



United Technologies

D E S I G N I N G   I N N O V A T I V E   S O L U T I O N S

AIR CONDITIONING & HEATING SOLUTIONS

# SMART HEATING PRODUCTION



High temperature heat-pump  
with PUREtec™ HFO refrigerant

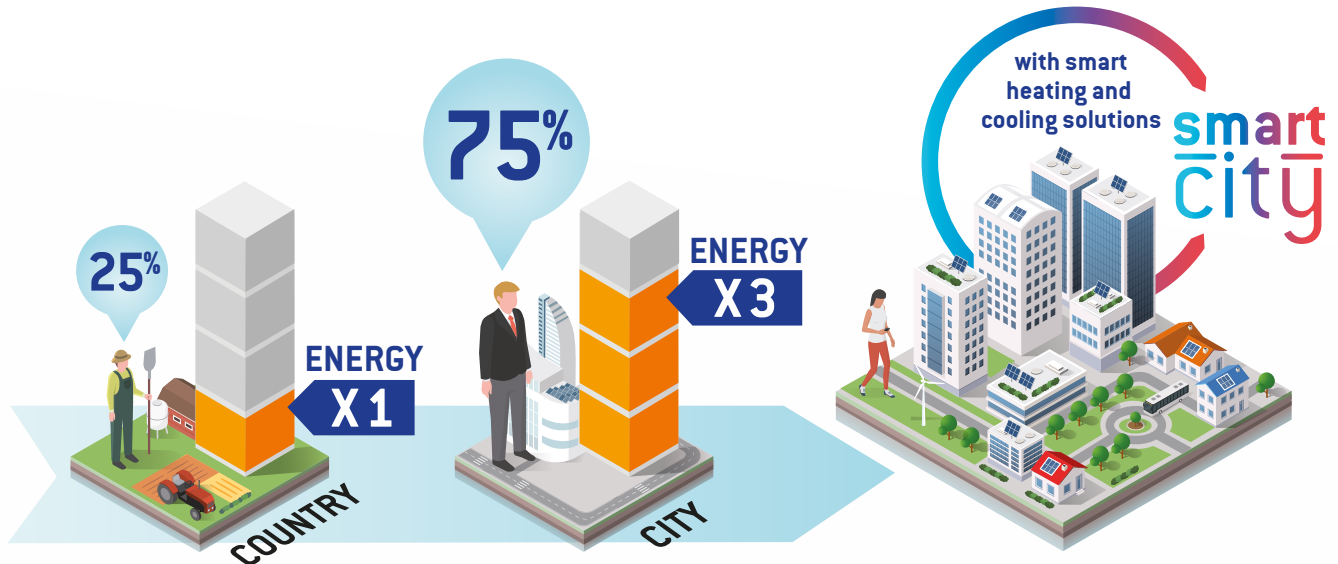
200 kW to 2500 kW

61XWHZE

**AQUAFORCE**  
PUREtec

# Smart urbanisation

## Developing smarter cities to anticipate the increase of urbanisation



75% of the people in Europe live in a city setting. **People in cities use three times as much energy as people who live in the country.** This has tremendous implications for the environment today and in the future if we do nothing. More and more, developers, consultants, cities, politics will need to imagine intelligent, sustainable cities **with smart heating and cooling solutions.**

## Heat recovery potential for smarter cities

Using renewable energy from both natural and wasted heat sources are great opportunities for more sustainable cooling and heating solutions.



### Value natural heat source

Smart cities can value natural heat sources as an advanced and cost effective alternative to fossil fuels. It is available free of charge and offers independence from oil and gas:

- Groundwater
- Lake water
- Sea water
- Geothermal Probes



### Value wasted heat source

Recent European surveys have demonstrated that there is enough waste heat produced in the European Union to heat the entire building stock. All this waste energy too frequently released into the air or into water bodies. Why not recover it? Smart cities shall value:

- Waste heat from data centers
- Waste heat from grey waters
- Waste heat from industrial process
- Waste heat from boilers (wood, gas...)
- Waste heat from chillers

