NEW GEOTHERMALAPPLICATIONS FOR HEATING AND COOLING IN NORTHERN ITALY AND AUSTRIA

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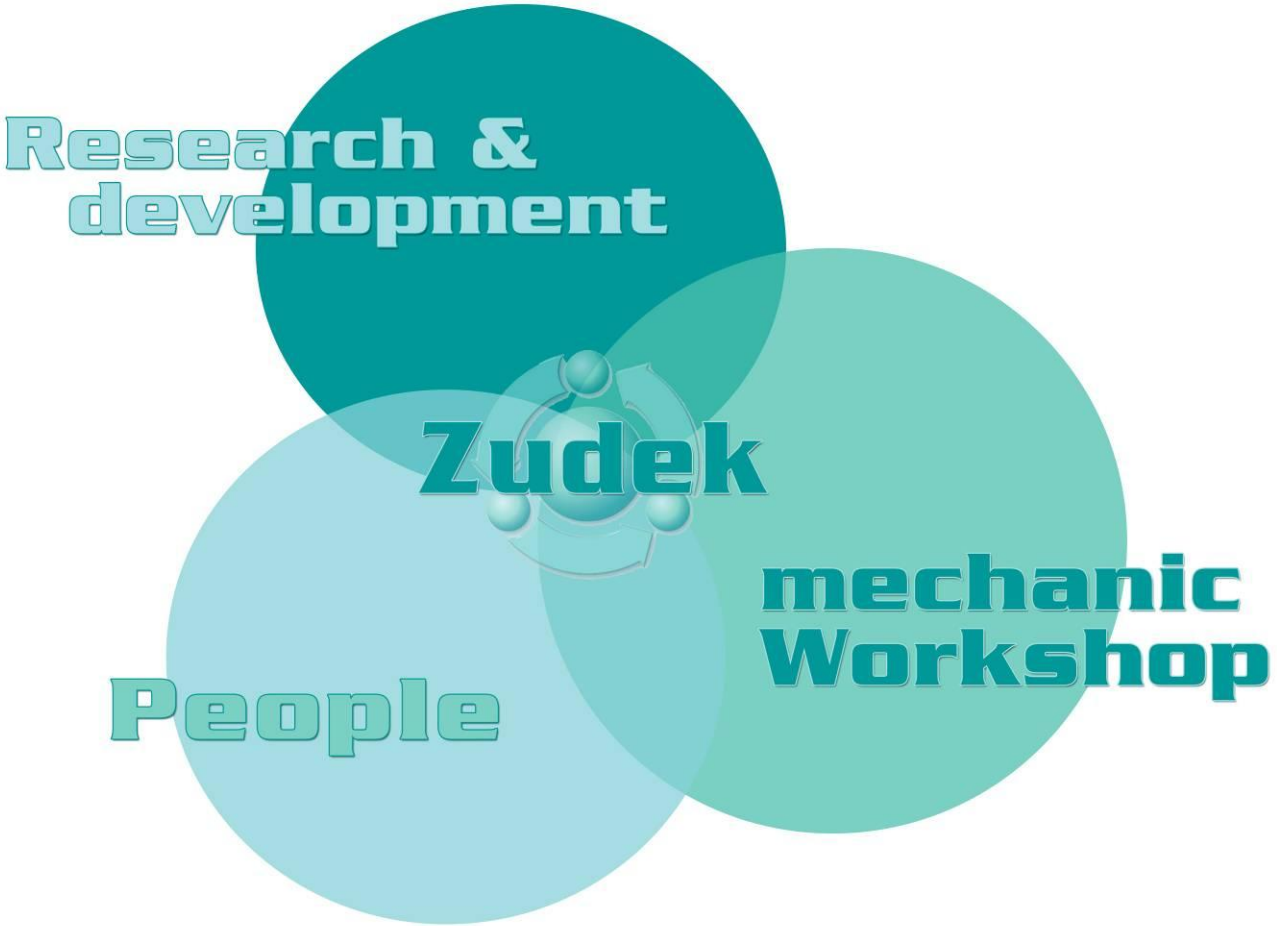

