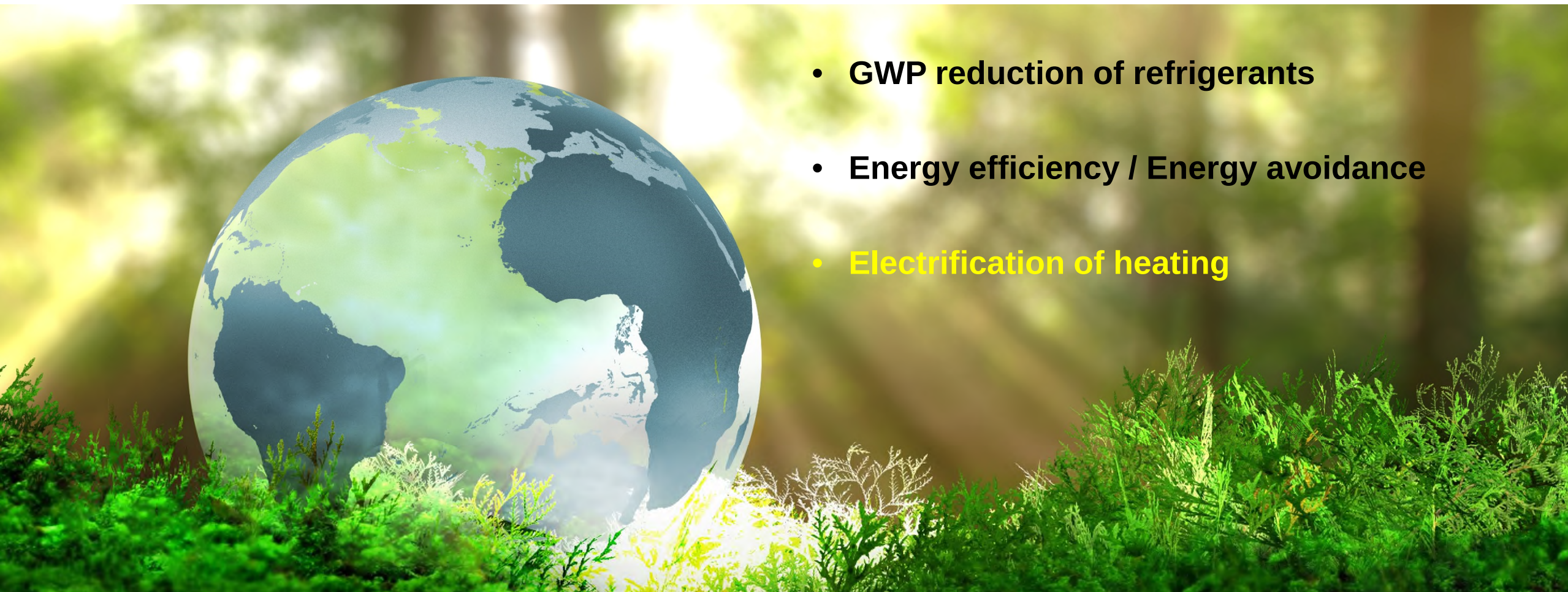
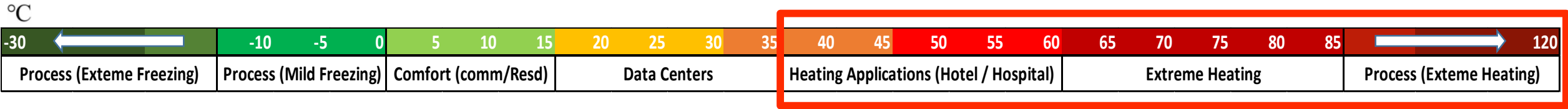


Three Pillars for Sustainable Solutions

- 
- GWP reduction of refrigerants
 - Energy efficiency / Energy avoidance
 - Electrification of heating



