

Ultra Efficient Technologies from MHI

Mitsubishi Heavy Industries introduce 30kW Heat Pump Water Heater



MHI's **NEW** "Q-Ton"

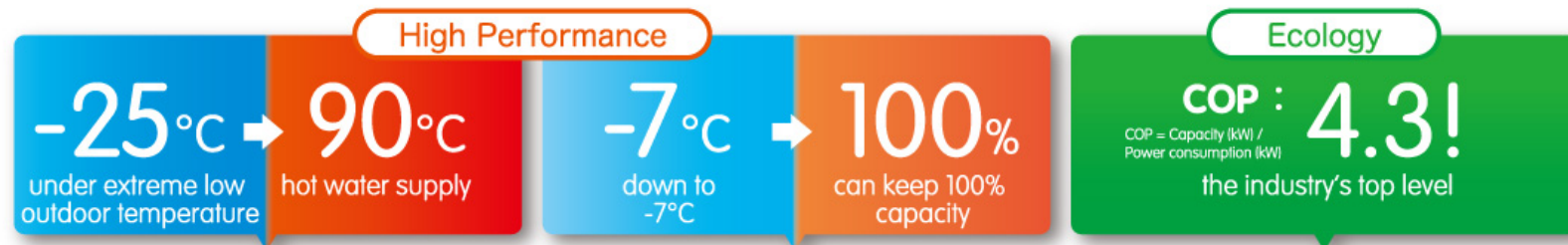
The World's **FIRST** 2-Stage CO2 Compressor

Provides Hot Water up to 90°C

COP of up to 4.3
[430% efficiency!]

Operation down to -25°C Ambient

Utilises **NATURAL REFRIGERANT**



Performance issue to be solved on conventional air to water heat pump

When operating under low outdoor temperature, heating capacity and heating efficiency decrease significantly.

MHI solution

Point 1 The world's first CO₂ two-stage compressor (Scroll + Rotary) is adopted.

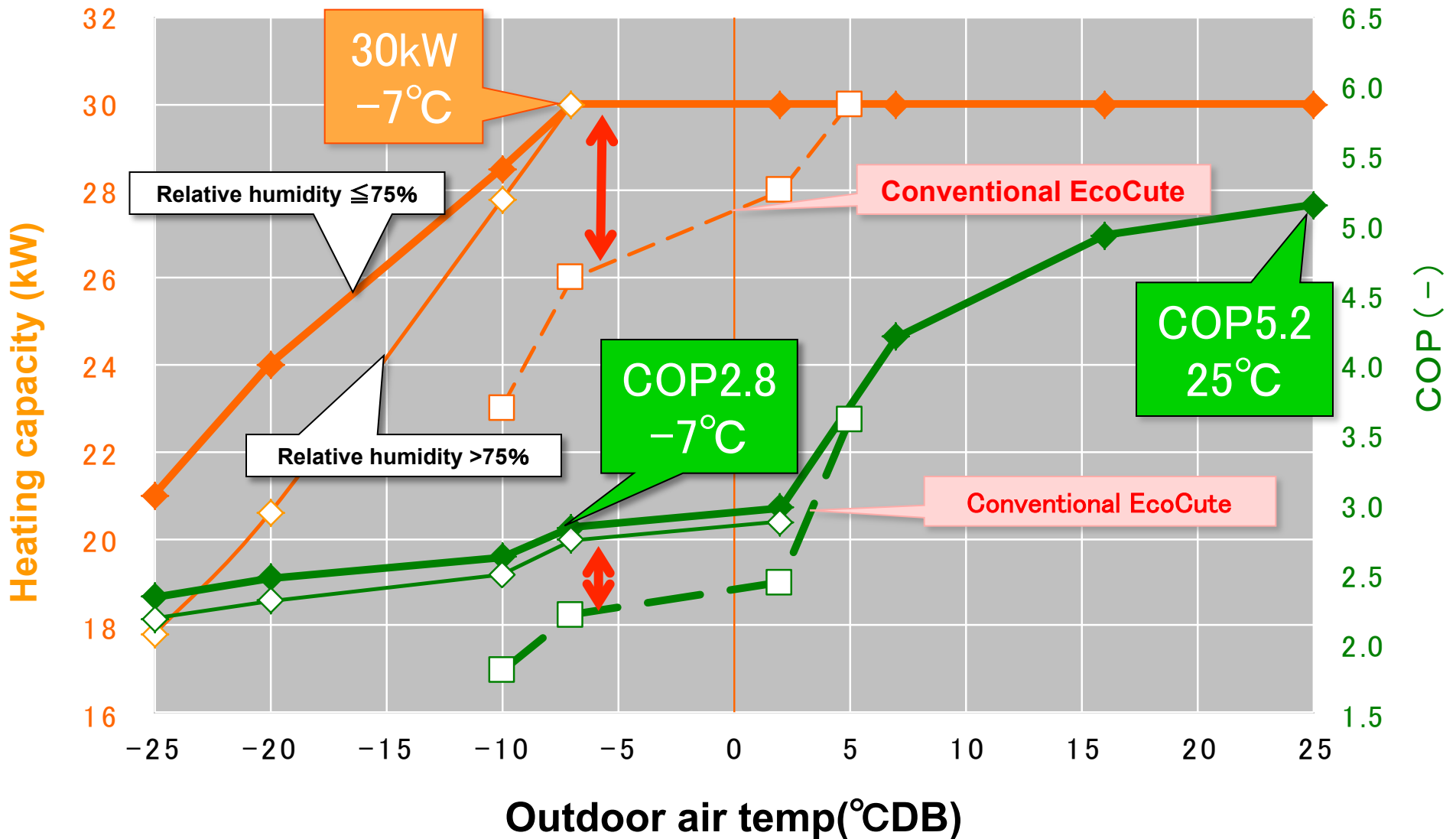
Point 2 The rated heating capacity is 30kW and sustainable at ambient air temperature as low as -7°C