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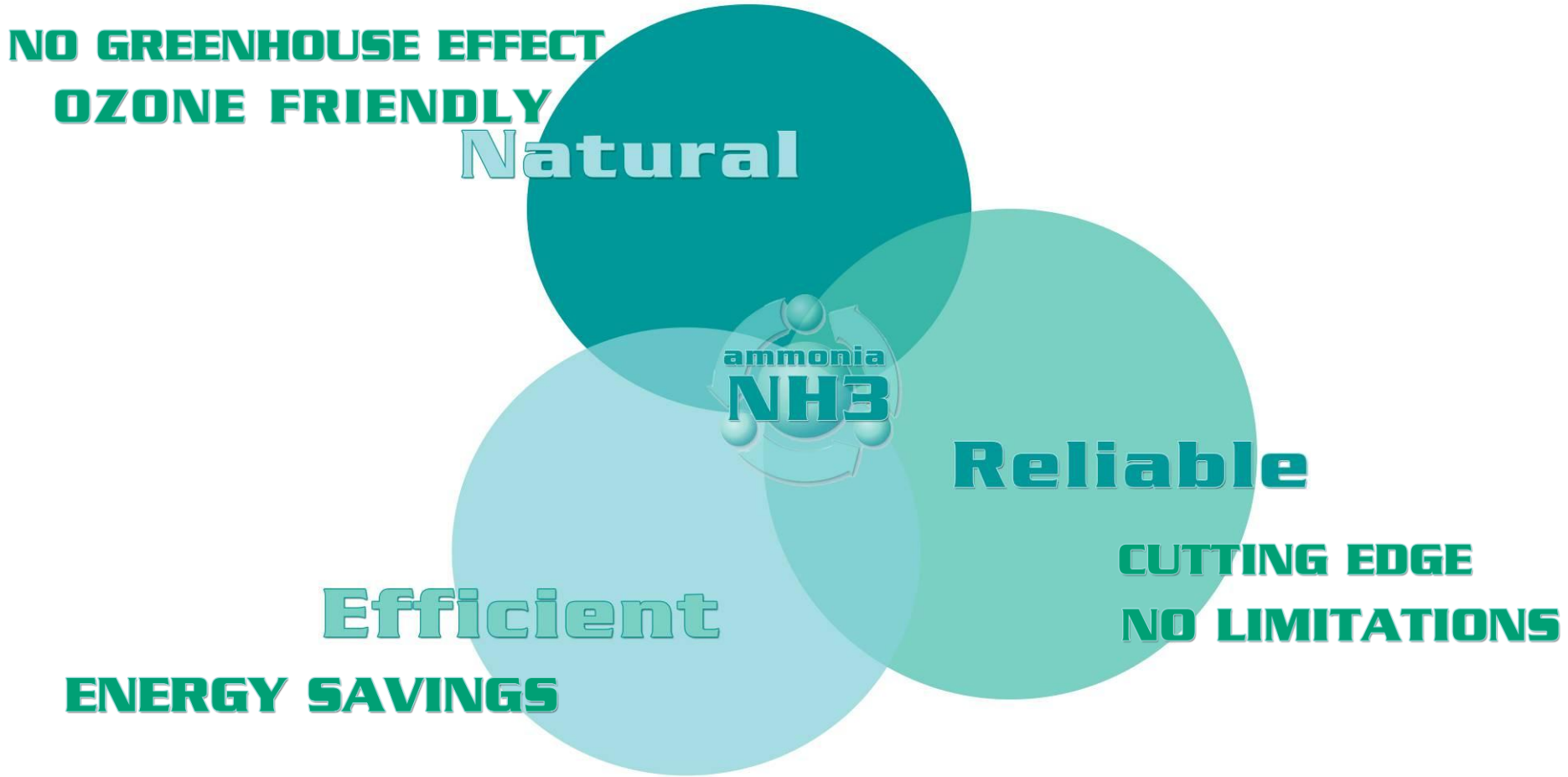

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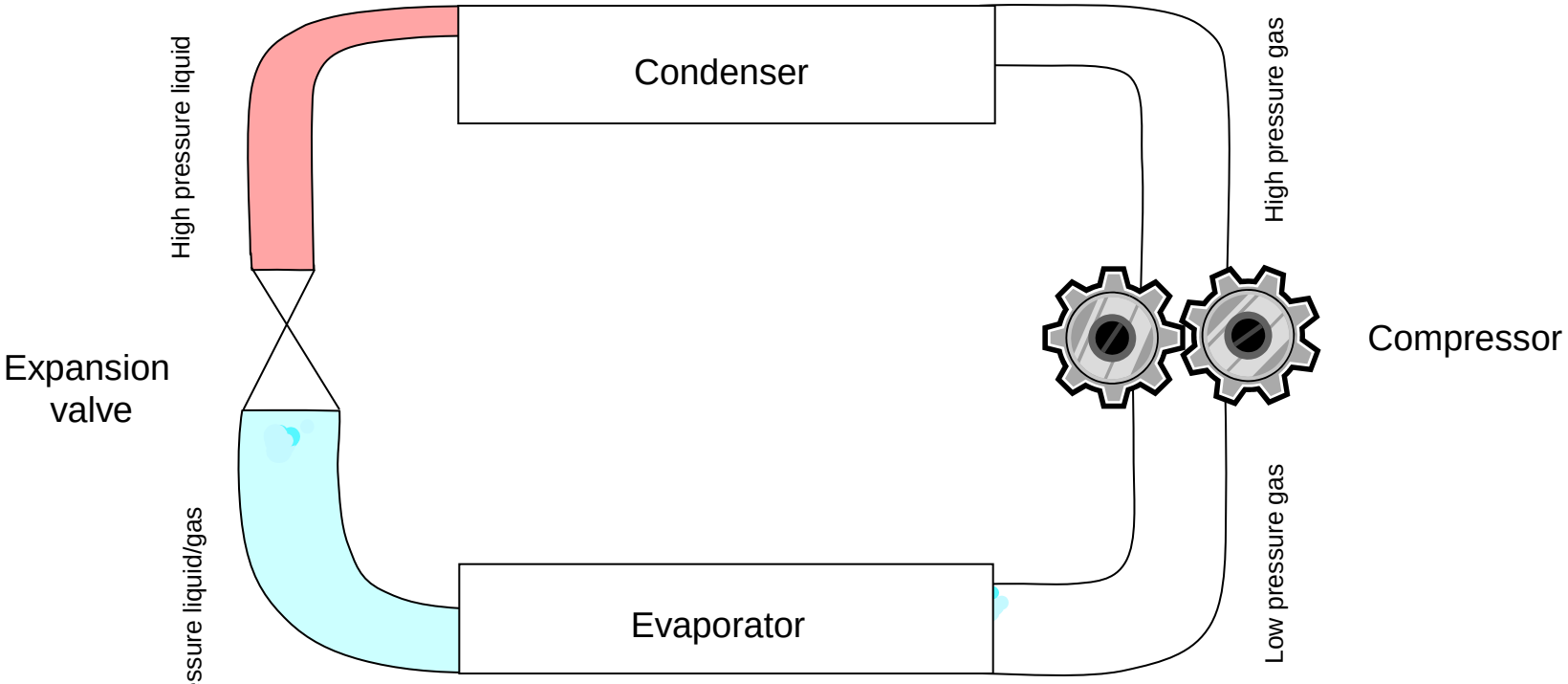
Media to be heated