Applications - Verticals



Refrigeration Industry



Food and Beverage Industry



Cold Storage



Pharmaceutical Industry



Ice Rink



Dairy Factory



Office buildings



Education



Agriculture /Farming



Hospitality



Healthcare



Entertainment



Plastic industry



Industrial



Airports



Shopping Mall





Hot Water Temperature Requirements in Buildings

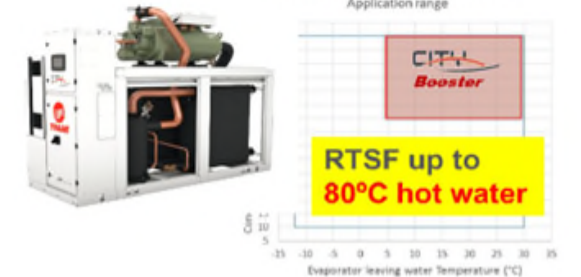
Possible uses	Temp. (°C)
Floor or wall heating	30 – 45
Swimming pool heating	30 – 45
Ventilation heating	30 – 40
Radiators Low temp.	45 – 55
Radiators Medium temp.	55 – 70
Radiators High temp.	70 – 90
Domestic hot water	>60/70
Heating Processes	>60/70

AC Chiller with HR
Or
Air Source
Heat Pump

Water Source HP
Or
AC Chiller with HR
(or AS HP) + Booster



Chillers and Water-to-Water Heat pump
Application range





Benefits of Heat Pumps & Heat Recovery

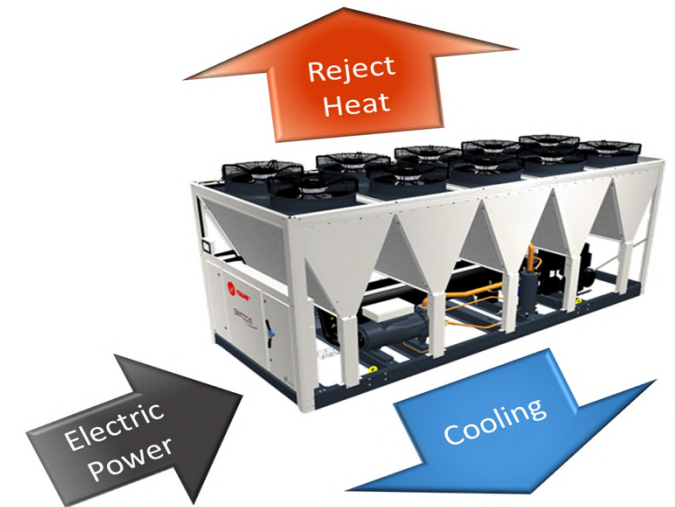
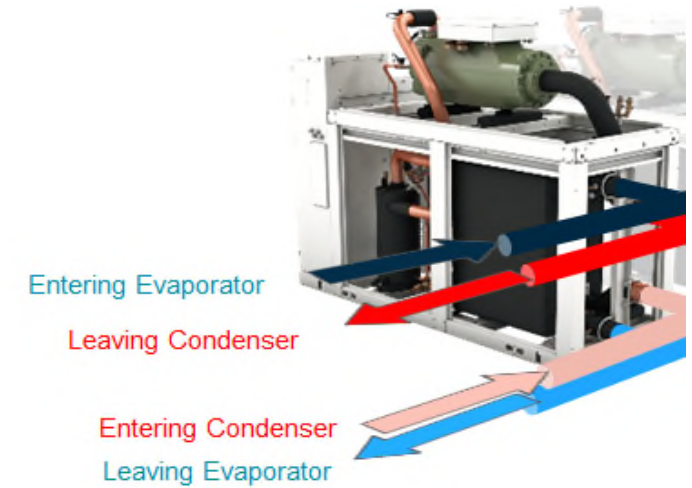
Use free energy to heat...

- ✓ Optimize operating cost, Lower energy bills
- ✓ Environmentally Sustainable Solution
- ✓ Easy and Safe to operate
- ✓ Combined Cooling & Heating

Capacity & Efficiency

- **Heat Pumps:**
 - 1 KW of Electricity → 3 KW of Thermal Energy!
 - Utilizes available thermal energy from water or air
 - Cooling load to satisfy heating load as much as possible
- **Electric Calorifier:**
 - 1 KW of Electricity → 1 KW of Thermal Energy
- **Fossil Fuel Boilers:**
 - Chemical Energy stored in fuel → Thermal Energy (Efficiency < 100%)

Water to water heat pump (as system design)



Heat Recovery (as additional chiller option)