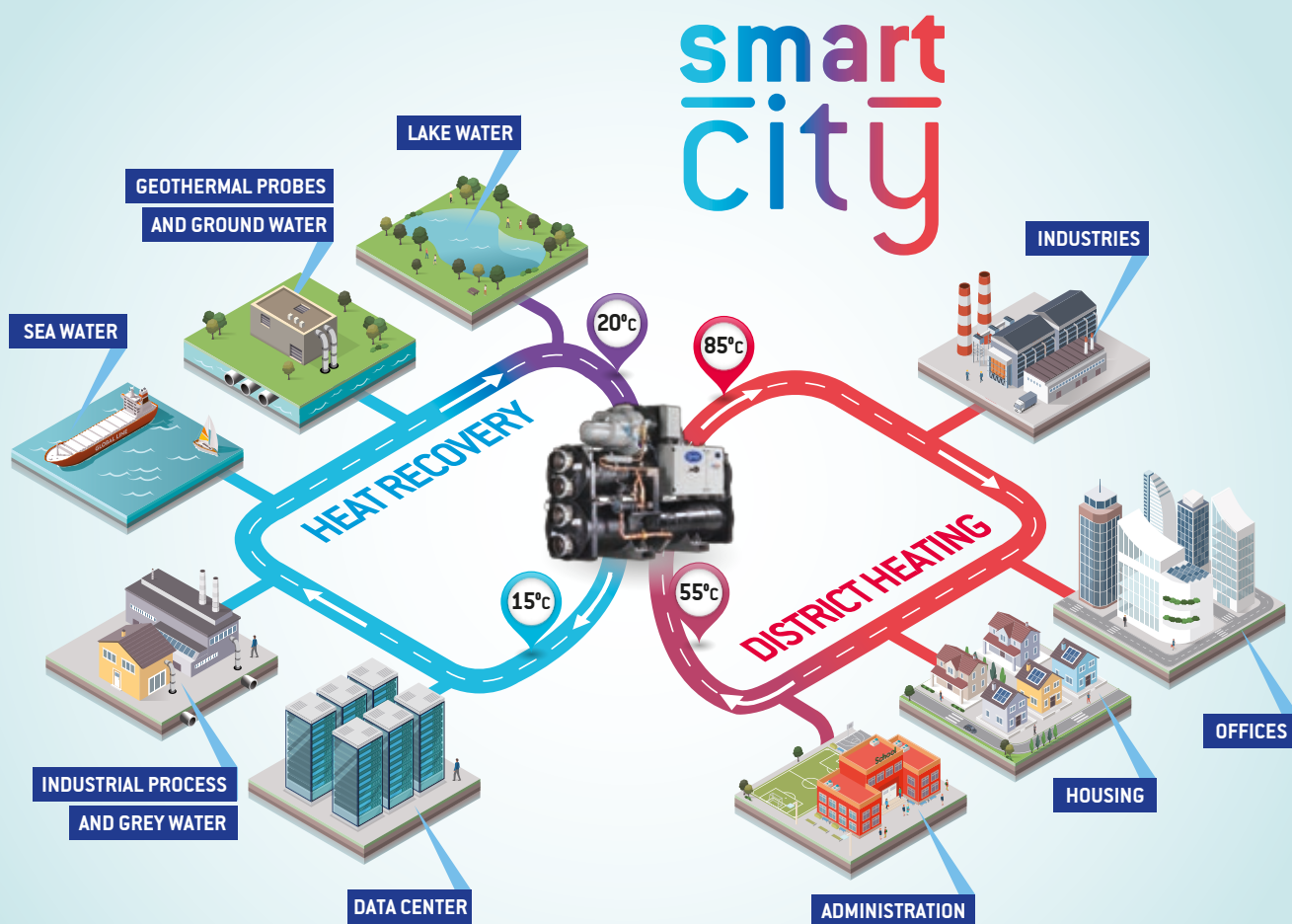
# AquaForce<sup>®</sup>, multiple heating applications

The Carrier AquaForce 61XWHZE heat pumps can **value both natural and wasted heat sources** to offer sustainable energy solutions for multiple heating applications.

By using renewable energy sources for air, water and ground, AquaForce 61XWHZE heat pumps offer smart cities a **more sustainable energy supply solution**.

Delivering hot water up to 85°C, the 61XWHZE heat pumps can supplement traditional boilers in applications such as:

- Commercial building heating
- District heating
- Industrial process heating



**AquaForce, at the heart of smart city,  
providing both natural and wasted heat sources to multiple applications.**

# AquaForce<sup>®</sup>, smart heating production

## ■ 85°C hot water production

The combination of Carrier technology and HFO refrigerant enables to offer high temperature PUREtec heat pumps capable of delivering hot water up to 85°C. Selecting the 61XWHZE, you can now supplement traditional boilers in applications such as district heating or industrial processes. The 61XWHZE units can also simultaneously produce chilled and hot water to supplement boilers and replace chillers.