Condensing temperature > Hot media temperature



Media to be cooled

Cold media temperature > Evaporating temperature

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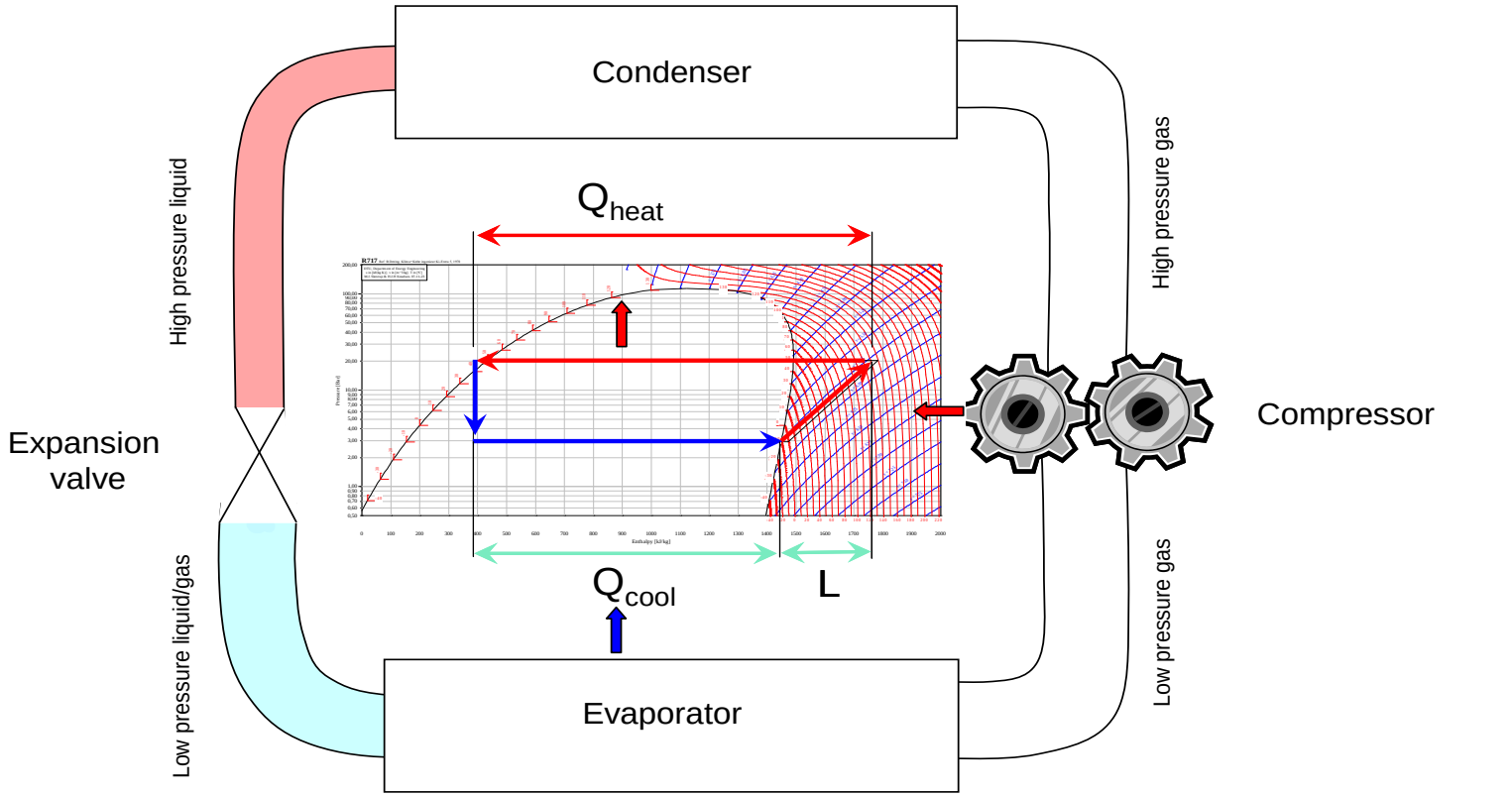
Media to be heated