Benefits of Heat Pumps & Heat Recovery

Environmentally Sustainable Solution:

- HP Uses Electric Energy → No Direct Emissions
- Boilers Using Fossil Fuel Emissions include:
Carbon Oxides, Nitrogen Oxides and Particulate Matters →
Environmental impact such as global warming, acid rain..etc.
- HP have the lowest indirect Emissions because
1 KW Electricity → ~ 3 KW Thermal Energy
- Extends Renewable Energy Utilization
 - Limited ROOF SPACE for Solar Heating
 - Solar heating available limited hours, HP & HR extends HOURS of Renewable Energy utilization
- Boilers Using Fossil Fuel have more Safety regulations include
Fire, Electric, and Environmental regulations





Air-to-Water Heat Pumps



Chiller + Heat Recovery

Heat Pump

Heat Recovery
Heat Pump

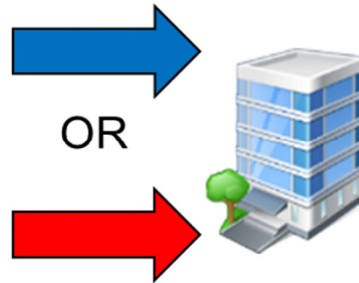
Multi-pipe



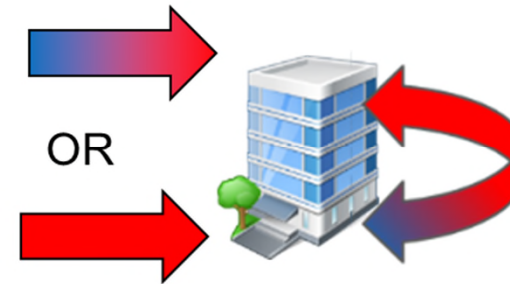
Cooling only



Heating while Cooling



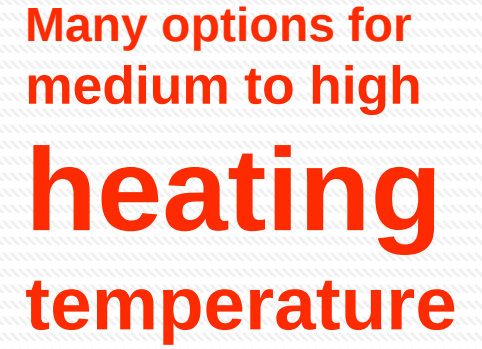
Heating or Cooling



Heating while Cooling
Or
Heating/Cooling



Any combination



✓ **VFD Compressor (*High Efficiency at full Load and Part Load , *Lower Starting Current)**

✓ **HFO Refrigerant (R 1234 Ze)**

✓ **SS 316 Heat Exchangers**

✓ **Screw Compressor**

✓ **Compact Design**

✓ **80 Deg C Temperature Output**

Adaptive Frequency™ Drive

- Industry leading Seasonal Efficiency
→ *Energy bill reduced*
- Eliminates inrush current
→ *No oversizing of electrical components*
- *Decrease cost of installation*

Controls

- Fastest controls of the industry
- Safe VPF
- No nuisance trips (Adaptive controls)
- Temperature control within 0.3°C
→ *Efficient, reliable and accurate operation*

