



eurammon Symposium 2017

***Water- and Air Cooled Chiller with
Propane R-290***

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Kevin Dujardin, Alpiq InTec West AG***

Schaffhausen, 22nd/23rd June, 2017

Cooperation Frigopol and Alpiq



- since 2014
- Main focus is on water and air cooled chiller solutions with natural refrigerants
- Total range between 20KW – 1,5MW
- Range with R290 from 20KW -340KW
- Special solutions on demand

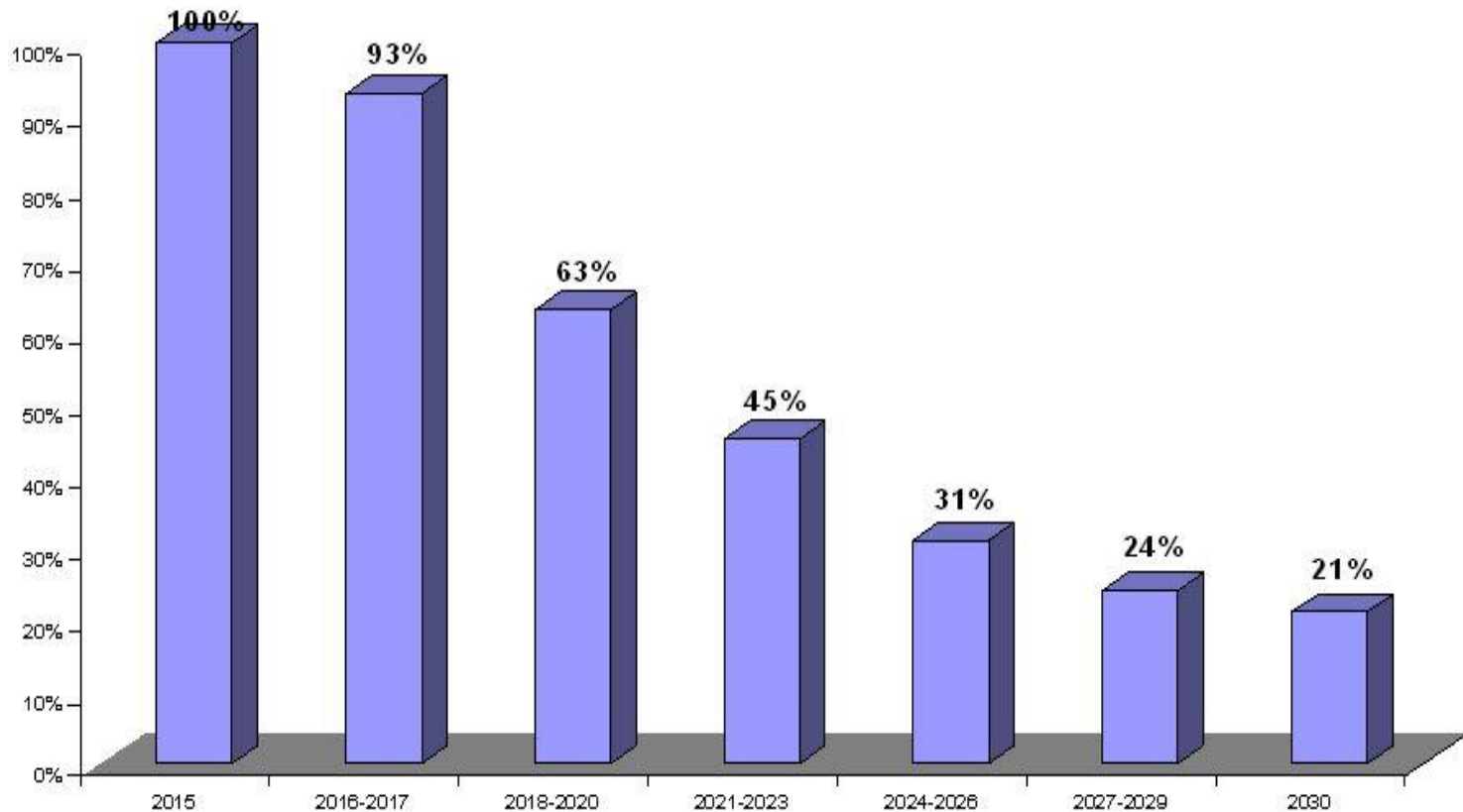
Agenda



Part 1: (presented by Johann Herunter)

1. **Reminder about „Phase Down Scenario“**
2. **Technical features with R290**
3. **Safety Concept**
4. **Water - Cooled Chillers**
5. **Air -Cooled Chillers**
6. **Applications & Examples**