Condensing temperature > Hot media temperature



Cold media temperature > Evaporating temperature

Media to be cooled

C.O.P. : COEFFICIENT OF PERFORMANCE

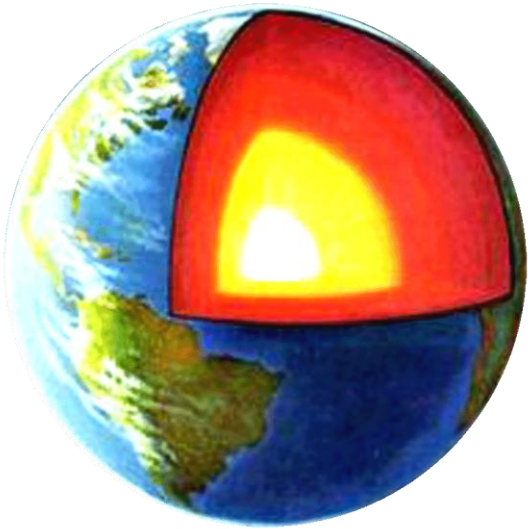
REFRIGERATION

$$EER = \frac{Q_{cool}}{L}$$

HEAT PUMP

$$C.O.P_{.heat} = \frac{Q_{heat}}{L}$$

TARGET: HIGH COP / EER



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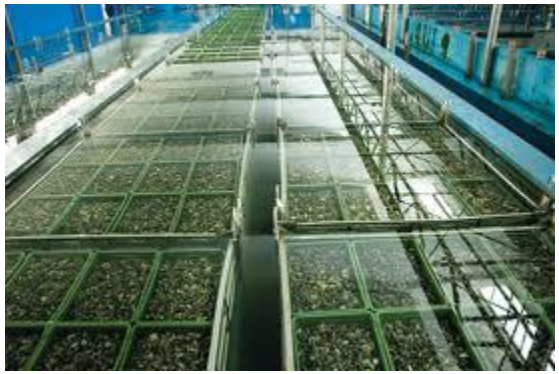
GEOTHERMAL HEATING AND COOLING IN SHELLFISH FACTORY

Consorzio Pescatori di Goro



- Water quality -> Shellfish quality
  - Controlled sea water temperature
  - Filtration sea water
  - Oxygenation sea water
- Heating seawater pools
- Cooling seawater pools

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GEOTHERMAL HEATING AND COOLING IN SHELLFISH FACTORY

Shellfish pools

Power consumption 110 kW

+6 /+16°C

+12 /+17°C

Cooling/heating capacity: 900 kW

EER/C.O.P.=8,2 / 9,2

Geothermal source

Depth 30 m

GEOTHERMAL HEATING AND COOLING IN SHELLFISH FACTORY

Heat pump technical datas:

- **Ammonia as refrigerant**
- **Titanium high efficiency plate heat exchangers**
- **Screw compressor**
- **Motor driven by inverter**
- **Water quality control**

GEOTHERMAL HEATING AND COOLING IN SHELLFISH FACTORY

CONDITION:

- **Start up: 2004**
- **Running hours per year: 8.600 hours**
- **Remote control with telemetry**

RESULTS:

- **Dismission of natural gas boiler**
- **Dismission of R22 chiller**
- **High reduction of electricity costs: -33,7%**
- **Reduction of CO2 emissions**
- **Improved quality system**

HEATING AND COOLING IN LEOBEN HOSPITAL

- Thermal power plant for contemporary heating and cooling (4,2 MW)
- Hot sanitary water 480 kW
- 6 ammonia heat pumps
- Use of waste water from steelworks to river

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HEATING AND COOLING IN LEOBEN HOSPITAL

Sanitary hot water:
(+25.0/+70°C)

Heating water:
(+35.0/+48.0°C)

Cold water:
(+15/+5.0°C)

Electric power consumption

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HEATING AND COOLING IN LEOBEN HOSPITAL

HOT SANITARY WATER

HEATING

GEOTHERMIC SOURCE

ELECTRIC POWER

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HEATING AND COOLING IN LEOBEN HOSPITAL

