PACK

E-newsletter #6, September 2021

The MultiPACK Project ends in September 2021!

Transcritical CO_2 refrigeration systems integrated with air-conditioning, space heating and domestic hot water production were built in supermarkets and hotels in Italy and Portugal. The systems have been operating successfully! The field data collected from the sites were presented in conferences and in different events.

For reading the publications and listening recorded presentations, click:

https://www.ntnu.edu/multipack/virtual-tour-to-demo-sites

For the raw data that collected from the sites, click:

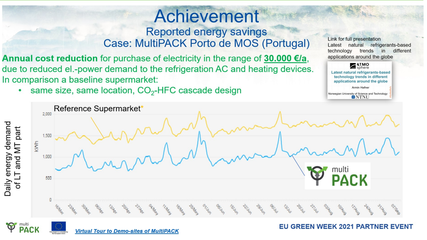
https://dataverse.no/

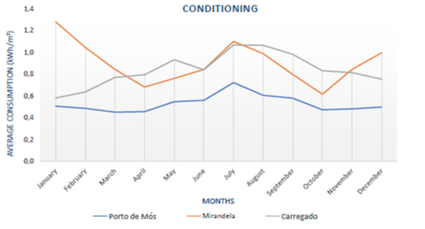
For downloading educational materials such as e-books, e-newsletters, click:

https://www.ntnu.edu/multipack/downloads

A picture from one of the MultiPACK sites: The installation and layout for Continente Modelo unit in Porto de Mos, Portugal.

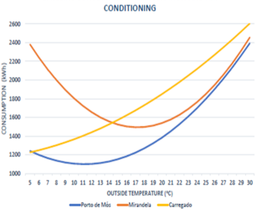
The MultiPACK sites have shown favorable performances in electricity consumption compared to reference sites. As an example, Continente Modelo unit in Porto de Mos Portugal has less energy demand in comparison with reference shops with the same size. An annual cost reduction of 30,000 €/a has been achieved!





Analysis Period: March 2020 to March 2021

- The multipack solution is more interesting for lower temperatures;
- In the case of the Mirandela store, due to the wide thermal range of the region, the multipack solution would be much more interesting;
- For temperatures above 25°C, the multipack has lower consumption but with a smaller difference in relation to the other solutions.



Ammonia and CO2 Refrigeration Technologies Ohrid, R. Macedonia, September 16-17th 2021

The MulltiPACK team participated in this conference!

Ammonia and CO2 Refrigeration Ohrid, R. Macedonia, September 16-17th 2021

An article was presented:

Two years of data monitoring of all-CO2 retail stores within the MultiPACK project

Authors:

Paolo Artuso

Silvia Minetto

Antonio Rossetti

Giacomo Tosato

Sergio Marinetti

EUROVENT
EUROPEAN INDUSTRY ASSOCIATION

Association for Indoor Climate, Process Cooling, and Food Cold Chain Technologies

19th EUROPEAN CONFERENCE

Event date:
Thursday, 10 June 2021 - 9:00am to Friday, 11 June 2021 - 5:00pm

Venue:
Online AND Politecnico of Milan, Milan, Italy

https://industriaeformazione.it/wp-content/uploads/2021/02/Registration_Form21.pdf?utm_campaign=eng_invito_convegno_eu_feb2021&utm_source=emailchef&utm_medium=email&utm_term=campaign

EUROVENT
EUROPEAN INDUSTRY ASSOCIATION
19th EUROPEAN CONFERENCE
Online, June 10-11th 2021

The MultiPACK team presented an article:

Field data of integrated CO2 heat pump systems for Italian hotels in the MultiPACK project

Authors:

Paolo Artuso

Giacomo Tosato

Armin Hafner

Antonio Rosetti

Silvia Minetto

EU Green Week 2021

Virtual tour to Demo-sites of MultiPACK

Virtual tour to demo-sites of MultiPACK: Explaining CO2 technology for integrated heating, ventilation, airconditioning and refrigeration (HVAC&R) installed in high energy-demanding buildings in Southern Europe. As being a green and energy-efficient technology, the applicability and benefits of CO2 refrigeration and heat pumping systems will be addressed along with their contribution to mitigating climate change by eliminating F-gases to be released into the atmosphere.

The event was held on 09.06.2021.

Life-C4R digital conference

Life-C4R is the international marketing project **co-financed by the EU and part of the European LIFE Programme** created to promote natural refrigeration and help **replacing HCFC and HFC refrigerants with transcritical CO_2.**

The conference **was held on 1st July at 15.00 CET** dedicated to illustrating the results of the project! Extensive information was presented regarding FTE and ETE technologies, as well as data and lessons learnt from the 7 pilot projects installed in Italy, Spain and Romania, with feedbacks from our Clients.

AIRAH Refrigeration Conference 2021
Melbourne, Australia, May 17-18th 2021

AIRAH Refrigeration Conference 2021

MultiPACK team contributed with an article:

"State-of-the-art CO" refrigeration systems with integrated HVAC functions"

Authors: *Sergiy Kolinchuk, Ekaterini Kriezi, Armin Hafner, Vahid Khoshidi, Christian Schemminger*

European Commission | Horizon 2020 European Union Funding for Research & Innovation

MultiPACK is funded by the European Union, under the Horizon 2020 Innovation Framework Programme, project number 723137

Compressors 2021
10th International Conference on Compressors and Coolants

13 January 2021

Bratislava, Slovakia

MultiPACK team contributed with two articles!

