

Hall 4A

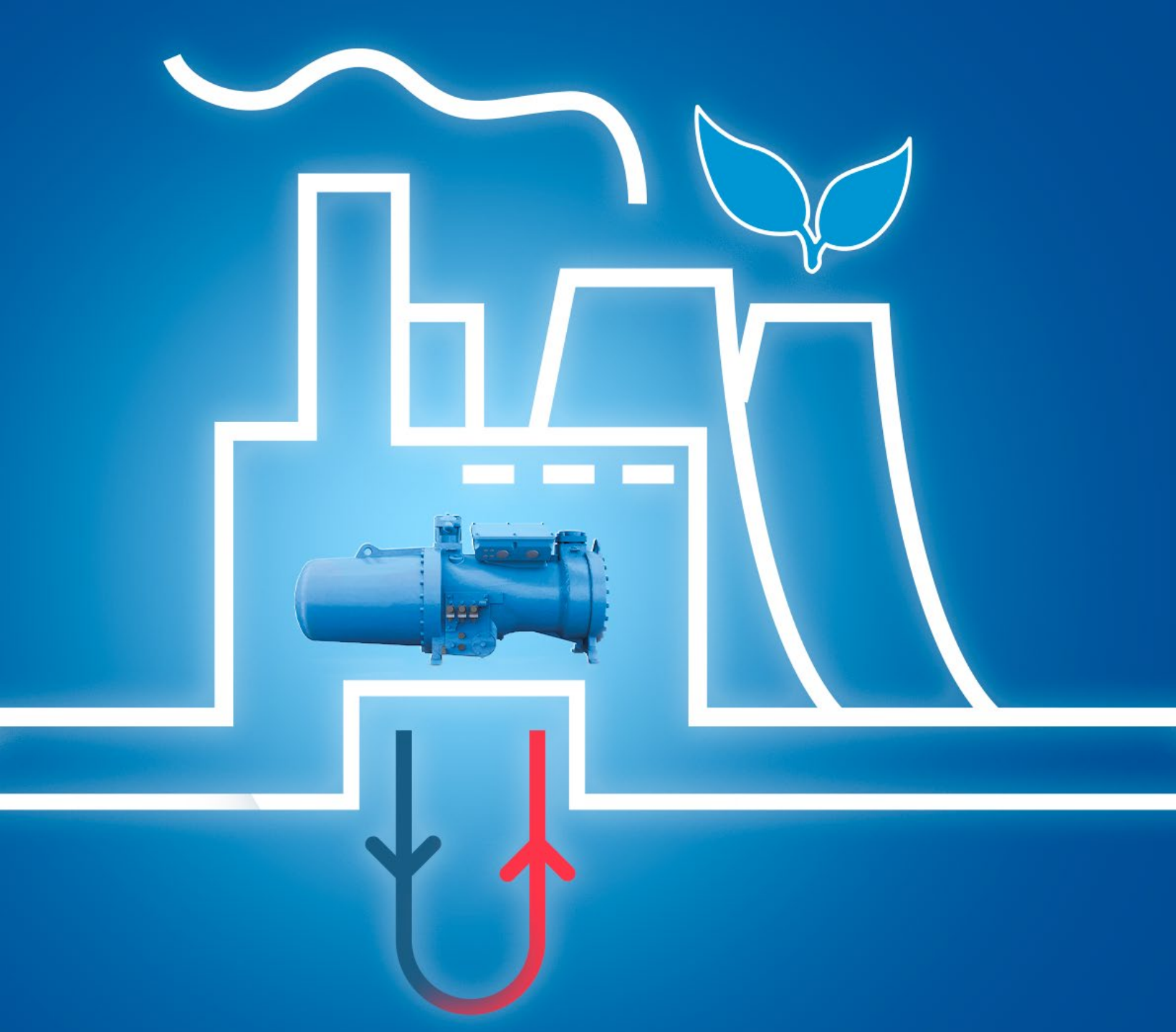
**CHILLVENTA**

# **Chillventa Specialist Forums 2022**

## **Chillventa Fachforen 2022**

**CONNECTING  
EXPERTS.**





## AIR SOURCE HEAT PUMP FOR DISTRICT HEATING WITH HC: CASE STUDY BY FRASCOLD

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# Agenda

- Frascold and Solid Energy Overview
- Heat Pump Application for District Heating
- Compact Screw Compressors for Heat Pump
- Case Study: Galten
- Case Study: Løgstrup
- Conclusions