## ■ High reliability and certified performances

Every Carrier 61XWHZE heat pump is factory assembled on a dedicated production line, leak-tested and run-tested in a ISO 140001 and ISO 9001 certified factory. Furthermore Carrier 61XWHZE heat pumps performances have been checked in UTC laboratory during the development phase and are Eurovent certified by an independent laboratory.

## ■ Eligible to financial incentives

Many government environmental programs provide financial incentives for heat pumps to support renewable heat production in the industry, the district heating sector and at multi-family buildings: Fonds Chaleur, Certificats d'Economie d'Energie (CEE) in France, Non-Domestic Renewable Heat Incentive (RHI) in the UK.

## ■ Low total cost of ownership

61XWHZE manufacture is based on large scale component production, standardized production line with leak test and running test of every machine to guarantee an absolute

reliability and peace of mind for our customers. During operation the bearing life time of the compressors is 100 000 hours without expensive mechanical revision and oil renewal. In regards with preventive maintenance, the cost of the replacement of components is limited as well. Only oil filter, motor expansion valves and liquid line core dryer are periodically concerned.

## ■ Low environmental footprint

61XWHZE heat-pumps are using ultra-low GWP HFO R-1234ze refrigerant in a tight circuit, thus reducing environmental impact of more than 99% compared with previous-generation HFC refrigerants. Furthermore, these units are highly efficient as they reach a COP of 3.0 or more. This results in both direct and indirect CO<sub>2</sub> emissions that contribute to global warming.

## ■ Carrier 61XWHZE multiple other advantages

Carrier 61XWHZE heat-pumps have many other advantages to meet every single customer needs and project constraints. It includes:

- Compact design (from 1000 mm wide) to save space into technical rooms.
- Multiple water connection arrangements for flexible installation in existing technical rooms.
- High entering water temperature on condenser side (up to 60°C) to connect multiple units in series counterflow arrangement.