Trane Compressor

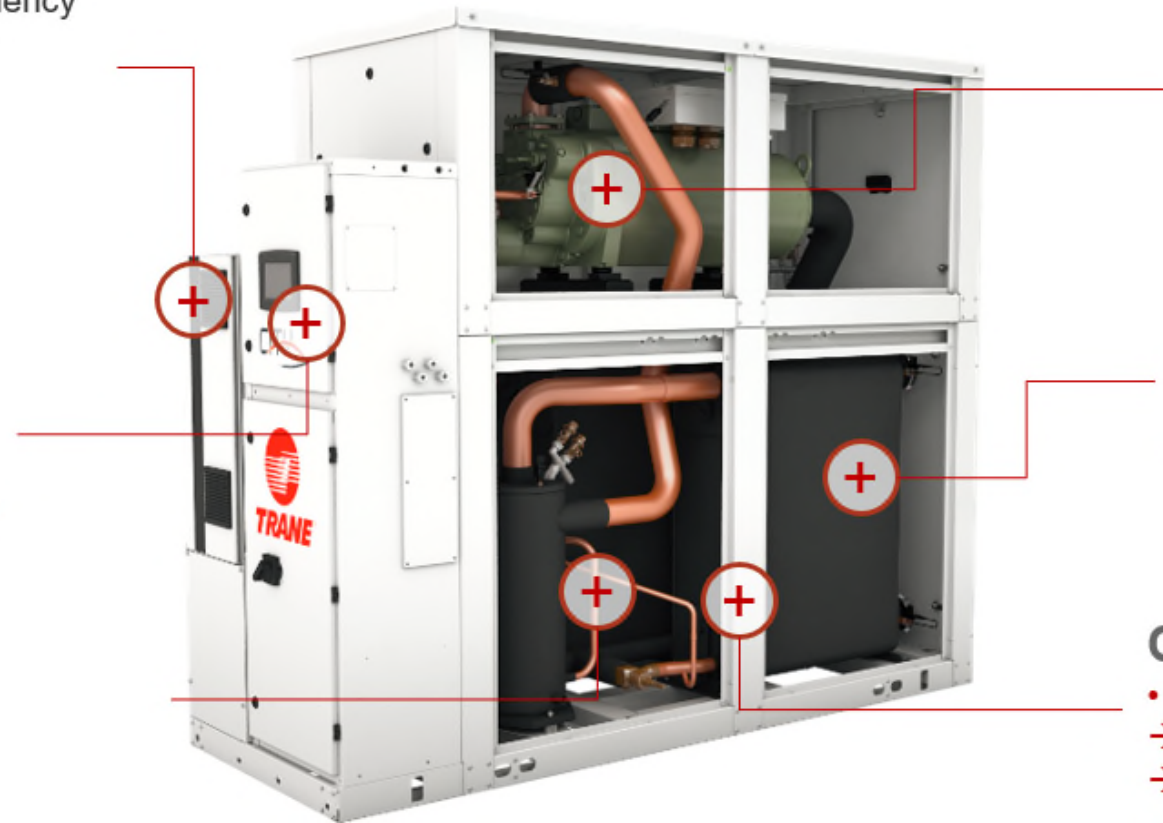
- Direct drive, low speed
→ *Excellent Load matching*
→ *Unequaled long lasting Reliability*

Heat Exchangers

- Single Circuit Brazed Plates Heat exchangers
→ *Maximum efficiency*

Compact design

- 920 mm Width only
→ *Fits standard doors and elevators*
→ *Can be easily moved*



