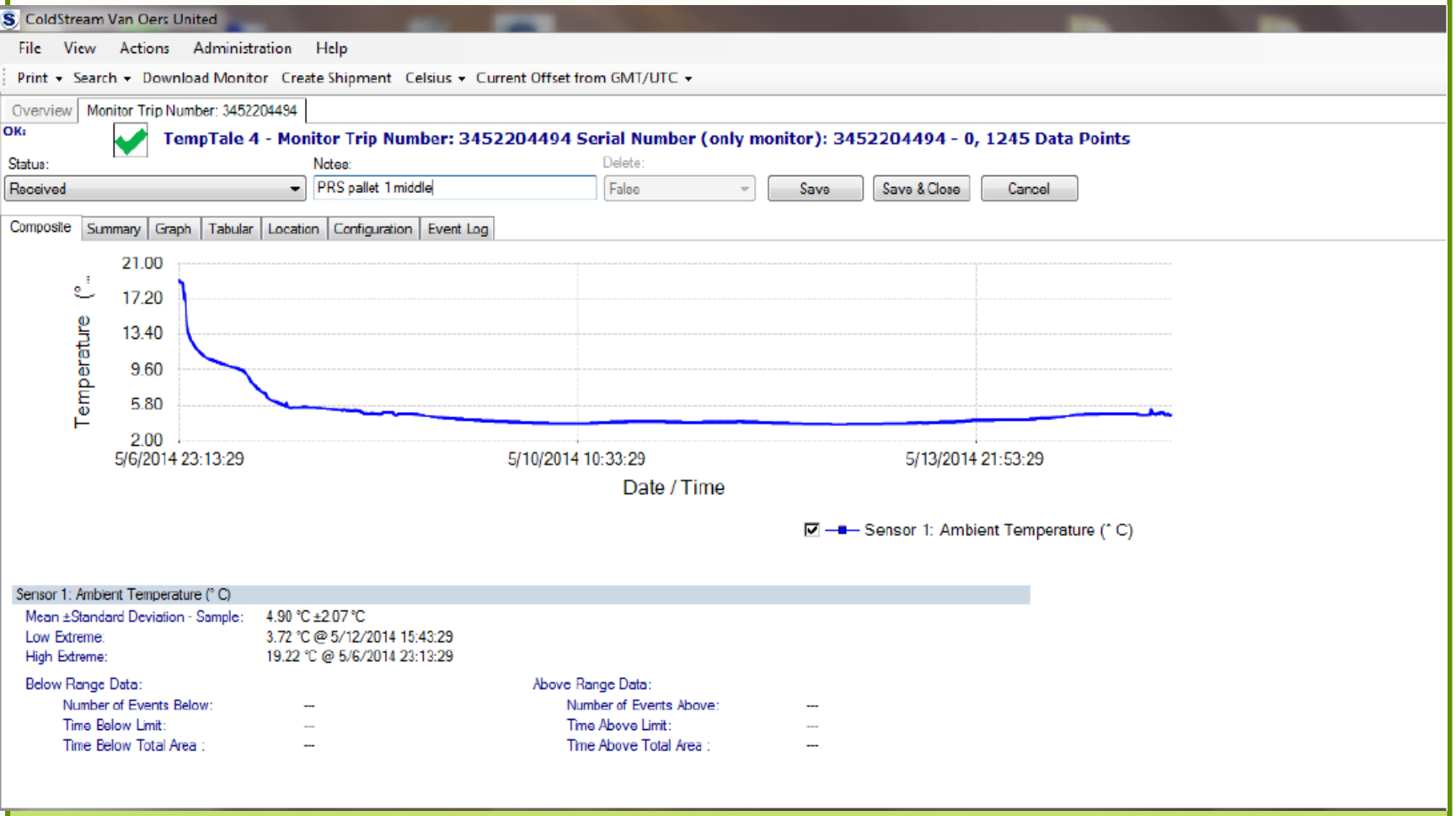
Competitive advantages: possibility of shipping non-pre-refrigerated products



Temperature recording relevant to a mix of non pre-refrigerated horticultural products shipped from Agadir at 19°C and arrived after 10 days in Rotterdam at 5°C without thermal charge during the transport

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Competitive advantages: quality of preservation