I. Reminder about the „Phase -Down -Szenario“



Exit and prohibitions for refrigerants

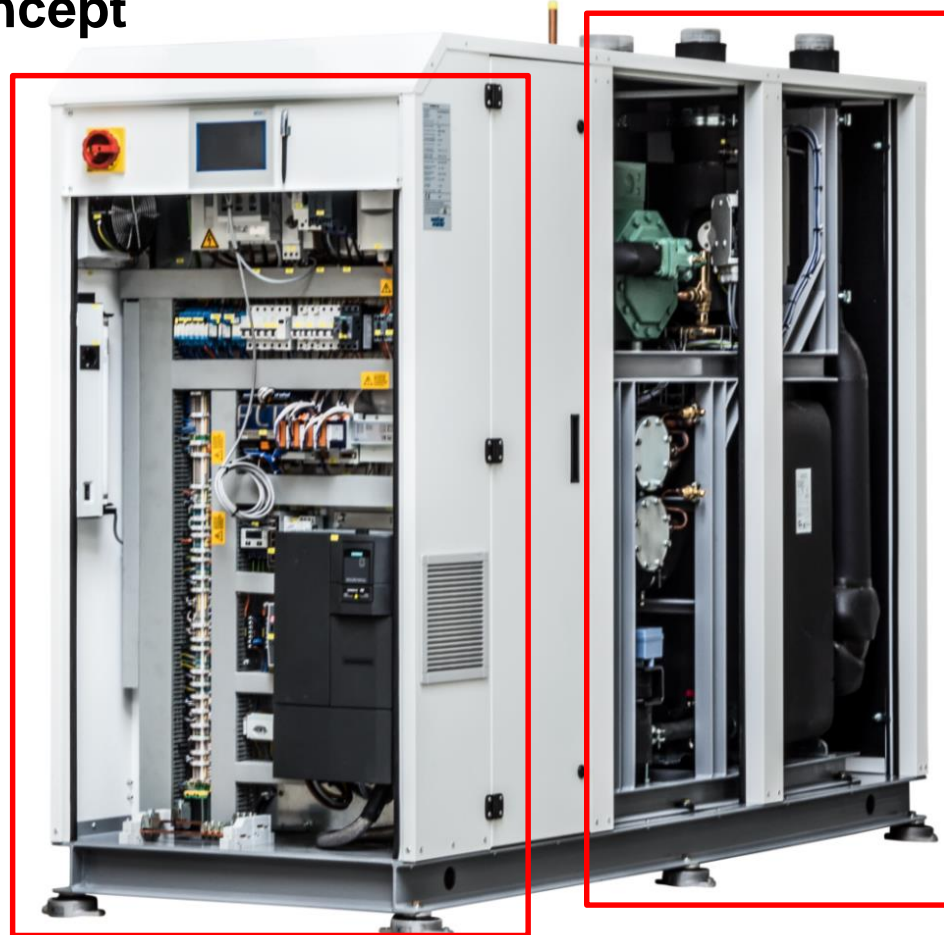
Direct prohibitions for new units

Date of prohibition	Subject	max. allowed GWP	Refrigerant
01.01.2015	Household cooler	150	R-134a, R-404a
01.01.2020	Commercial refrigerators and freezers	2500	R-404a
01.01.2022	Commercial refrigerators and freezers	150	R-134a, R-404a
01.01.2020	Local refrigeration units, example supermarket or cooling room	2500	R-404a
01.01.2020	portable air-conditioning units	150	R-407c, R-410a
01.01.2022	multi-part refrigeration units	150	R-134a, R-404a, R-410a
01.01.2025	split air conditioning units, example for house use	750	R-407c, R-410a
<p>The regulation has different definitions. Simplifications and summaries are presented here to illustrate the topic. For the exact definition please refer to the regulation.</p>			

II. Technical features and design

- 1 , 2 or 3 refrigerant circuits depending on the cooling capacity to keep the charge of R290 as low as possible
- Semi – Hermetic Reciprocation Compressors
- Brazed heat plate exchangers
- Electronic Expansion Valves
- Frequency Inverter for at least on compressor
- Safety Valves (single or multiple) and discharge line (Ex-zone)
- Electrical cabinet is separated from the refrigerant circuit (IP54)
- PLC control and Touch Panel with Visualization
- Refrigerant detection system
- Outdoor and Indoor design
- TÜV approval and safety concept included
- COP and EER measurement
- Wide range of applications , °C and KW