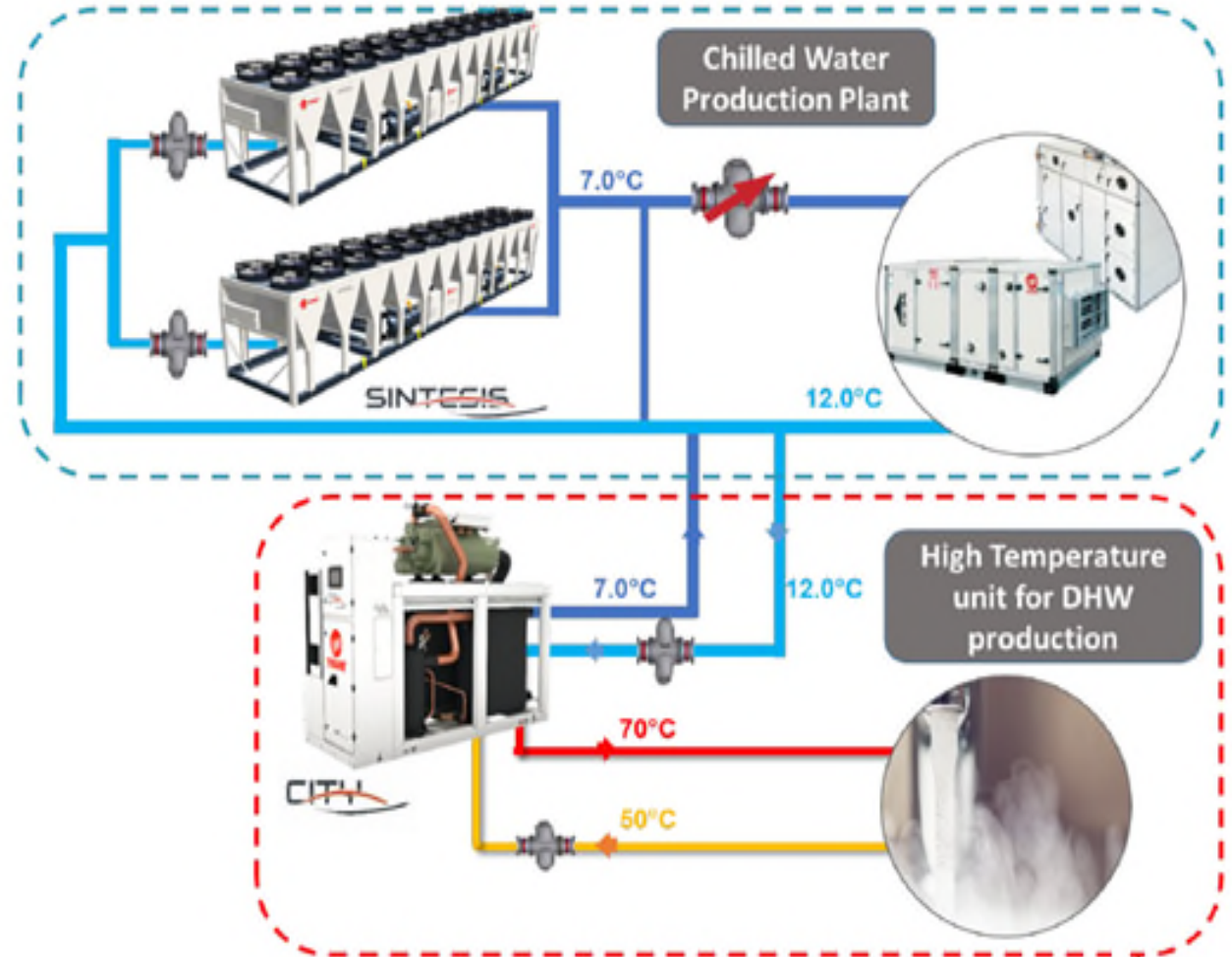


Examples of HP & HR Applications

Sanitary Hot Water Production From Chillers Plant

Hospitals and healthcare

- Heating and Cooling Plant with
 - Chillers for producing chilled water
 - Gas Boiler for heating and hot water production
- RTSF connected (sidestream) to the chilled water and hot water systems
- Boiler shutdown during summer period
- Applicable on a vast majority of sites





Le Meridien

- ❖ Air Cooled Chillers with Heat recovery
- Consultant: WASL Group

Marina Star

- ❖ Air Cooled Chillers with Heat recovery
- Consultant: Dimensions Engg Consultants