Point 3 The COP on rated conditions reaches 4.3, which is the highest level in the industry

Point 4 A 90°C hot water supply is available even an ambient air temperature as -25°C

Heating performance characteristics curve

【Hot water outlet temp: feed water inlet temp 5°C→outlet water 65°C】

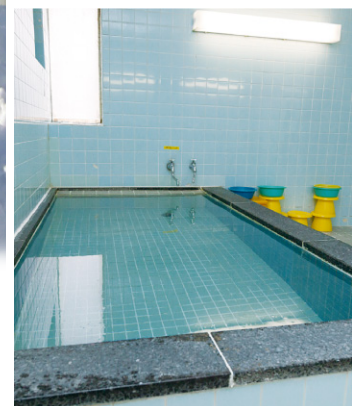


Field Test installation site

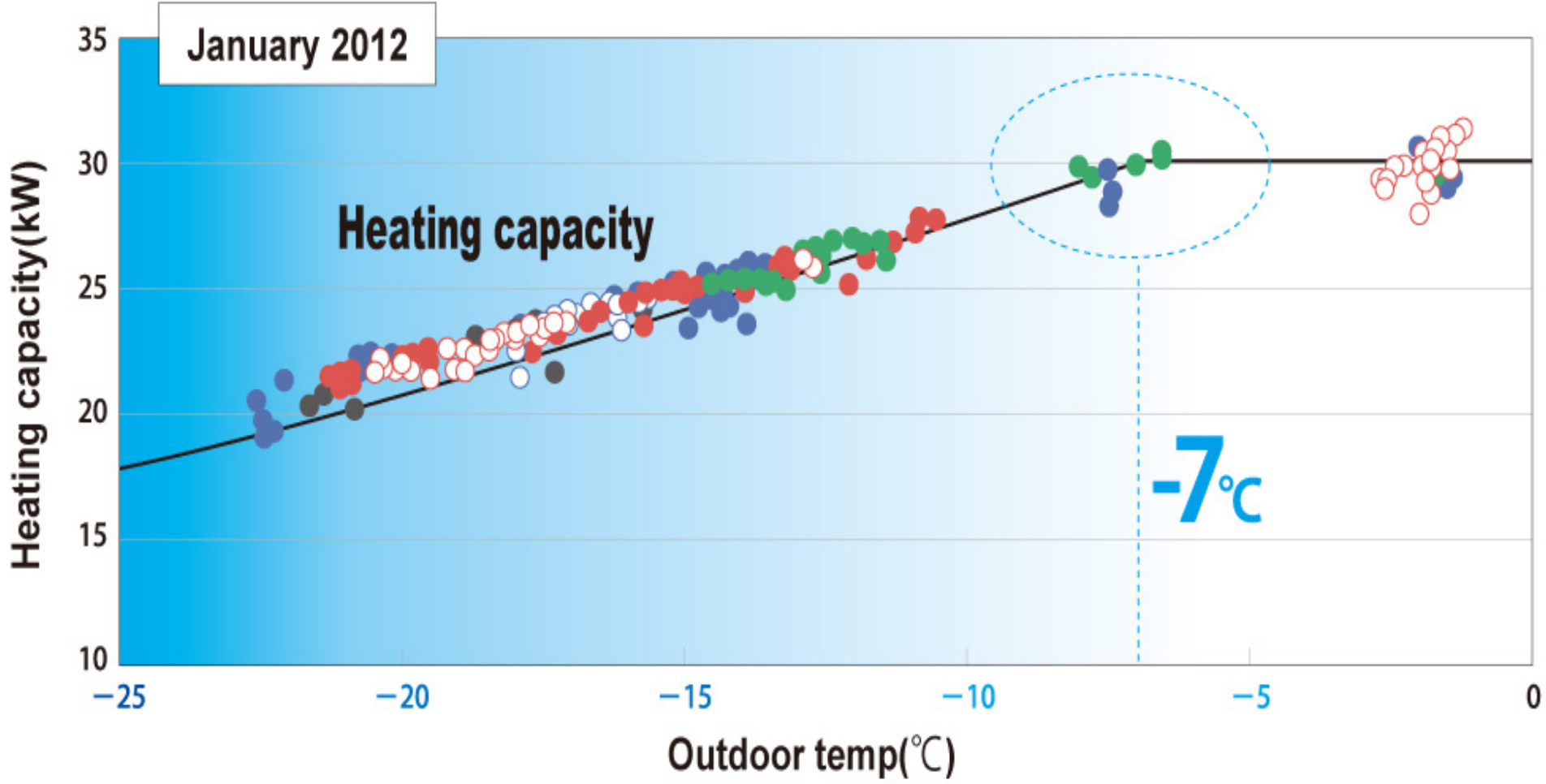
A certain pharmaceutical company



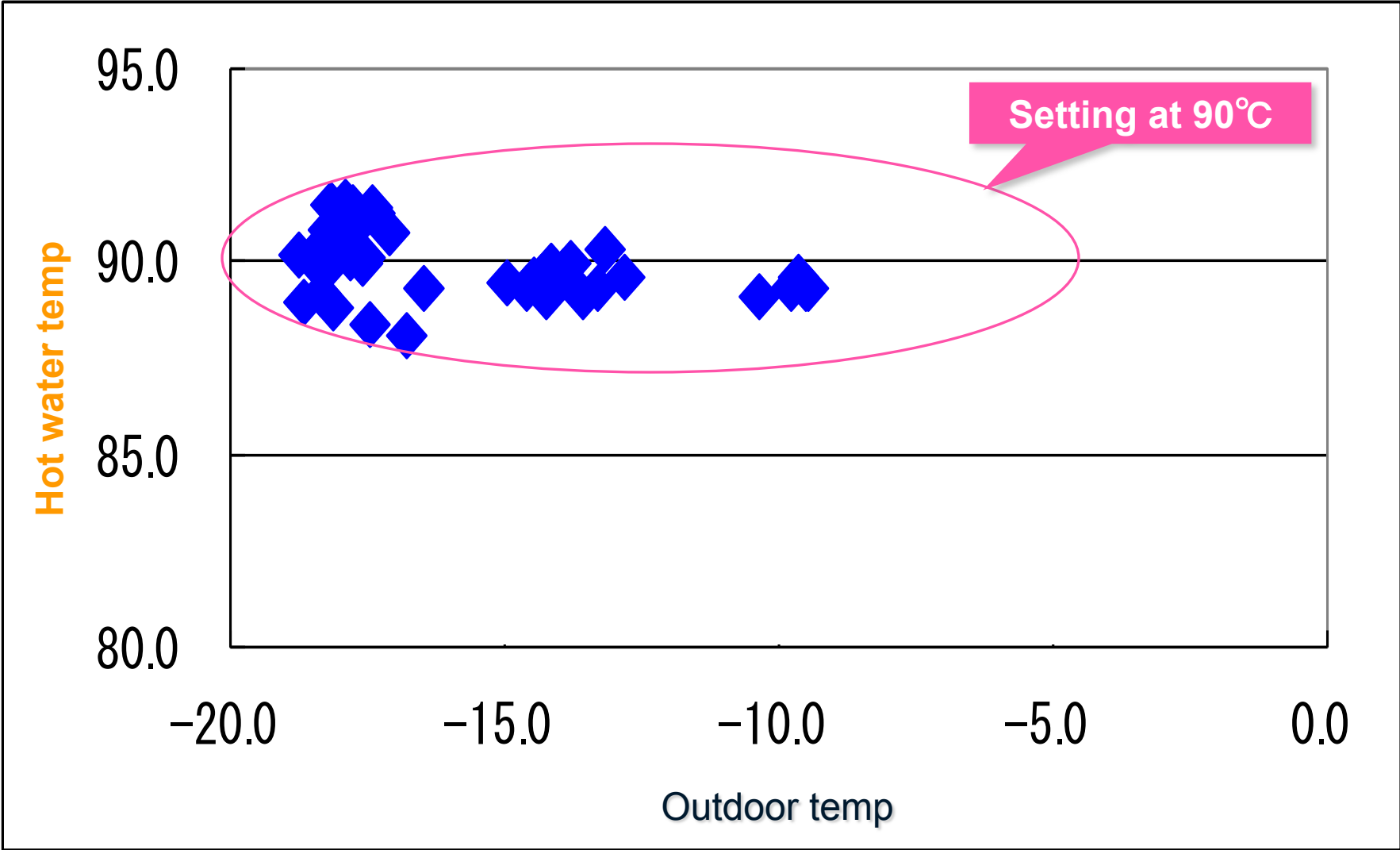
- **System composition**
Q-ton 1 unit,
Unvented cylinder 500ℓ x 4units
- **Purpose of use**
Kitchen and bathroom