III. Safety Concept

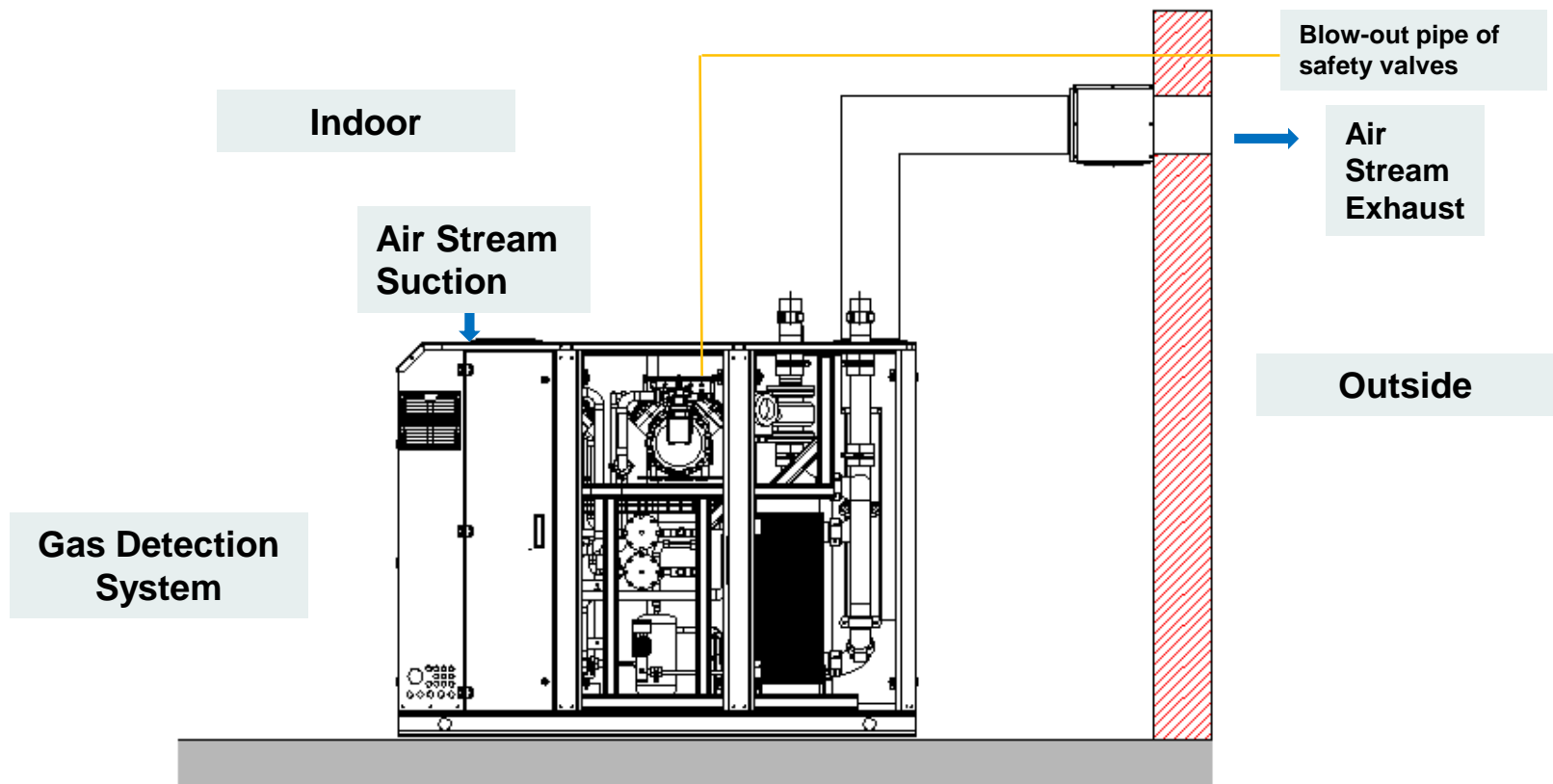


Electric cabinet

Machine room

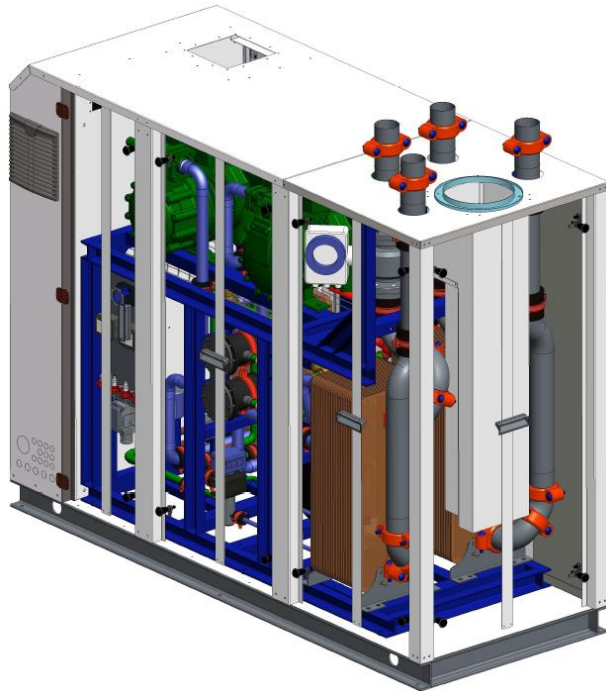
III. Safety Concept

Example indoor installation



IV. Water – Cooled Chillers „Energy Station“ for heating, cooling and sanitary water

Indoor Unit



Outdoor Unit



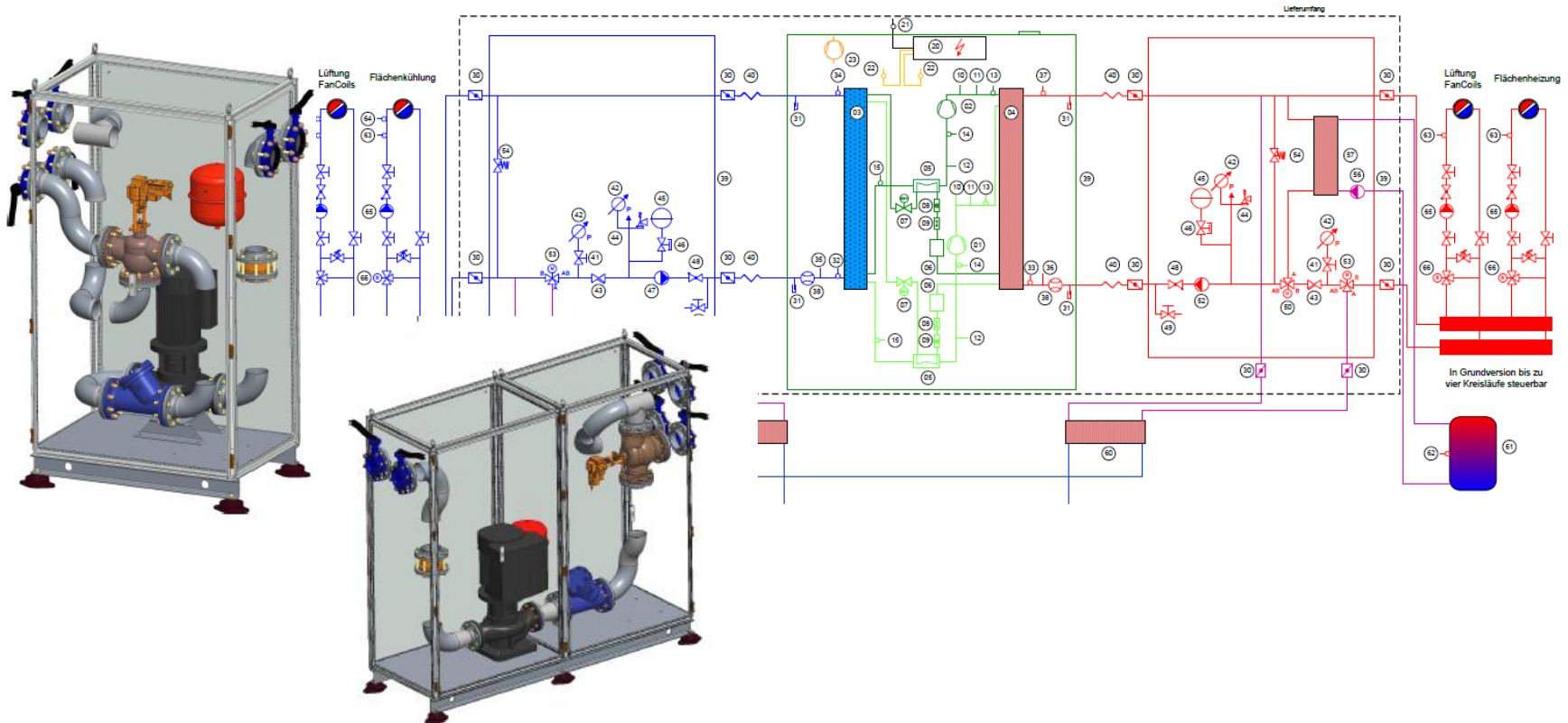
IV. Water – Cooled Chillers

„Energy Station“ for heating, cooling and sanitary water