Paper 1: presented by Vahid Khorshidi, MSc. (Danfoss A/S)

Performance of integrated R744-packs Part 1 - Compressor mass flow estimation based on data driven models using analytical methods and actual field measurement

Paper 2: presented by Ekaterini Kriezi, PhD (Danfoss A/S)

Performance of integrated R744-packs Part2 - Ejectors performance, a comparison of onsite measurements and model predictions

Authors:

Vahid Khorshidi, MSc.	**Danfoss A/S**
Ekaterini Kriezi, PhD	Danfoss A/S
Christian Schlemminger, Dr.Ing. / PhD	SINTEF Energy Research
Engin Söylemez, PhD	Norwegian University of Science and Technology NTNU
Armin Hafner, Professor	Norwegian University of Science and Technology

14th IIR-Gustav Lorentzen Conference on Natural Refrigerants(GL2020)
Kyoto, Japon, December 7-9th 2020

MultiPACK team contributed with three articles!

Experimental and numerical investigation of a transcritical CO_2 air/water reversible heat pump: analysis of domestic hot water

Author(s) : TOSATO G., ARTUSO P., MINETTO S., ROSSETTI A., ALLOUCHE Y., BANASIAK K.

Development of CO_2 refrigeration technology between 1995 and 2020

Author(s) : HAFNER A.

Field data of CO_2 integrated refrigeration, heating and cooling systems for supermarkets

Author(s) : TOSATO G., MINETTO S., ROSSETTI A., HAFNER A., SCHLEMMINGER C., GIROTTO S.

shecco
Global Natural Refrigerant Virtual Trade show
The world's first Virtual Trade Show for natural refrigerants

on September 1, 2020

MultiPACK team participated with three presentations!

(Three presentations have been prepared as video format and merged in as a single video. you can reach the presentations via 'on-demand webinars' section of Virtual Trade Show)

MultiPACK: Demonstrating the performance and efficiency of the next generation of standardised integrated cooling and heating packages.

Part-A_Dissemination of results for integrated CO2 systems monitored under MultiPACK Project *by Ekaterini Kriezi, Danfoss.*

Part-B_Modelling of CHCP for Supermarkets *by Michael Jokiel, Christian Schlemminger, Karl Oskar Pires Bjørgen, Sintef Energy Research.*

Part-C_CO2 Heat Pump Water Chillers *by Armin Hafner and Engin Söylemez, NTNU Department of Energy and Process Engineering*

European Commission | Horizon 2020 European Union Funding for Research & Innovation

MultiPACK is funded by the European Union, under the Horizon 2020 Innovation Framework Programme, project number 723137

eurammon symposium 2020

Heating and cooling with Natural Refrigerants - a Way to Decarbonization

June 25 - July 8, 2020

The presentationby MultiPACK team *(Online, July 6, 2020)*

CO2 Heat Pump Water Chillers

Armin Hafner, NTNU; Sergio Girotto, ENEX SRL; Giacomo Tosato, CNR-ITC

Content:

Introduction: CO2 heat pump history

Benefit of CO2 chiller heat pumps

Innovative CO2 chiller development by ENEX

The CO2 Heat Pump Water Chiller within the MultiPACK project

Summary & Conclusion

ICCC 2020
NANTES – FRANCE
Cité des Congrès
April 15–17, 2020

6th IIR International Conference
on Sustainability and the Cold Chain

ICCC 2020 - 6th IIR Conference on Sustainability and the Cold Chain

Dr. Christian Schlemminger
(Research scientist, SINTEF)

Dr. Yosr Allouche
(Researcher, NTNU)

Dr. Silvia Minetto
(Researcher, CNR)

Dr. Giacomo Tosato
(Technologist, CNR)

MultiPACK team participated with two papers!

Paper 1: Integrated energy systems for supermarkets are becoming popular for the shop owners due to significant energy and cost savings. Integrated system means: the centralized refrigeration unit delivers the entire freezing, cooling and Air Conditioning demand of the Supermarket. Only the natural working fluid CO2 is applied within the units.

Paper 2: Pushed by sustainability drivers, commercial refrigeration is now strongly oriented towards CO2 based systems, and, amongst them, integrated solutions are gaining market share, as they offer an environmental friendly, all-in-one solution serving the entire supermarket thermal energy needs.

EuroShop
The World's No. 1 Retail Trade Fair
16 – 20 February 2020
Düsseldorf, Germany · www.euroshop.de

EuroShop World´s No. 1 Retail Trade Fair

When: **16-20 February 2020**

Where: Dusseldorf, Germany

Dr. Ekaterini Kriezi , Technology expert (Danfoss)

A talk was given by Dr. Ekaterini Kriezi!

Content: The demonstration sites with CO_2 integrated systems in south European supermarkets are presented. Design Key Performance Index (KPI) for comparison of supermarkets performance and the challenges of monitoring supermarket installation and data handling are discussed.

ICR 2019

THE 25th IIR INTERNATIONAL CONGRESS OF REFRIGERATION
August 24-30 | Montréal, Québec, Canada

MultiPACK team participated with two presentations!

The MultiPACK Consortium attended the ICR 2019 took place on 24-30 August 2019 in Montreal, Canada. The congress focused on the current issues associated with the refrigeration sector: energy saving and energy efficiency, food supply, health, reduction of global warming and the protection of the ozone layer. Therefore, this event was perfectly aligned with MultiPACK purposes. Dr. Silvia Minetto presented some results related to MultiPACK.

European Commission | Horizon 2020 European Union Funding for Research & Innovation

MultiPACK is funded by the European Union, under the Horizon 2020 Innovation Framework Programme, project number 723137