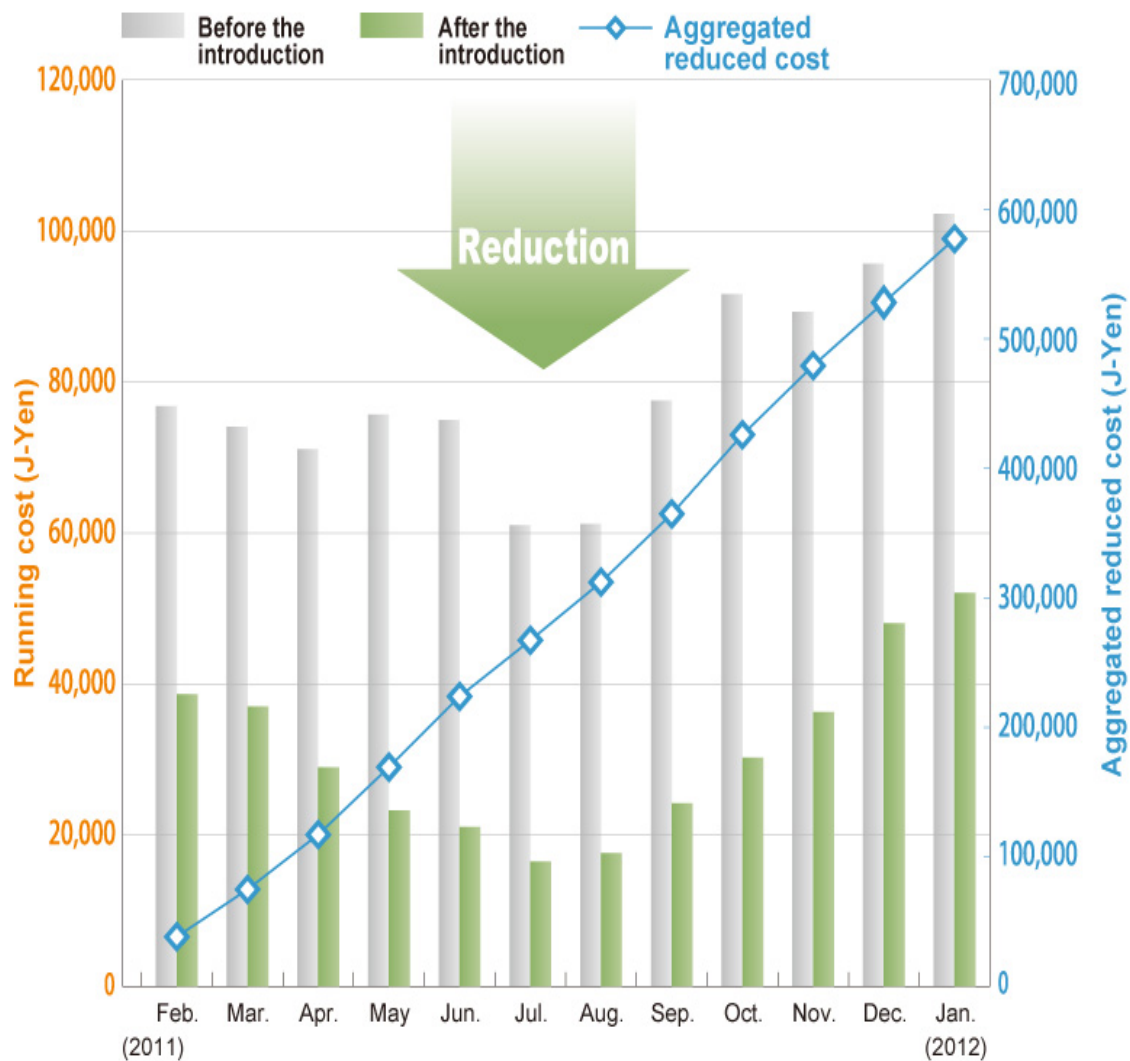
◆ Relationship of heating capacity and the outside air temperature