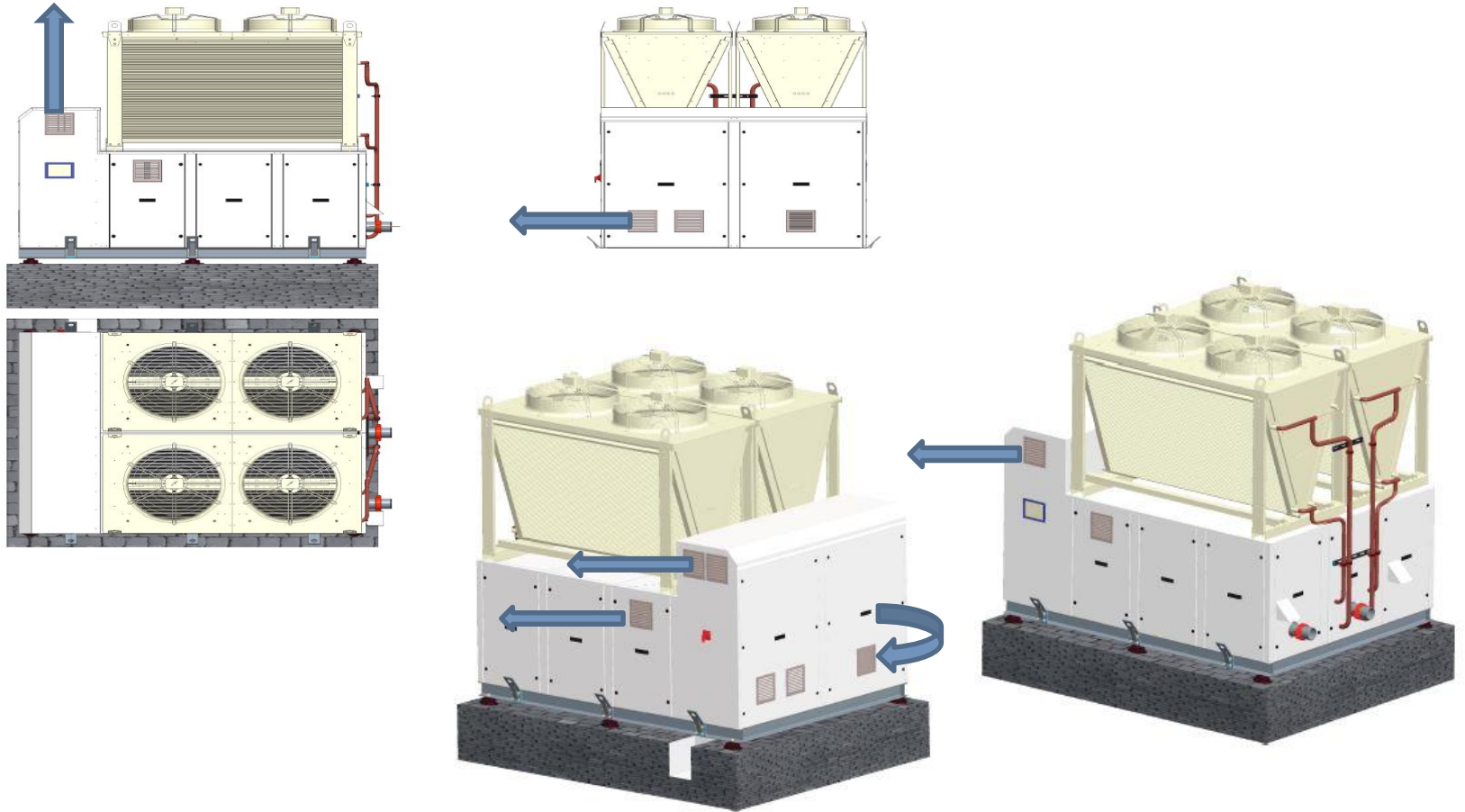


- Chiller Range from 20KW – 250KW
- Temperatures:
 - Brine or water -10°C -> $+15^{\circ}\text{C}$
 - Heat or water $+30^{\circ}\text{C}$ - $+60^{\circ}\text{C}$
- 1 or 2 refrigerant circuits
- 8 standard models
- Different concepts with primary sources like
 - Dry coolers
 - Soil
 - Groundwater
 - Geothermics
 - Concrete of buildings
- Indoor and Outdoor Unit