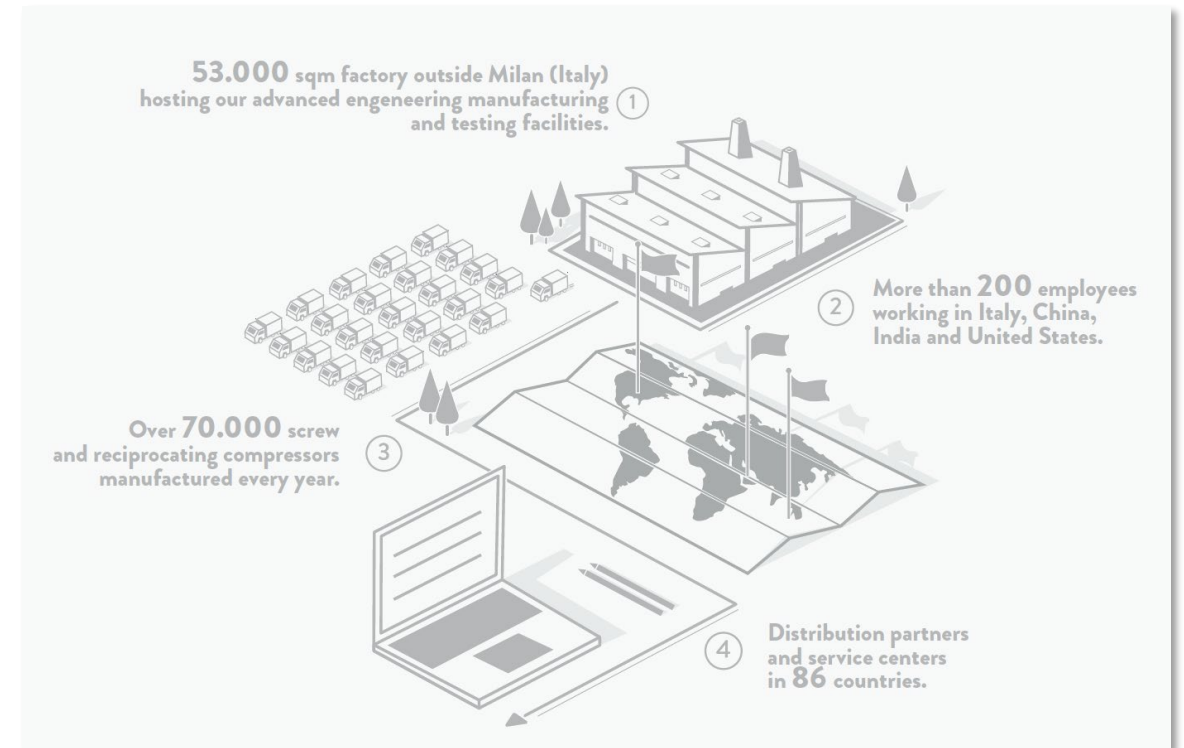
## Introduction

# FRASCOLD OVERVIEW

**Refrigeration and air conditioning company** since 1936.

**HQ and production plant** based in **Milan** with branches in **USA, India and China**.

**Frascold** enjoys **success** all over the world thanks to its proven **excellence** in the pursuit of **quality and innovation**.



1936 2022

## SOLID ENERGY OVERVIEW

# Solid Energy

Solid Energy A/S is a **cleantech-company**, which was founded in 2015, specialized in heat pump solutions for **district heating power plants, industry** and other **large heat consumers**.

Solid Group has 35 employees, and has sold 13 turn-key Projects with a total of 40 MW heat power.



# Cleantech company



Toender district heating - air / water and waste heat - 4.6 MW.

Ringkøbing district heating - air / water - 4.6 MW.

Bording district heating - air / water - 4.6 MW.

Hjortebjerg horticulture - groundwater - 0.6 MW.

Karup district heating - air / water and waste heat - 5.0 MW.

**Galten district heating - air / water - 3.4 MW.**

Solid Production - air / water - 0.3 MW.

Tommerup district heating - air / water - 2.3 MW.

Hammel district heating - air / water and flue gas cooler - 1.0 MW.

Egtved district heating - air / water - 2.0 MW.

Glyngøre district heating - air / water - 1.0 MW.