COLD WATER

GEOTHERMIC SOURCE

HOT SANITARY WATER

ELECTRIC POWER

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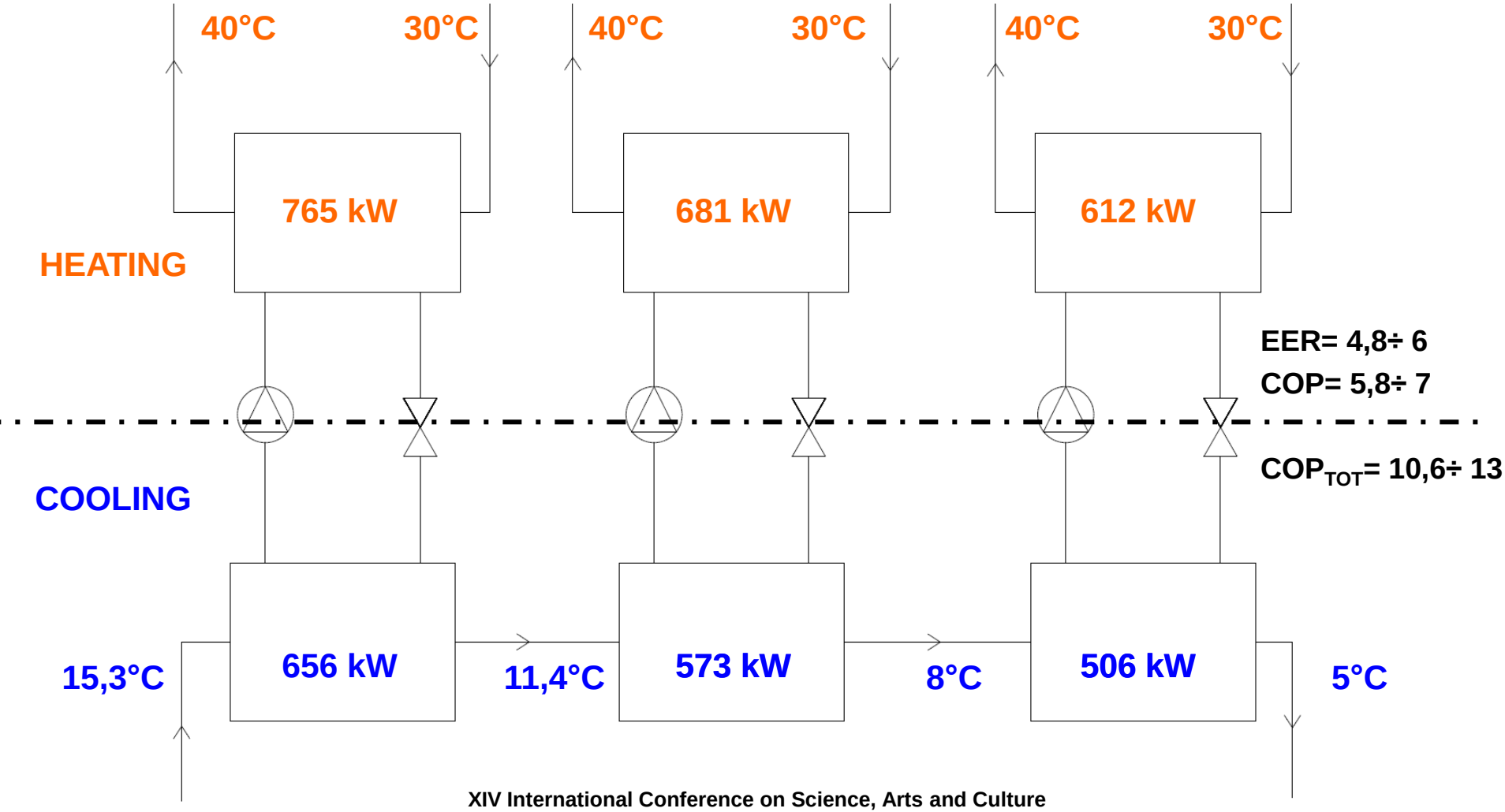
HEATING AND COOLING IN LEOBEN HOSPITAL



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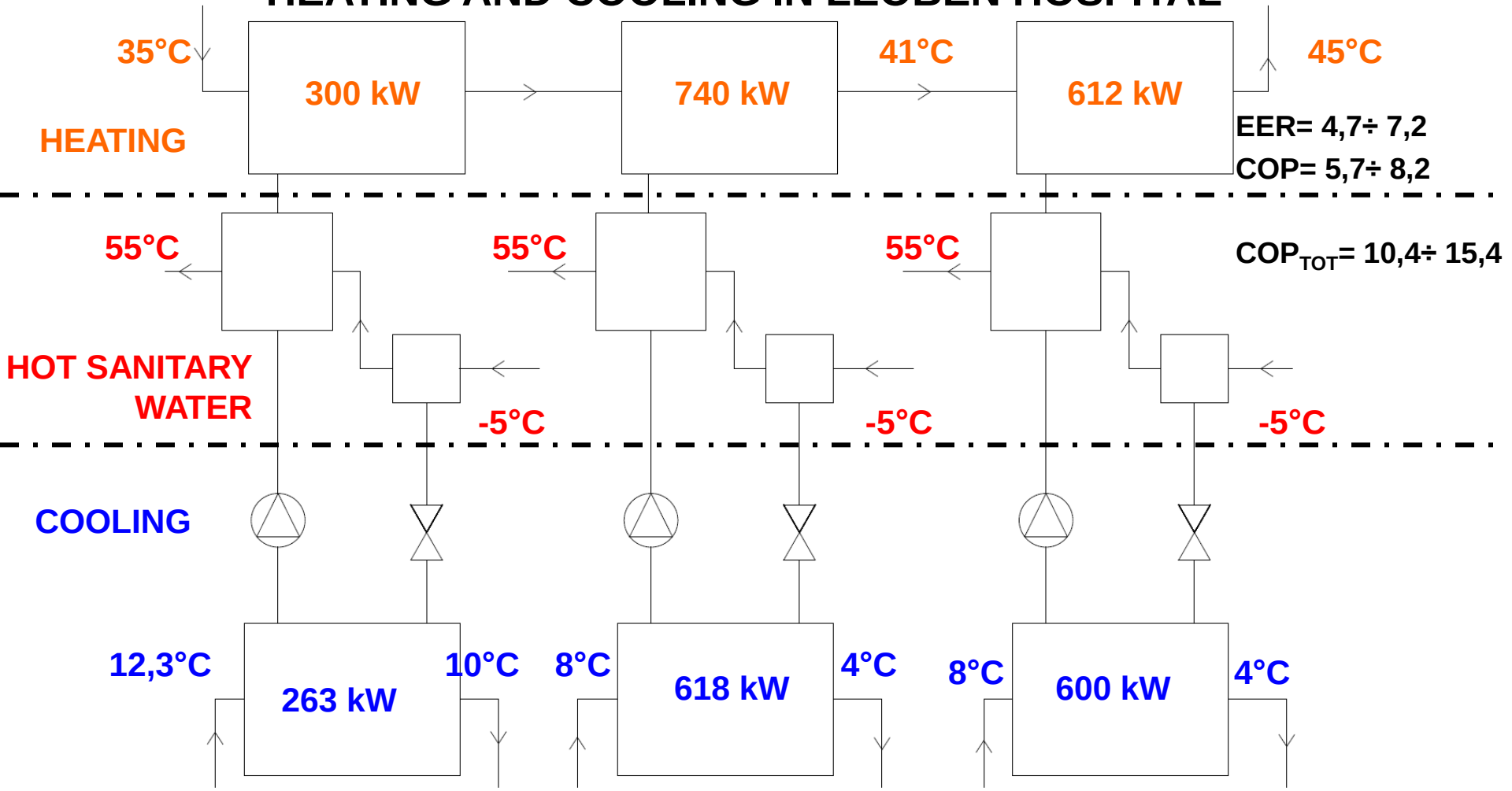
HEATING AND COOLING IN LEOBEN HOSPITAL