Field Test; Actual Supplying 90°C hot water



Cost-saving result Annual results summary



Running cost
-61%

Co2 emission amount
-29%

[Calculation conditions]

Price rate	
Q-ton/electric rate	The summer : ¥11.65/kWh, The other season: ¥10.70/kWh
Boiler/kerosine	: ¥90/L
CO2 emission amount	
Q-ton/electric	: 0.546kg-CO ₂ /kWh
Boiler/kerosine	: 2.490kg-CO ₂ /L

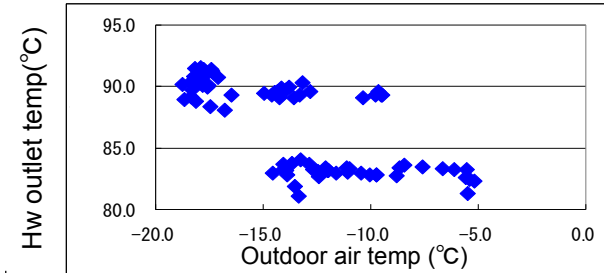
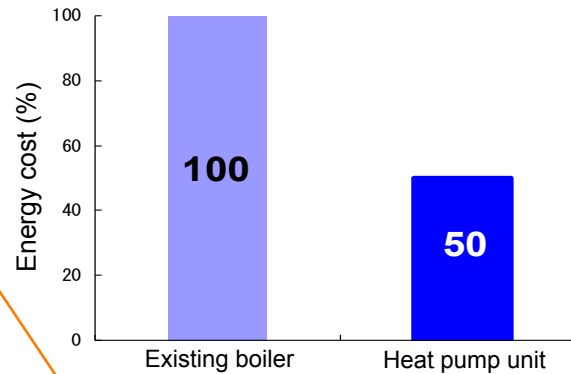
■ Energy cost was reduced to 43-54% in comparison with the conventional boiler in the winter season when operation conditions were the severest for heat pump unit. And there was no trouble. (at the lowest temperature: -20°C)

■ In the intermediate season and summer season when heat pump performance improves, it can be presumable that energy cost may be reduced further.

Hokkaido

- Supplying hot water for kitchen and hand-wash
- 30kW x 1set + unvented cylinder
- Installation site: Hokkaido area severely cold area (-20°C or lower)

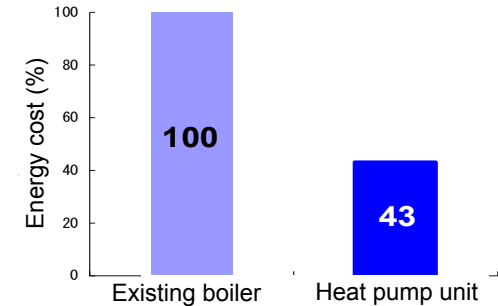
In Hokkaido (Dec/2010 to Jan/2011)



Iwate

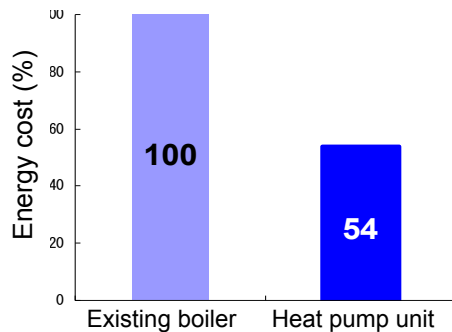
- Supplying hot water for kitchen and bath
- 30kW x 1set + unvented cylinder
- Installation site: North Iwate area severely cold area in Tohoku