**Løgstrup district heating - air / water - 2.5 MW.**

**Galten 2 district heating - air / water - 7.7 MW.**

## HEAT PUMPS INTEGRATION

**Integrate Heat Pumps in District Heating systems can reduce the dependency to fossil fuel and their price fluctuations**

HP can balance the grid from fluctuations of intermittent energy sources

HP offer flexibility to DH systems (due fast commissioning and low start up cost)

Possibility to use low temp and waste heat sources

Possibility to integrate district Heating and Cooling

**Barrier to integration** is the reduction of COP at high temperature DH networks that are the most diffused

### CHALLENGES OF HP

Challenges to **REDUCE CARBON FOOTPRINT** and improve environmental sustainability:

**Reduce direct GHG emissions** → low GWP refrigerants → HC

**Reduce indirect GHG emissions** → improve efficiency and DH integration

**TO BE INTEGRATED** in traditional DH a HP need to have:

**High temperature water supply** → high condensing temperature

**High capacity** → high displacement screw compressors

**High efficiency** in these severe conditions



Frascold Compressors For High Temperature HP

## COMPACT SCREW COMPRESSORS FOR HP

### RANGE AND INNOVATION

**Largest range certified ATEX zone 2**

From **120 to 1085 m<sup>3</sup>/h screw AX**

CXHI possibility to **inverter drive** - range up to **30-70Hz**

Easier risk assessment of the system

### DEDICATED LUBRICANT

**PAG150** for CX compressors

**Discharge** temperature up to **120°C without oil cooling**

### "N" PROFILE SCREW

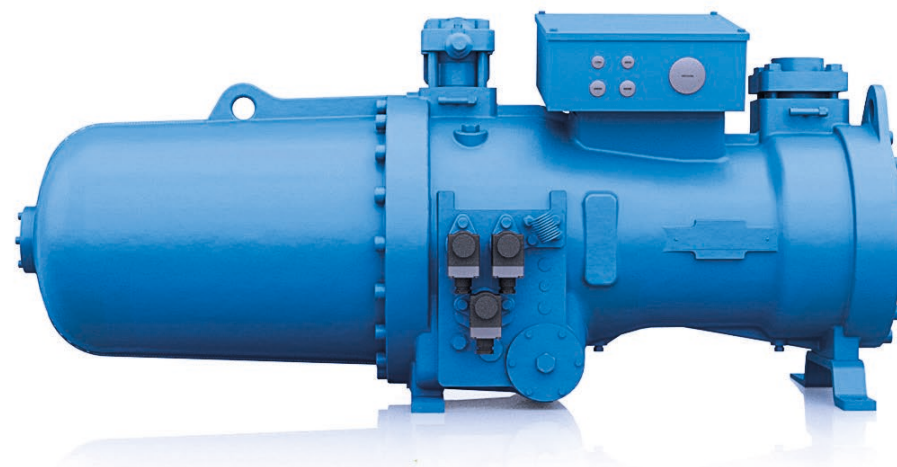
High efficiency

Low noise

Low vibration

### PROVEN RELIABILITY

with worldwide running applications



**frascold**

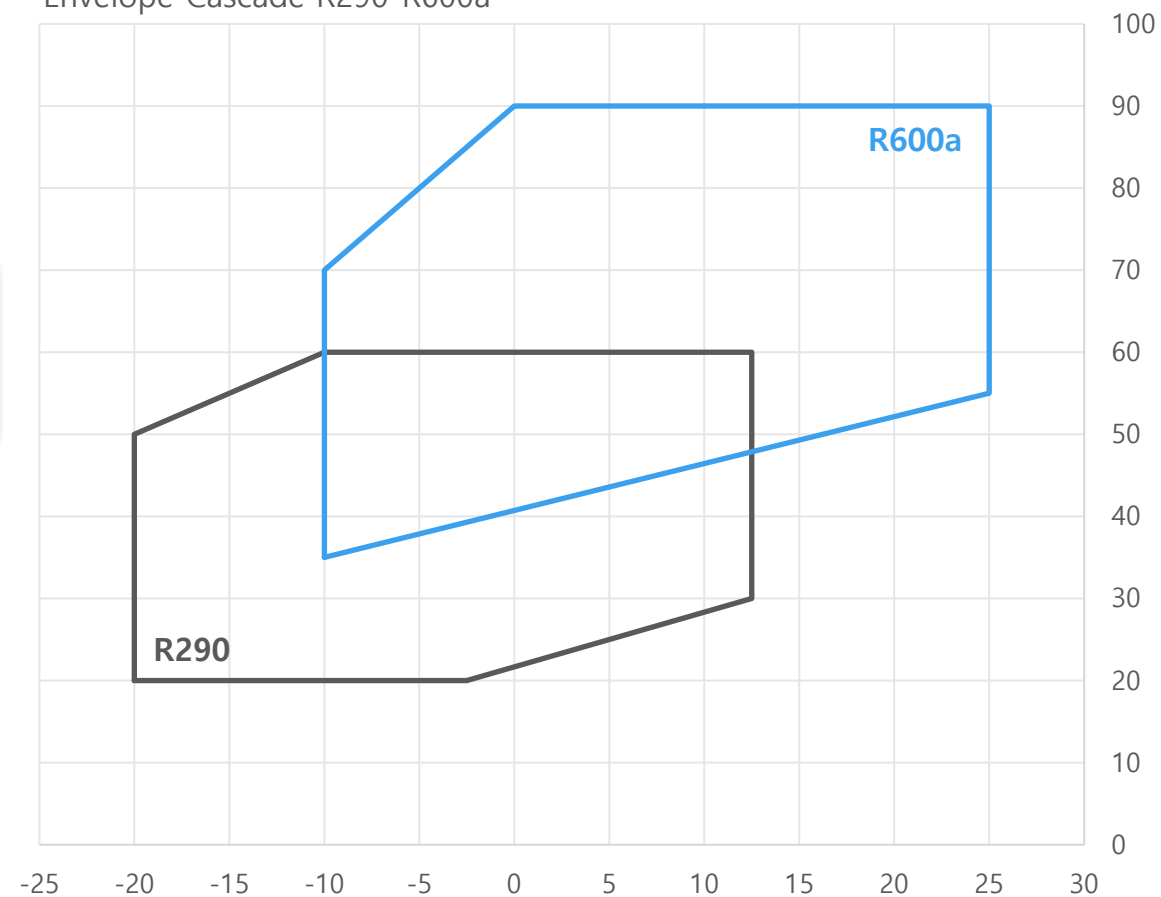
## FRASCOLD COMPRESSOR HCs APPLICATION ENVELOPE

### EXTENDED APPLICATION ENVELOPES

**R600a** up to 90°C condensing temperature → water production up to 85°C

**R290** up to -20°C → ambient air temperature up to -10/-15°C

Envelope Cascade R290-R600a