HEATING AND COOLING IN LEOBEN HOSPITAL

CONDITION:

- **Start up: January 2014**
- **Remote control with telemetry**
- **Installation in underground machinery room with safety**

RESULTS:

- **No fossil fuels boiler**
- **No synthetic refrigerant chiller**
- **45% more efficient than actual chillers**
- **2 available hot water temperature for heating and 1 for combined cooling**
- **Refrigerant with zero GWP and ODP**

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GEOTHERMAL HEATING AND COOLING IN ICE RINK – PONTEBBA - FVG

COMUNE DI PONTEBBA

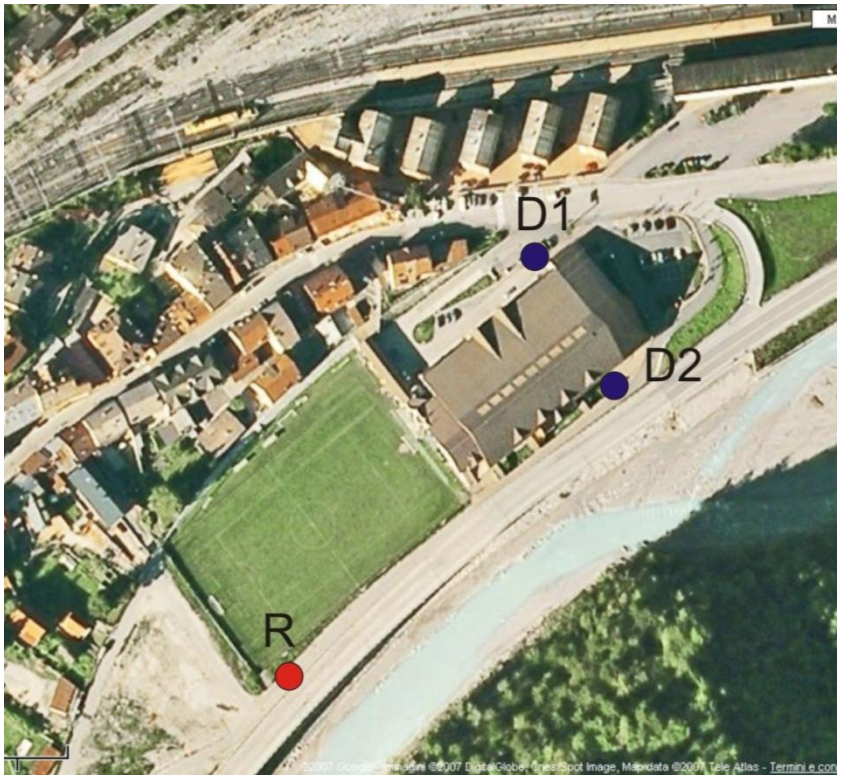
ASSOCIAZIONE DEI COMUNI VIRTUOSI

UNIVERSITÀ DEGLI STUDI DI TRIESTE

dicar

Prof. Bruno DELLA VEDOVA

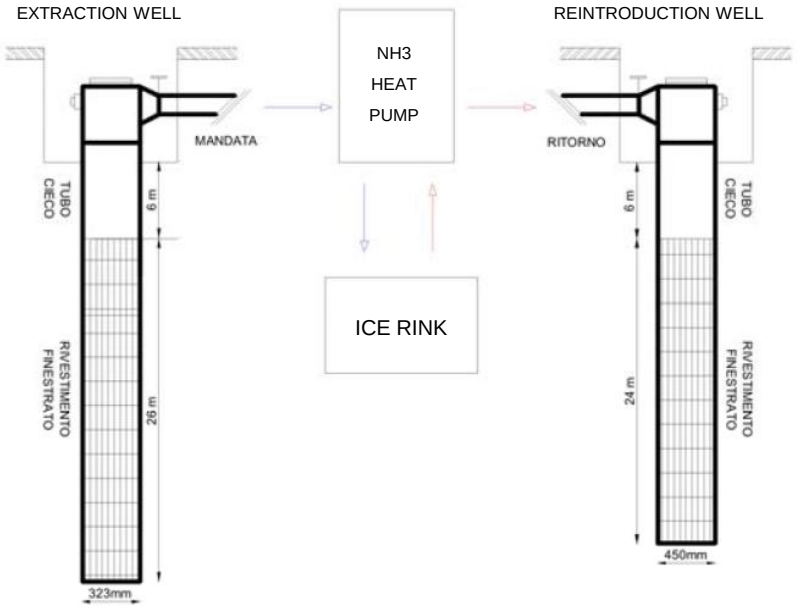