Ripe organic peaches after 44 days

Reefer

PRS™

Tests carried out by Slow Food Presidium “La Carcassola” on July 2008

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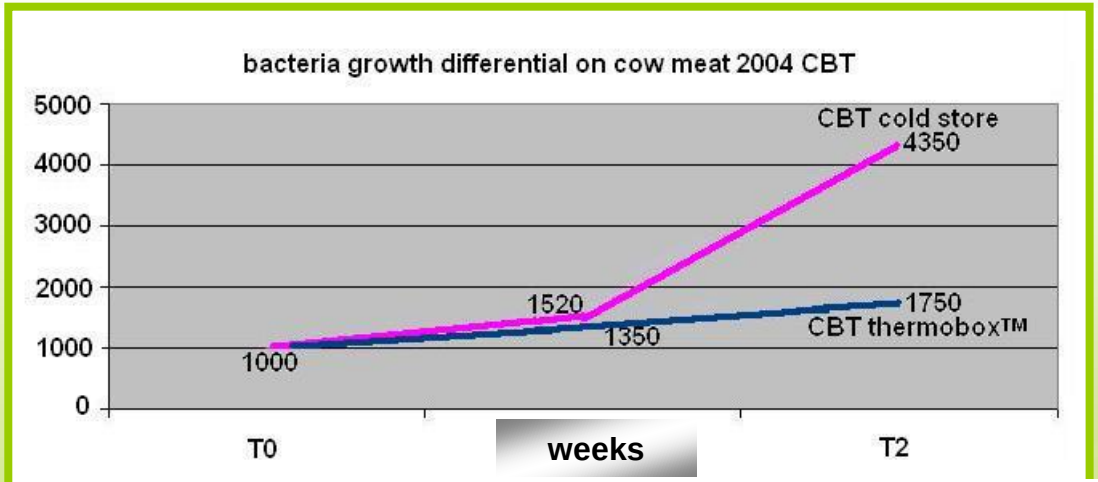
Preservation comparison: 20 day radish in PRS and conventional cold store

Radish after 20 days

Cow meat preservation: bacteria growth



15 day bacteria growth test:

Blue line: sample A

Red line: sample B.

15 day surface deterioration test

Sample A: preserved in PRS™

Sample B preserved in high quality cold store.

Comparison between the bacteria g
the convention

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Flower preservation without water

Preservation test - Red C rose without water

21 day test without postharvest cooling and without water after 2 days in vase

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Comparative energy consumption test

Energy consumption and CO2 emission comparative test
20' PRS container vs. a 20' conventional reefer container
National Test Center
Beijing - January 2016

Date:	**January 2016**
Ambient conditions:	**+ 30°C constant (in accordance with ATP)**
Internal temperature:	**+2/+4 °C**
Overall test duration:	**25 days**
Total energy consumed by conventional reefer:	**4.426 kWh**
Total energy consumed by PRS container:	**799,8 kWh**
Hourly energy consumption of conventional reefer:	**7,4**
Hourly energy consumption of PRS container:	**1,3**
PRS Energy Saving:	**3.626,3 kWh**
Percentage of energy saving:	**81.93 %**
CO_2 production by reefer:	**2.350 kg**
CO_2 production by PRS:	**425 kg**

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Field to Fork to Field Multimodal Project

Field to Fork
Multimodal Italy-Egypt-Germany –Italy-Egypt Logistic Project

The scope of the Project is to demonstrate that PRS makes feasible the operation of an optimized fresh chain with the following features:

1. Ship the PRS containers as dry-unplugged containers from warehouse to the field.
2. Perform the in-field postharvest product packing, stuffing into the container, make the pull down and ship directly to final destination(for the products where this is possible as grape) as dry units
3. Avoid going through the packing house, un-stuffing, blast cooling, repacking with SO2, re-stuffing, shipping to port with genset fitted container, plug-in at the port, charging on board and plug the containers.
4. Ship directly to final destination from port of discharge without transfer to reefer trucks or trucks with genset .
5. In addition to the direct operational cost savings, PRS allows to:
    1. Provide to Clients a complete service enabling the operation in remote areas with limited/no infrastructures and therefore less investments.
    2. Gain a significant portion of road traffic which today is justified by shorter transit time and relevant reduced deterioration.

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Contacts

Thanks for your attention

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