In Iwate (Jan/2011 to Mar/2011)



Toyama

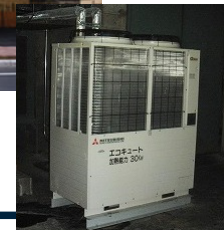
Toyama (Jan/2011 to Feb/2011)



- Preheating feed water to the boiler
- 30kW x 1set + heat exchanger
- Installation site: Toyama area Low temp and high humidity area

Installation Sample in Japan

spreading through the various fields of Japan



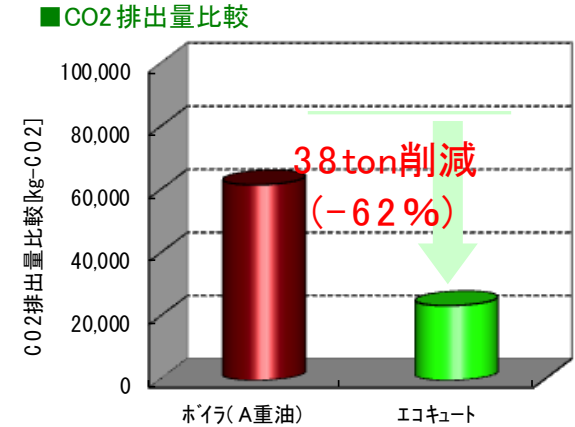
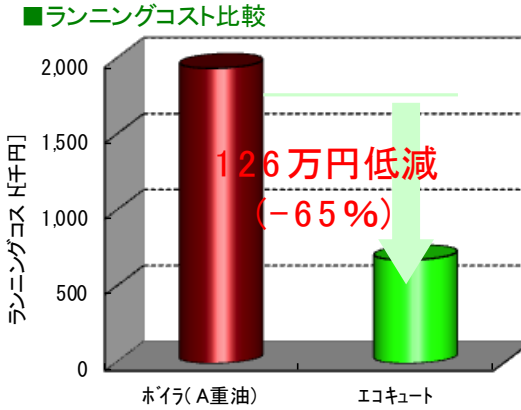
Installation Sample① (Hybrid system with boiler)

The hybrid system combined with a boiler takes advantage of good sides of 2 system.

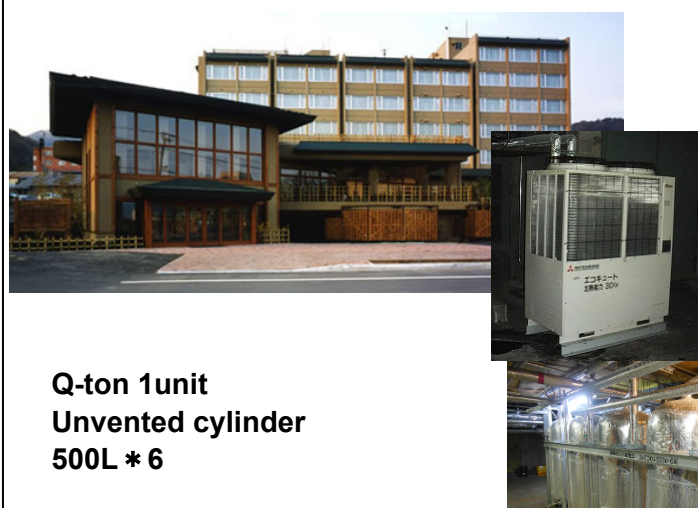
Japanese hot spring hotel in Hokkaido ,4 places



Q-ton 1unit
Unvented cylinder 4000L



Q-ton 1unit
Unvented cylinder 4000L



Q-ton 1unit
Unvented cylinder
500L * 6



Q-ton 1unit
Unvented cylinder 4000L



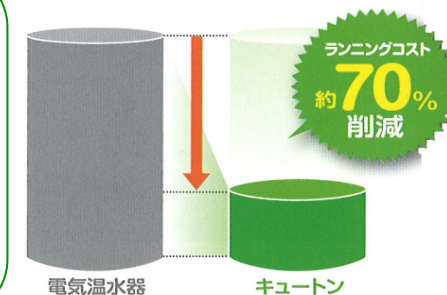
Nursing home for the aged in Fukushima



Key factor of the installation

- Deterioration of existing facility
 - Increase of the consumption of hot water
 - Repeated troubles
- ⇒focus on Q-ton