IV. Water – Cooled Chillers „Hydraulik Modules“



V. Air -Cooled Chillers - Design



V. Air -Cooled Chillers – Range and Technical Details

- Cooling Capacity 23kW – 340kW
- Water Inlet 6°C /12°C or –8°C/ -4°C as a standard
- Special ranges are our passion
- Assembled and prepared for on-site installation
- EC –fans and microox coils
- Safety concept and gas detection
- 2 or 3 refrigerant circuits
- Highest Energy efficiency



Qo: 130kW, tc: +45°C/to: -12°C

VI. Examples and Applications

„DAIRY – AUSTRIA“



- Aircooled Chiller, R-290, Qo: 180kW, tc: +45°C / to: -19°C

Air-cooled chiller with propane R-290

Example: Meat Factory with 2 redundant units 40kW and 180kW

Compact energy station for process water cooling 40kW / brine -10°C and Air conditioning at 180kW / brine +6°C



- Redundant execution
- Cooling Water temperature +35°C
- Refrigerant charge 1 x 5,7kg und 2 x per circle 11kg
- Power control 25-100%



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Water- und Air Cooled Chiller with Propane R-290 – Part 2

Mr. Kevin Dujardin – Alpiq InTec Schweiz AG

Schaffhausen, 22nd/23rd June, 2017

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Brief Alpiq introduction

As an Actor in cooling systems

Supermarket

- Migros
- Coop
- Aldi
- Lidl
- Prodega
- Growa
- Howeg
- ...



Commercial

- Restaurant and Hotel
- Hospital, Homes and Panel institutions
- Bakeries, Butcheries and Flowers Shop
- Convenience Shop's
- Research Institute and Laboratories
- ...



Small Commerce

- Plug and play cooling cabinet
- Plug and play cold rooms
- Ice machines
- ...



Brief Alpiq introduction

As an Actor in cooling systems

Industry

- Logistic center
- Cold and Freezer Hall
- Food and production Industry
- Chemical Industry
- Ice Rink
- ...



Air Conditioning

- Data Centers
- Offices, Houses and Retail spaces
- Production rooms
- ...



After Sales Service

- 24/7/365
- Customer Service
- Maintenance
- Remote monitoring
- ...



Brief Alpiq introduction

Our Commitment in natural refrigerant

R744 – As a reference for Supermarket technology

2003 : First CO₂ Subcritical Unit in Switzerland

2006 : First CO₂ Transcritical Cascade Unit in Switzerland

2009 : First CO₂ Transcritical Booster in Switzerland

R717 – As a reference for Industry high cooling power Technology

Active since 2009 in Ammonia Heat pump Technology

References from 300kW to 3MW

Specialty such as Valorization of Waste Water Energy

R290 – As a new Reference for the future small to mid-size Units

We have a strategy !

The fruit of our Commitment Partnership



Since 2014, we are working together with
Frigopol Kälteanlagen GmbH
as Partner in Switzerland to push our new Technology with
Natural Refrigerants.

The fruit of our Commitment

Our Propane Chiller



Alpiq InTec Schweiz AG and Frigopol GmbH has developed a new product range for mid-size Industry Propane Chiller.

Power Range from 40 to 350kW for Glycol from +6°C to -15°C.