Up to  
**85°C**



**Heating  
& Cooling**



**Full  
reliability**



**Financial  
incentives  
&  
Low total  
cost of  
ownership**



**Low  
environmental  
footprint**

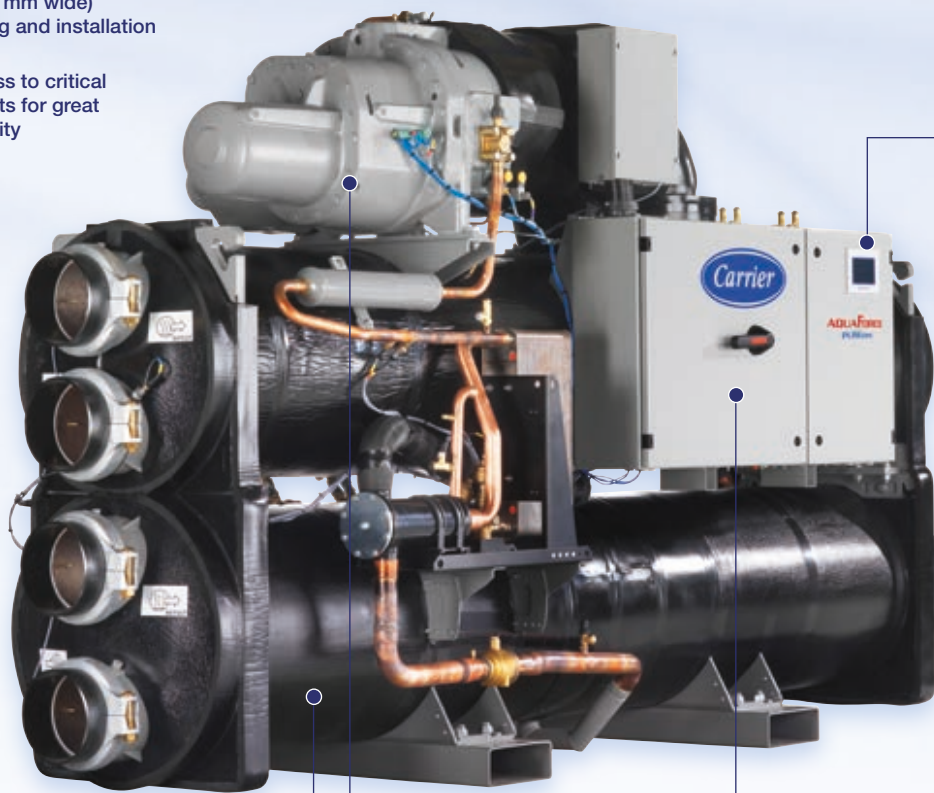


# Technical Insight

## Water-sourced heat pumps with PUREtec refrigerant 61XWHZE

### AQUAFORCE HEAT PUMPS

- Compact sizes (from 1000 mm wide) for handling and installation flexibility
- Easy access to critical components for great serviceability



### SHELL AND TUBE HEAT EXCHANGERS

- Flooded technology for enhanced heat transfer and easy cleaning of the tubes on the water side
- Polyurethane foam thermal insulation as standard
- Water drain and purge
- Up to 1000 kPa operating pressure on water-side

### SCREW COMPRESSOR

- Carrier 06T screw model
- High efficiency motor
- 100 000 hours bearing lifetime in operation
- Variable slide valve for capacity control



### TOUCH PILOT™ CONTROL

- User-friendly touch screen
- All main parameters displayed on one screen
- Direct access to the unit's technical drawings and main service documents
- Easy remote monitoring via the internet
- Easy and secure access to unit parameters

### PRESSURIZED ELECTRICAL BOX

- Integrated fan blowing (outside to inside)
- Interface to receive inlet duct for fresh air
- Hermetic closure (new box, new doors)
- Fan operation detection prior unit startup

**PUREtec**

### PUREtec REFRIGERANT

- Long-term refrigerant solution
- Selection of HFO R-1234ze
- GWP<1
- ODP = 0

# AquaForce<sup>®</sup>, a tried and trusted solution



CORIANCE, Blanc Mesnil • France  
District heating network



## CUSTOMER'S REQUIREMENT

Heating capacity of 4.5 MW with a heat pump system connected to a geothermal heat source, located at 2 km depth.  
Condenser leaving water temperature of up to 85°C.  
Evaporator entering water temperature of 55°C.

## CARRIER'S SOLUTION

2 AquaForce 61XWHZE heat pumps in cascade counterflow system with smart monitoring.



Carrier was ready to provide an innovative solution due to its leadership in HFO implementation. Beyond the high coefficient of performance (COP >4), the 61XWHZE heat pump offers an environmentally responsible solution with a very low GWP and non-toxic refrigerant (HFO R1234ze). Its compact dimensions allow for a simplified installation in existing buildings.



## Bjölse Energy, Oslo • Norway

District heating network for student housing



### CUSTOMER'S REQUIREMENT

Environmentally responsible solutions able to deliver up to 71°C at brine temperature of 1°C.

### CARRIER'S SOLUTION

2 AquaForce 61XWHZE heat pumps with PUREtec HFO refrigerant, recovering heat from geothermal source and from a nearby supermarket.



Carrier ensures the full reliability of the plant and experts close at hand. The smart algorithms of the control allows for a perfect management and monitoring of the heat pumps with the bio boiler in place.



## YGEO, Rosny sous bois, Noisy le sec, Montreuil • France

District heating network



### CUSTOMER'S REQUIREMENT

Heating capacity of 12 MW with a heat pump system connected to a geothermal heat source, located at 1.8 km depth. Condenser leaving water temperature of up to 80°C. Evaporator entering water temperature of 52°C.

### CARRIER'S SOLUTION

6 AquaForce 61XWHZE heat pumps in cascade counterflow system with smart monitoring.



The 61XWHZE range offers full modularity due to the cascade system and smart monitoring management. The combination of full reliability and low maintenance ensure a high level of availability. Smart Carrier algorithms have been designed to optimize cascade system efficiency.



## CADZIPLO, Plan-les-Ouates • Switzerland

Europe's first screw water-to-water heat pumps using HFO for a district heating application



### CUSTOMER'S REQUIREMENT

Compliance with stringent Swiss refrigerant regulations. Combination of reduced low GWP and high efficiency with a heating capacity of 2.5 MW.

Re-use of data center energy as district heating source thanks to the large operation envelope of the AquaForce heat pumps.

### CARRIER'S SOLUTION

2 AquaForce heat pumps with PUREtec HFO refrigerant.



Carrier's experience and its leadership of HFO implementation have made the difference.