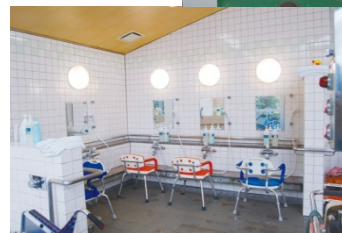
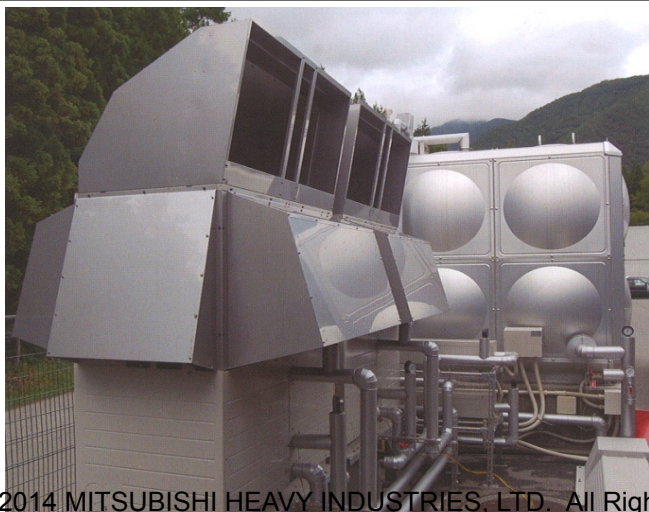
●ランニングコストの大幅削減



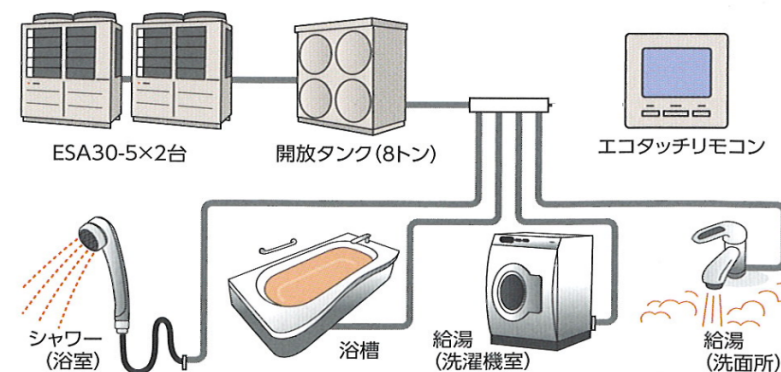
**Approximately 70% of reduction in running cost !
(comparison with the electric heater)**

Building : Reinforced concrete
floor space: 12675m²
capacity of accommodation: 70 people

System composition
Q-ton; 1unit, Open tank; 8000L

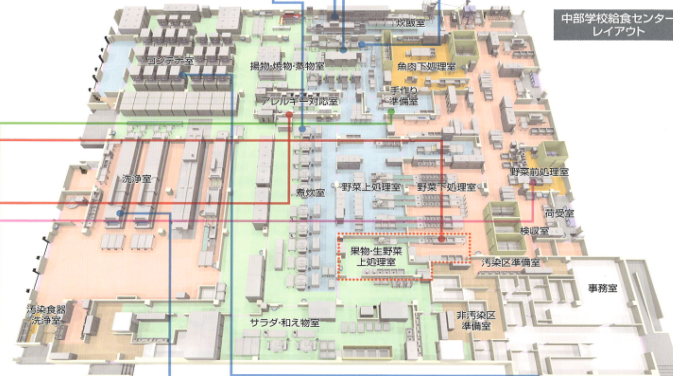


[システム図]



Installation Sample③ (School lunch center)

all-electric facility school lunch center in Shizuoka



【野菜洗浄専用ライン】 【アレギー対応室】



地元野菜の受けの様子 【野菜前処理室】



【手作り準備室】 【強化磁器食器】



【災害時救出室】 【炊飯室】

● 作業環境と効率を高めた洗浄・保管システム



【自動食器洗浄機】 【コンテナ消毒保管庫】

汚染作業区域
非汚染作業区域
高度清潔作業区域



- **System composition**
Q-ton 12units,
Large open tank 72m³
- **Purpose of use**
hot water supply for
dishwashers

Installation Sample④ (Food factory)

- **System composition**

Q-ton 4units,
Open tank 4,000L, 15,000L

- **Purpose of use**

Cleaning in the factory, food manufacturing process use



Installation Sample⑤ (Sauna SPA)

- **System composition**
Q-ton 2units,
Horizontal closed tank 8,000L
- **Purpose of use**
Bathroom, shower, faucet Utilizing existing tank and boiler.