## Case Study

# GALTEN

**Galten District Heating** was built in 1964  
It supplies now **2130 households**  
**45'000 MWh** annual heat production

HPs replaced Wood Chips boilers

### Galten1

**2019** installation of Air-to-Water Heat Pump  
3,4 MW Heating capacity  
6 Frascold CXH screw compressors **CXH92-310-1000AX**

### Galten2

**2021** installation of additional Air-to-Water Heat Pump  
7,7 MW Heating capacity  
12 Frascold CXH screw compressors **CXH92-280-912AX**

Galten1 and Galten2 HP provides **98%** of DH heat request with a  
**SCOP of 3,1**



## Case Study

### GALTEN

The heat pump **absorbs energy from the outdoor air** with a total of **34 flat bed air coolers**, with a total air flow of 3'215'000 m<sup>3</sup>/h

Heat for district heating the grid is supplied with 70°C delivery and 38°C return temperature.

Design **COP** @8°C (yearly avg temp. in Denmark) = 3,4

Save **19 kt wood chips**, avoiding about **1600 trucks loads**



## Case Study

# LØGSTRUP

**Løgstrup District Heating** was built in 1964  
It supplies **743 consumers**

The heat comes from  
**20% is covered by solar heat**  
**60% is covered by Heat Pump**  
**20% is covered CHP (combined heat power system)**

**16'000 MWh** annual heat production

**2021** installation of additional Air-to-Water Heat Pump  
2,5 MW Heating capacity  
**6 Frascold CHX92-300-912 screw compressors**

PBT = **4,0 years**

**Løgstrup** provides **98%** of DH heat request with a **SCOP of 3,14**



## Case Study

# LØGSTRUP

The heat pump absorbs energy from the outdoor air with a total of **5 V-shape air coolers**, with a total **air flow of 885'500 m<sup>3</sup>/h**.

Heat for district heating is supplied with 70°C delivery temperature and 36°C in return temperature.

Design **COP** @8°C (yearly average temp. in Denmark) = 3,43



**“The right  
solution for  
all your  
needs „**

**HP for DH decarbonisation**

**HC suitable solution for HP**

**High Temp HP**

**Competency and reliable partners**



**THANK YOU!**

**Kaven Nourrice**  
HALL 6 – BOOTH 312



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