Project reference

Meat Products – Lüthi & Portmann AG



Project reference „Lüthi & Portmann“

Lüthi & Portmann AG needs

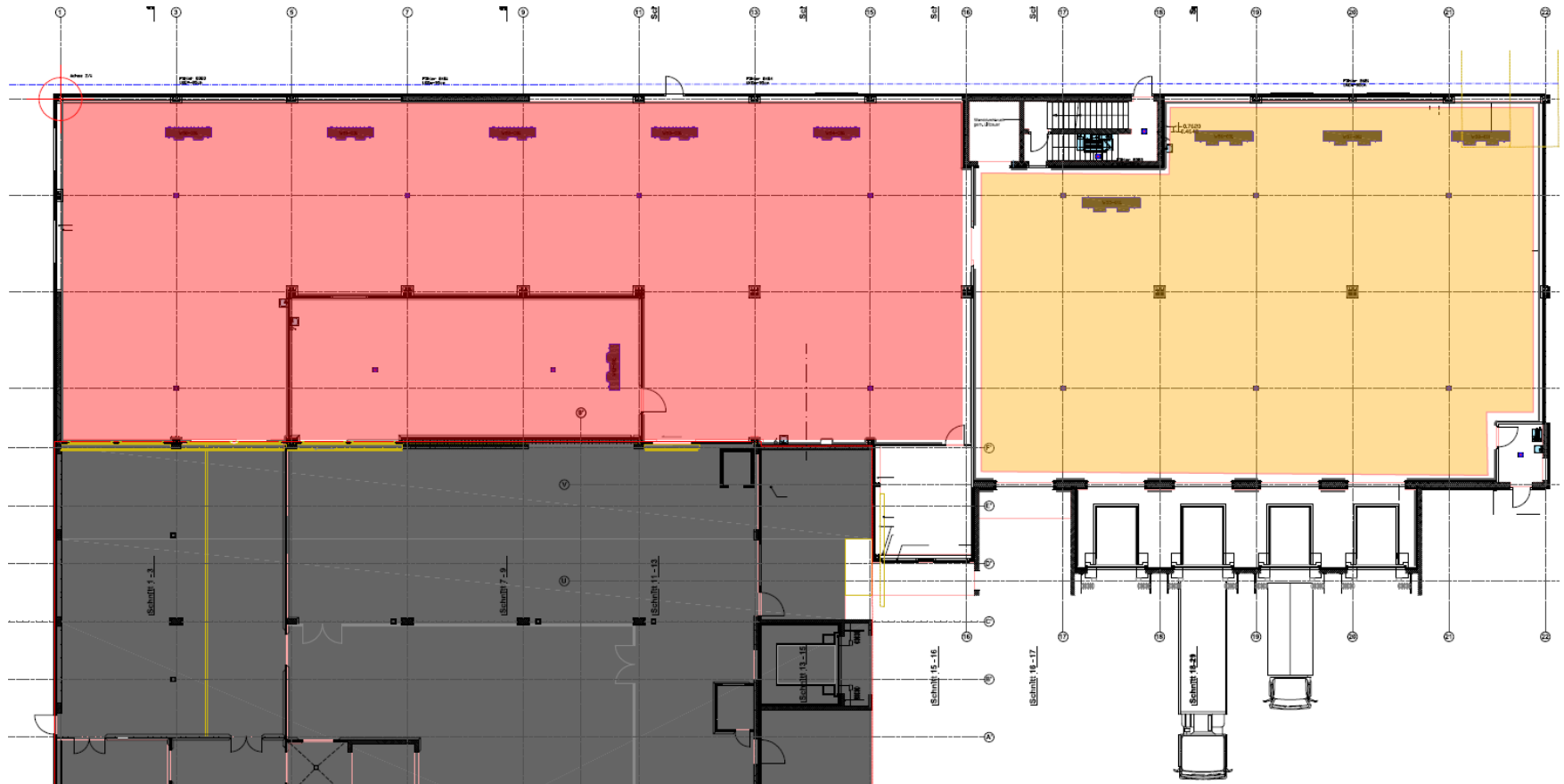
For his activity expansion Lüthi & Portmann AG needs new Cold Halls as delivery platform and product transformation. The Engineer Office SSP Kälteplaner AG has define the following requirements :

Cooling Capacity :	2 Units with each 160kW Capacity
Cold Hall temperature :	+3°C
Colling principle :	Air coolers with cold glycol
Production principle :	Compact chiller to produce glycol at -8°C
Exigencies :	Natural Refrigerant Small Refrigerant charge Redundancy Energy efficiency

Lüthi & Portmann AG has already other cooling systems with Natural refrigerant (CO₂) and also wanted a Natural refrigerant for the extension.

Project reference „Lüthi & Portmann“

Lüthi & Portmann AG needs



Red Final product preparation for expedition
Yellow Final product expedition

690m² at +3°C
540m² at +3°C

Project reference „Lüthi & Portmann“

Why Propane

Advantages with our propane chiller :

Energy efficiency thanks to the Refrigerant itself, the technology used (piston and EC Ventilators) and 6 capacity steps combined to pump speed reduction.

Extremely small refrigerant charge thanks to Condenser construction : 11kg per circuit.

High redundancy thanks to 3 circuits per Units.

Natural refrigerant which is non Toxic.

Extremely Low explosion probability due to the extremely small refrigerant charge on different circuits.