GEOTHERMAL HEATING AND COOLING IN ICE RINK – PONTEBBA - FVG



GEOTHERMAL HEATING AND COOLING IN ICE RINK – PONTEBBA - FVG

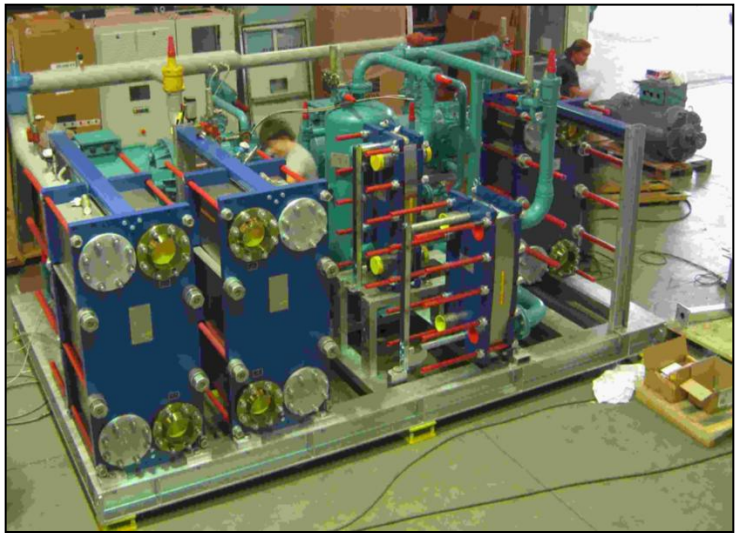
Heat pump system technical datas:

- **Well circuit: open type**
- **No. 2 Extraction well: Q=130 m3/h each**
- **No.1 Reintroduction Q=260 m3/h**
- **Maximum differential temperature control (ΔT=3K)**
- **Water quality control**
- **AMMONIA HEAT PUMP**
- **4 working conditions**



GEOTHERMAL HEATING AND COOLING IN ICE RINK – PONTEBBA - FVG

Cooling capacity : 640 kW



-10.0°C

Ice rink

9.0°C

Geothermic source

40.0°C

Ice rink stadium

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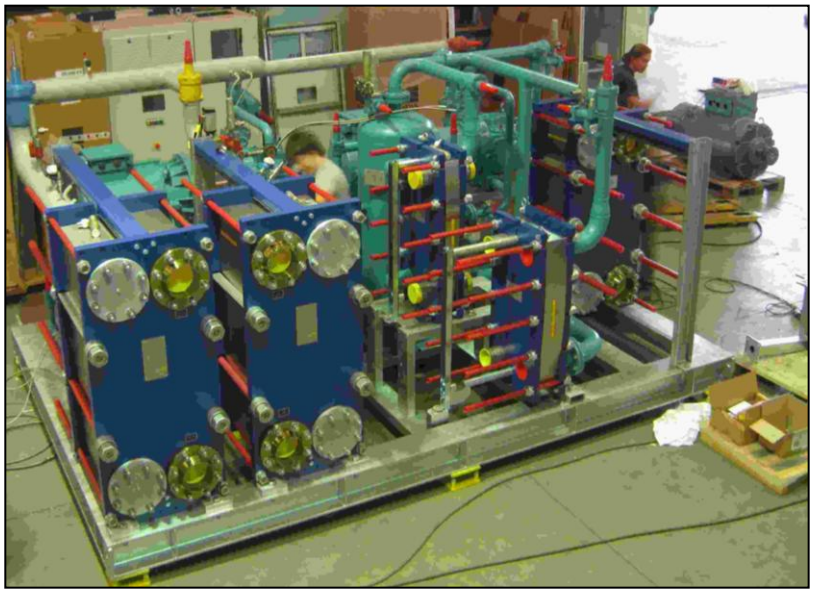
GEOTHERMAL HEATING AND COOLING IN ICE RINK – PONTEBBA - FVG