Unilever, Dubai

- ❖ Water Sourced Heat Pumps x Nos. 1

Al Wasl

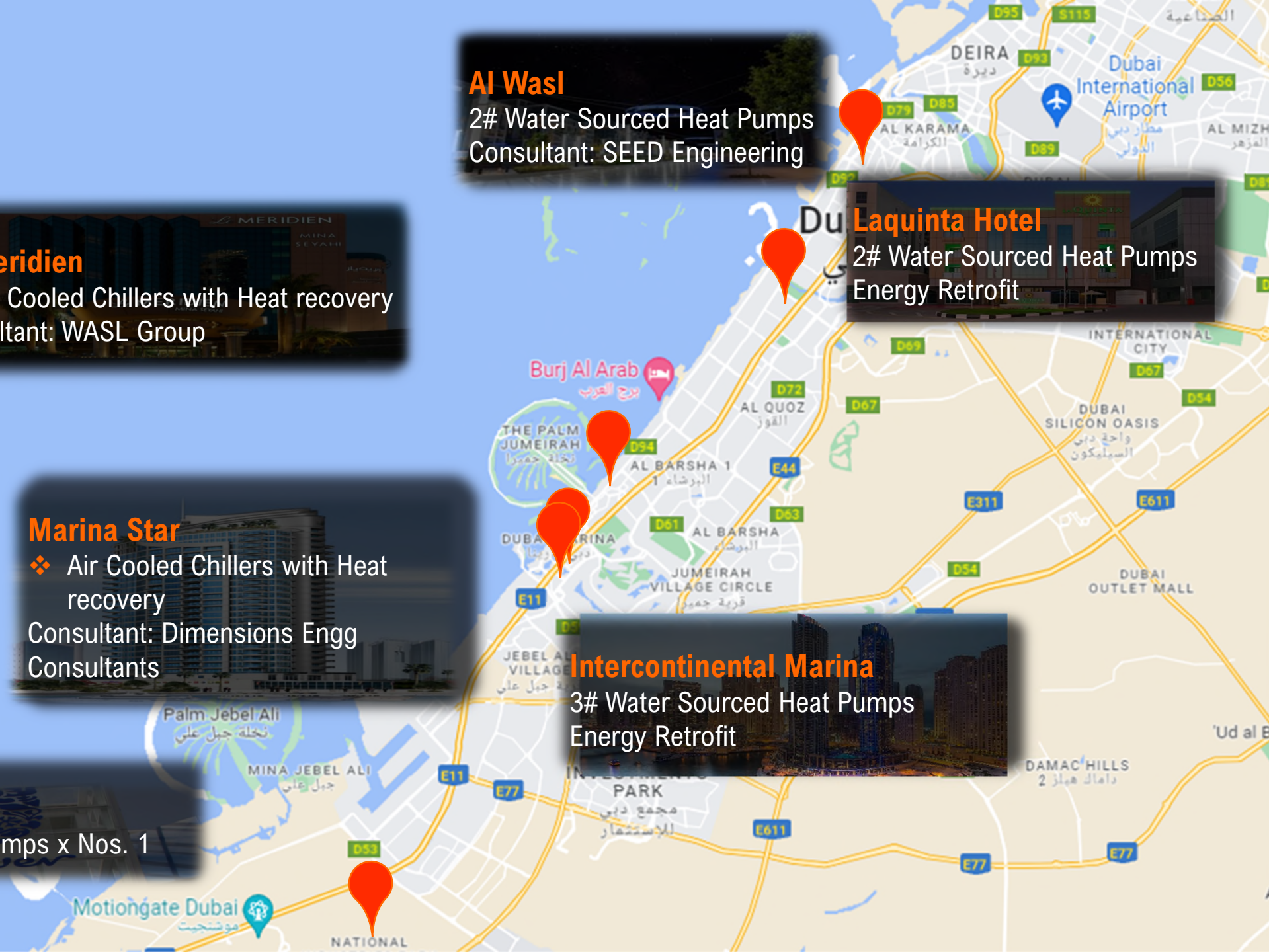
- 2# Water Sourced Heat Pumps
- Consultant: SEED Engineering

Laquinta Hotel

- 2# Water Sourced Heat Pumps
- Energy Retrofit

Intercontinental Marina

- 3# Water Sourced Heat Pumps
- Energy Retrofit





GUGGENHEIM MUSEUM ABU DHABI

Water Sourced Heat Pumps

❖ HEATING : 2 #RTWF 490

Design Consultant - Arup

YAS VILLAGE ACCOMMODATION BLDG.

Zero Operational cost for Heating using Combination of Heat pump and Air-cooled chiller with heat recovery

❖ Air Cooled Chillers 12 nos. with heat recovery

Consultant: KEO

VACCINE FACTORY KIZAD

❖ Air Cooled Chillers with Heat recovery 10 nos.
The heating is used for humidity control in AHU heating coil.

YAS SEA WORLD ABU DHABI

Chiller With Low Temp and Heat Pump

Water Sourced Heat Pumps

❖ HEATING : 2 #RTWD 130, 3 #RTWD 160 Heat Pumps
45/50 CWT

❖ COOLING : 3# RTHF 700 HSE @ -9.6 / -6.7

PURE HARVEST FARMS

❖ COOLING : Centrifugal Chiller x 2 nos.
HEATING : Water Sourced Heat Pumps

MARRIOTT DOWNTOWN ABU DHABI

Water Sourced Heat Pumps

❖ HEATING : 1 #CXWF 125

Energy Retrofit

ABU DHABI SPECIAL NEEDS CLUB

❖ Air Cooled Chillers #2 with Heat recovery
Consultant: EHAF