Project reference „Lüthi & Portmann“ Pictures



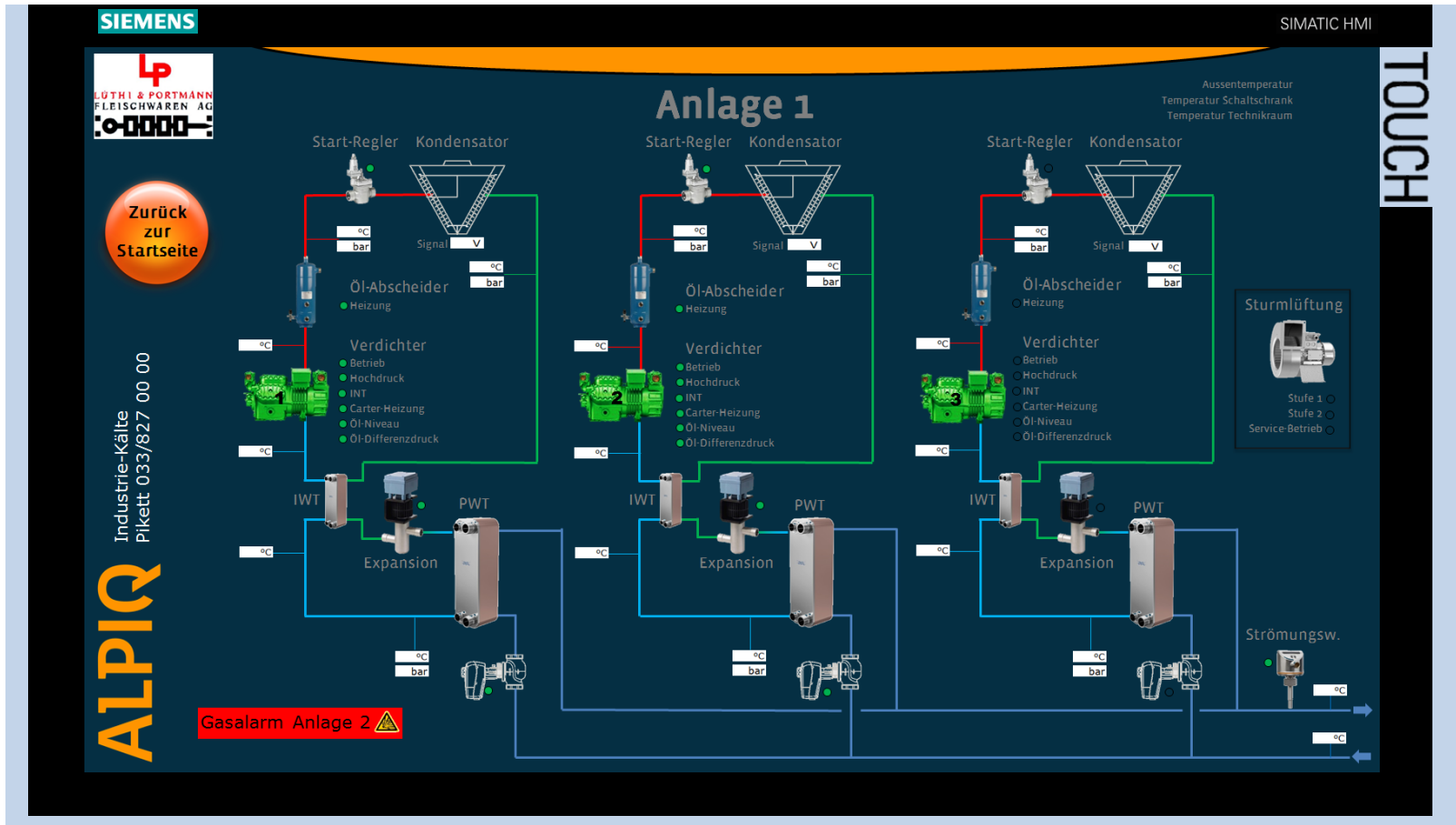
Project reference „Lüthi & Portmann“ Pictures