Heating capacity: 720 kW

Geothermic source



40.0°C

Lockers room

40.0°C

Ice rink stadium

GEOTHERMAL HEATING AND COOLING IN ICE RINK – PONTEBBA - FVG

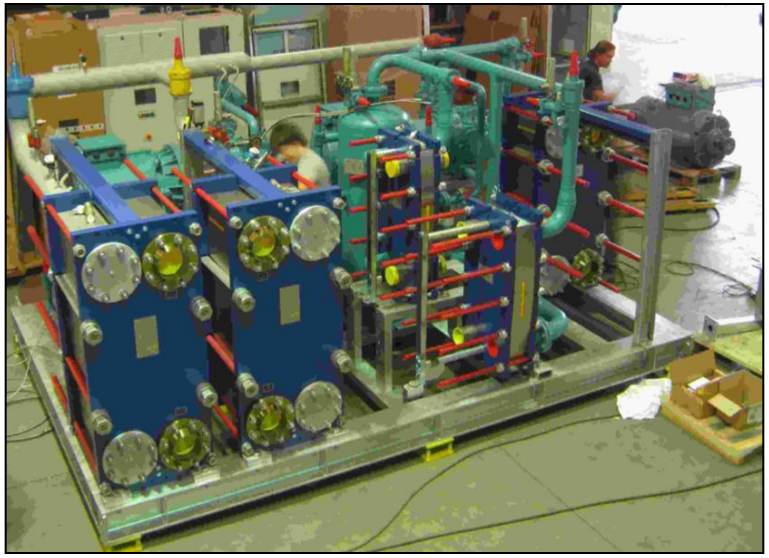
COMBINED SYSTEM

-10.0°C

Ice rink

Lockers room

40.0°C



Geothermic source

Ice rink stadium

40.0°C

GEOTHERMAL HEATING AND COOLING IN ICE RINK – PONTEBBA - FVG

CONDITIONS:

- START UP: SEPTEMBER 2012
- RUNNING HOURS: 4400 HOURS
- REMOTE CONTROL WITH TELEMETRY

RESULTS:

- ELECTRICAL CONSUMPTION: **-40,5%**
- ENERGY REDUCTION COSTS: **€ 33.000 EACH YEAR**
- HEATING POWER REDUCTION COSTS: **€ 17.000 EACH YEAR**
- **AVOIDED CO2** EMISSIONS: **244 tons EACH YEAR**
- LOCKER ROOM, ROLBA AND STADIUM HEATING FOR FREE (NO BOILERS)
- RELIABILITY

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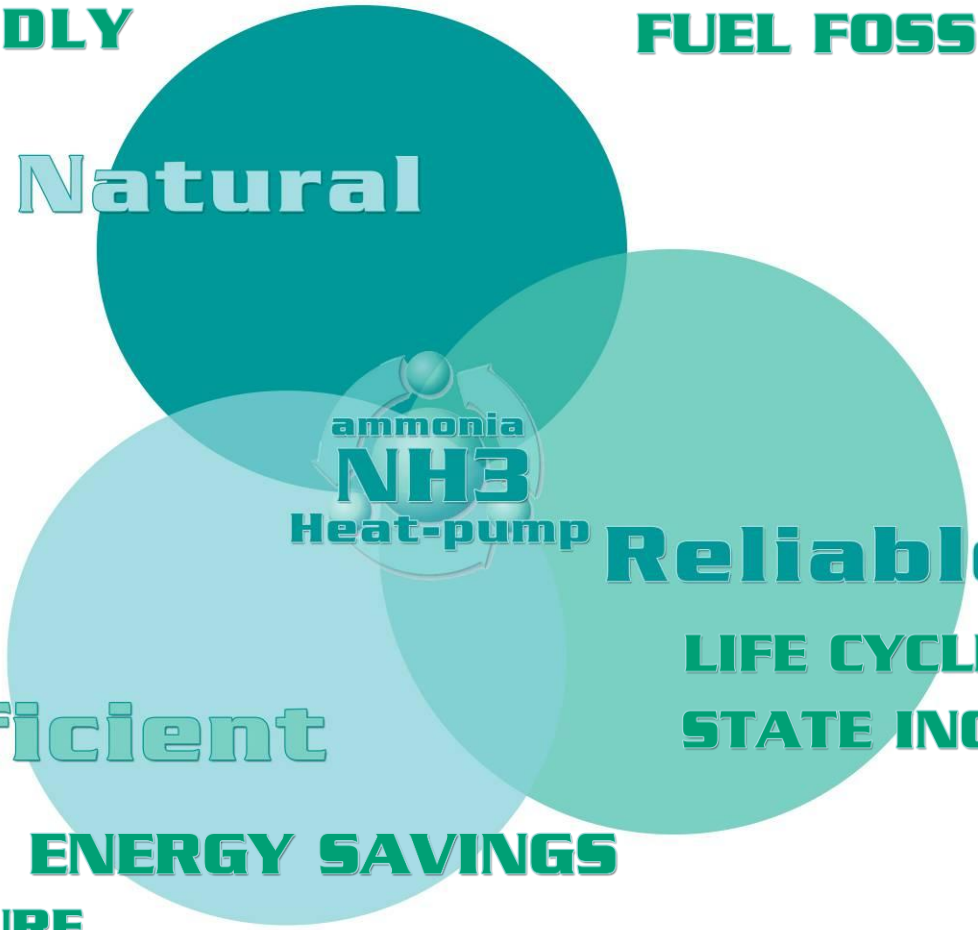
NO GREENHOUSE EFFECT

OZONE FRIENDLY

REDUCED CO2 EMISSIONS

FUEL FOSSIL FREE



LIFE CYCLE > 25 years

STATE INCENTIVES

GEO THERMAL
HEAT PUMP

ENERGY SAVINGS

HIGH TEMPERATURE
HEATING (80°C)

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Thanks for your kind attention