DISCOVER THE CADZIPLO PROJECT  
ON [YOUTUBE.COM/C/UTCCLIMATECONTROLSSECURITY](https://www.youtube.com/c/UTCCLIMATECONTROLSSECURITY)

# Technical characteristics



The AquaForce 61XWHZE range covers heating capacities from 200 kW to 2500 kW and up to 12 MW or more in cascade systems when used with Carrier's plant room management solution.

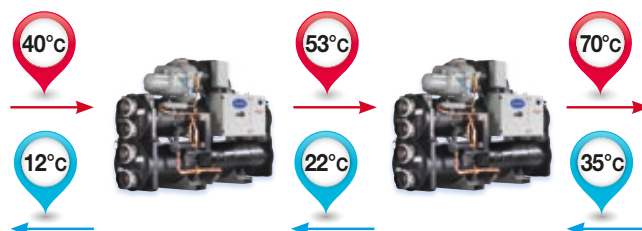
In a series counterflow arrangement with multiple 61XWHZE heat pumps, heating system efficiency is maximized. The work done (lift) by each compressor is reduced, which significantly improves the efficiency of the heat pumps at full and part load conditions. Such series counterflow arrangement can improve system efficiency by as much as 40% and Carrier's plant room controls solution ensures efficient and precise control of multiple units to ensure that individual units act as one to meet the applications requirement.

## SYSTEM ONE 1x heat pump unit



COP up to  
+ 40%

## SYSTEM TWO 2x heat pumps units in series counterflow



**Series counterflow arrangement can improve COP by up to 40%**

61XWHZE	Model L / - / H*	Size						
		3	5	7	10	14	15	17
HEATING CAPACITY*	kW	300	484	727	967	1453	1468	1570
LENGTH	m	2.7	3.1	3.3	4.7	4.7	4.8	4.8
WIDTH	m	0.9	1.1	1.1	1.1	1.2	1.4	1.4
HEIGHT	m	1.6	1.8	2.0	2.0	2.1	2.3	2.3

In accordance with standard EN14511-3:2013. Heating performances of model H based on condenser hot water temperature 70°C/75°C and evaporator water temperature 20°C/15°C.

\*Each model is available in three versions to optimize system efficiency and offer multiple combinations: "L" for low heat source temperatures, "-" for medium heat source temperatures and "H" for high heat source temperatures.

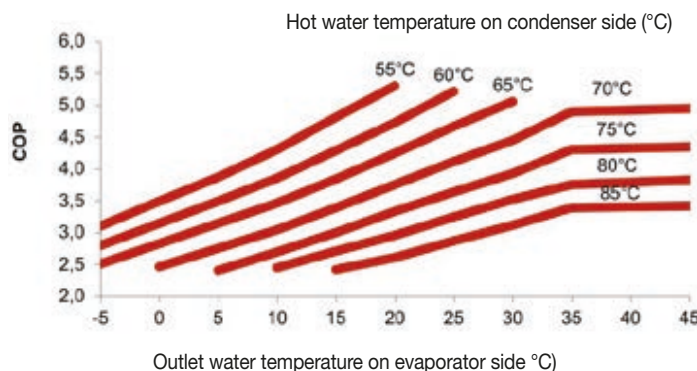
## MAIN OPTIONS

- Counterflow hydraulic configuration to maximize system efficiency
- Exchangers with one pass more for large DT > 20 K on evaporator and condenser sides
- Evaporator with one pass less to reduce significantly water pressure drops and pumping energy costs
- Welded or flange water connections
- Low noise option using evaporator acoustic insulation
- Star/delta start to reduce the unit inrush current (models 3, 5 and 10 only)
- Pump power/control circuit (models 3 to 10 only)
- Master/slave operation
- 7 inch Touch Pilot user interface
- J-Bus, Lon, Bacnet over IP communication gateways
- Carrier smart monitoring solutions for remote energy servicing

## ENERGY EFFICIENCY OF 61XWHZE HEAT-PUMPS IN SINGLE UNIT CONFIGURATION

The COP of 61XWHZE heat-pump will vary depending on the temperature difference between the heat source (evaporator side) and the heat sink (condenser side). The work done (lift) by each compressor is reduced when this temperature difference is low thus significantly improving the efficiency of the heat-pump.

### 61XWHZE COP



[www.carrier.com](http://www.carrier.com)

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