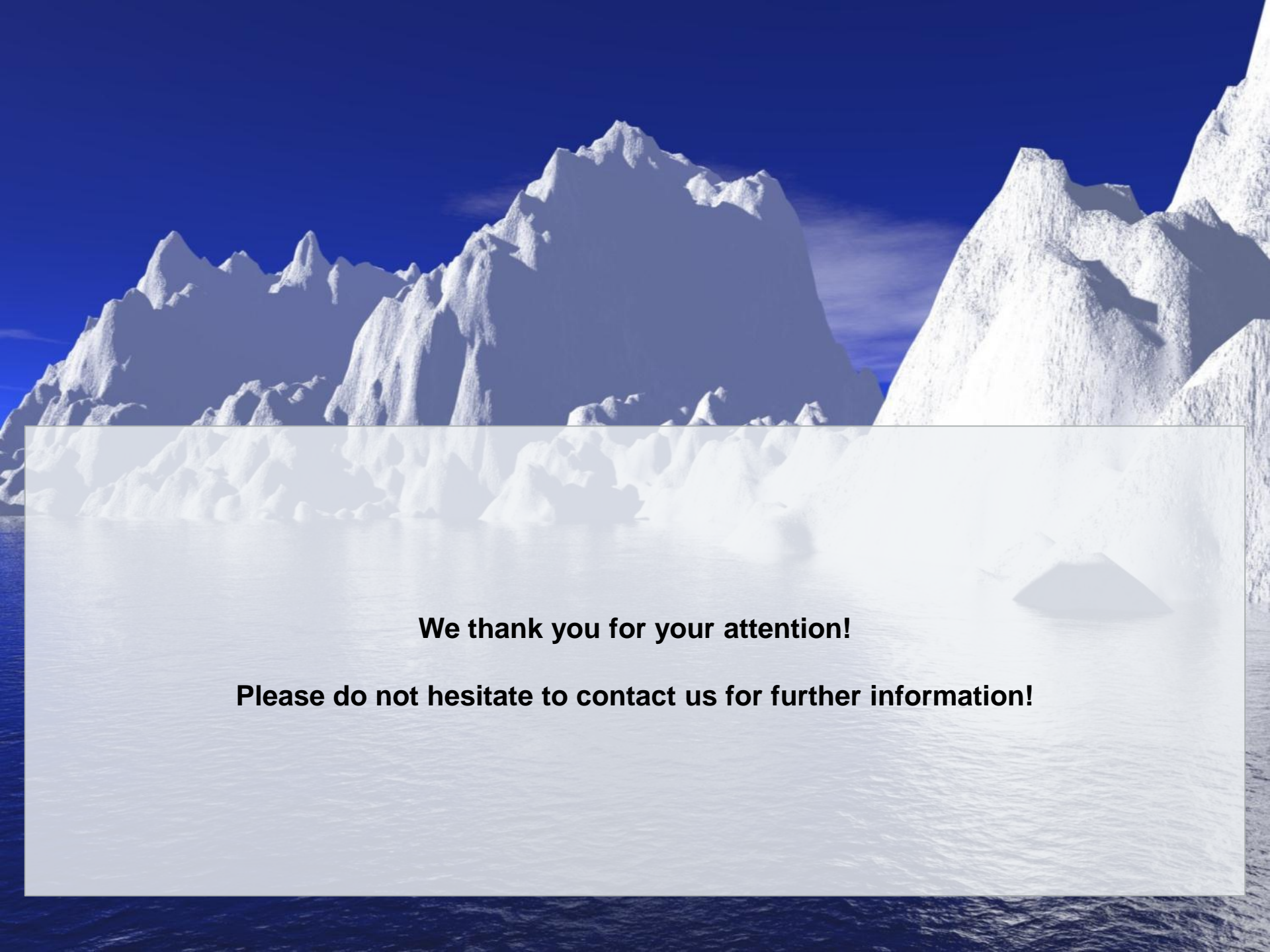


Project reference „Lüthi & Portmann“ Pictures



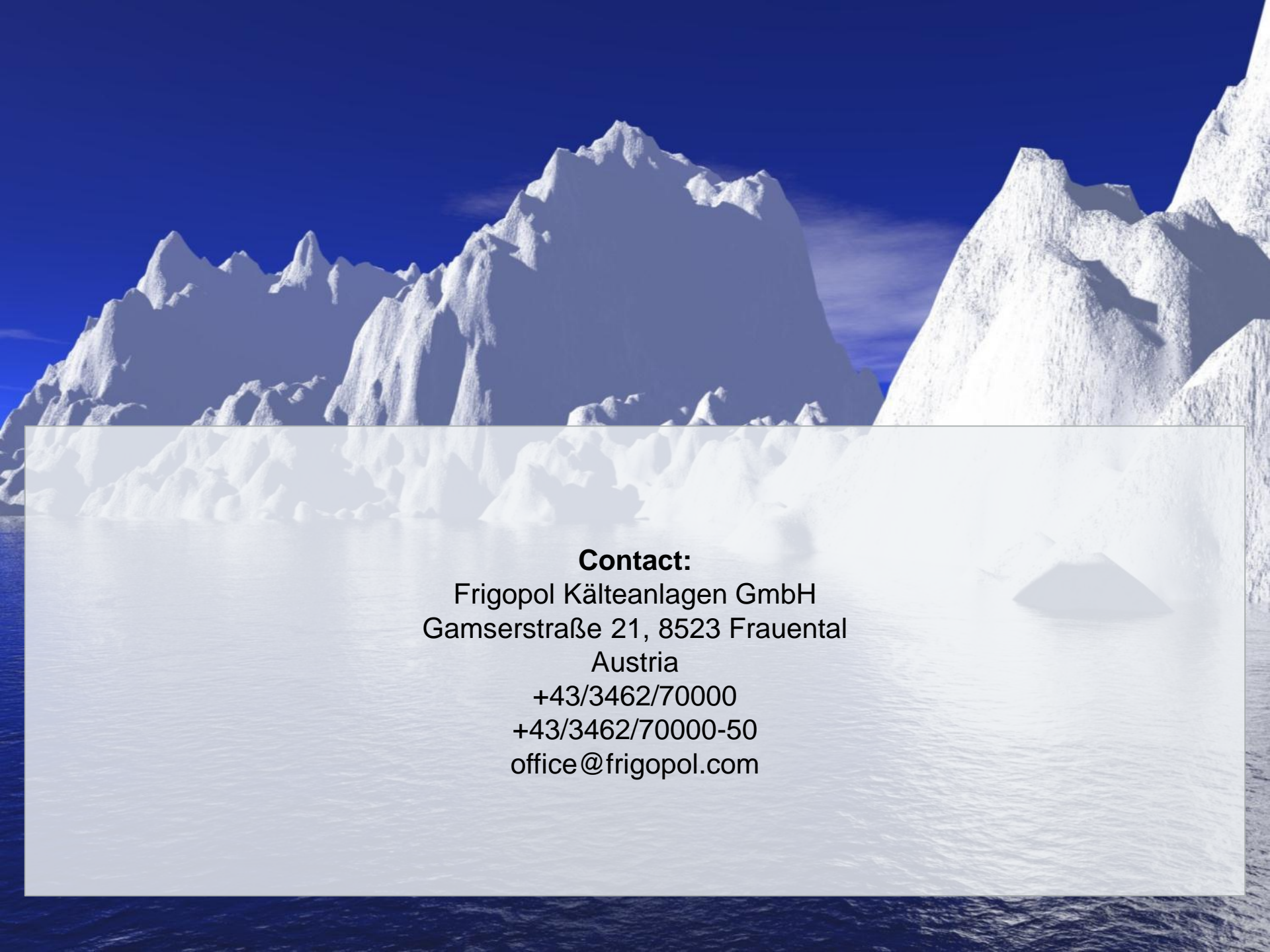
Project reference „Lüthi & Portmann“ Pictures



A large, jagged iceberg with a prominent peak is the central focus, set against a clear blue sky. The iceberg's surface is highly textured with various ridges and shadows. In the foreground, the dark blue water of the ocean is visible, with a smaller, more rounded iceberg floating to the right. A semi-transparent white rectangular box is overlaid on the lower half of the image, containing the text.

We thank you for your attention!

Please do not hesitate to contact us for further information!

A large, jagged iceberg floats in the ocean under a clear blue sky. The iceberg is the central focus, with its sharp peaks and ridges clearly visible. The water is a deep blue, and the sky is a lighter blue with a few wispy clouds. The overall scene is serene and cold.

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