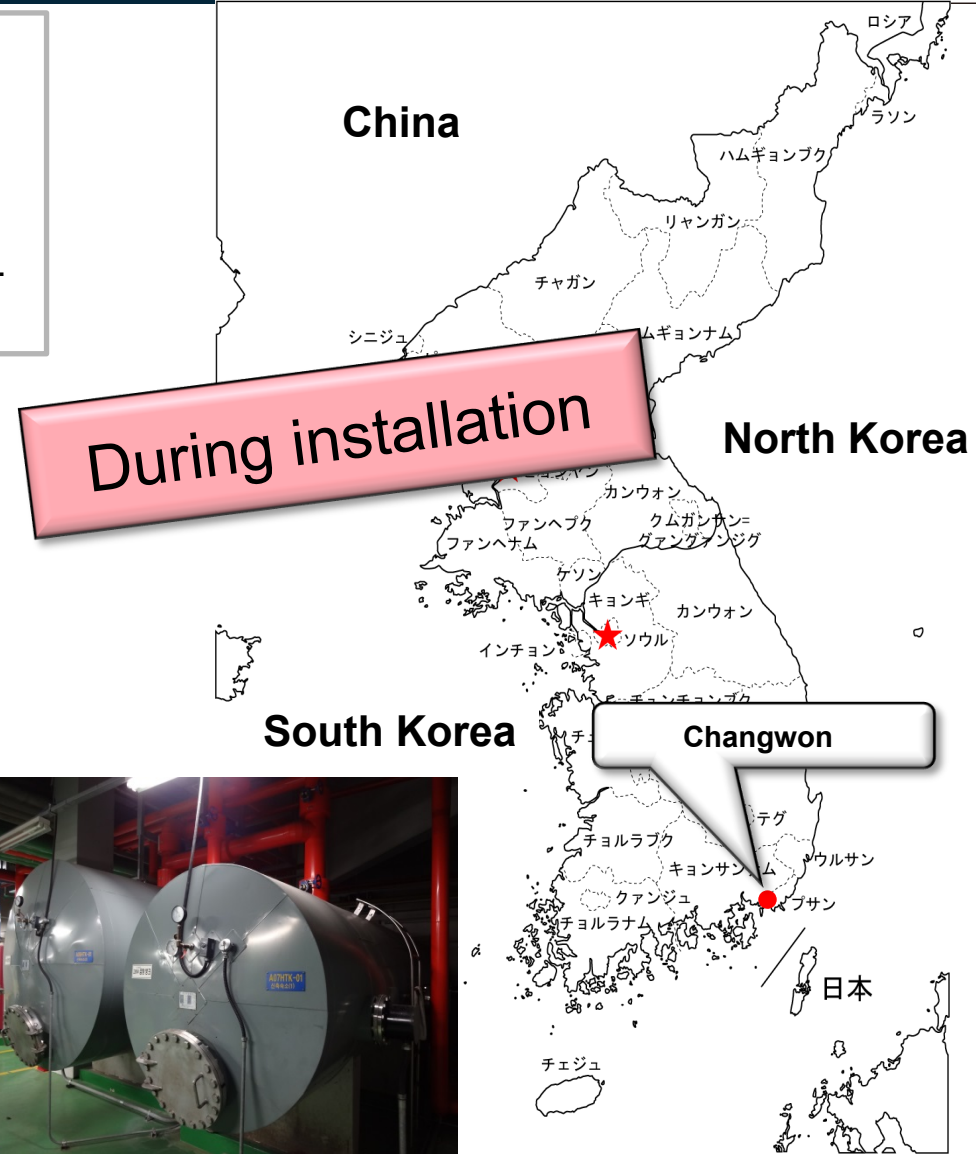


During installation



Installation Sample⑥ (Company dormitory)

- **System composition**
Q-ton 8units,
Horizontal closed tank 12,000L x 2
- **Purpose of use**
Bathroom, shower, faucet Utilizing existing tank and boiler.



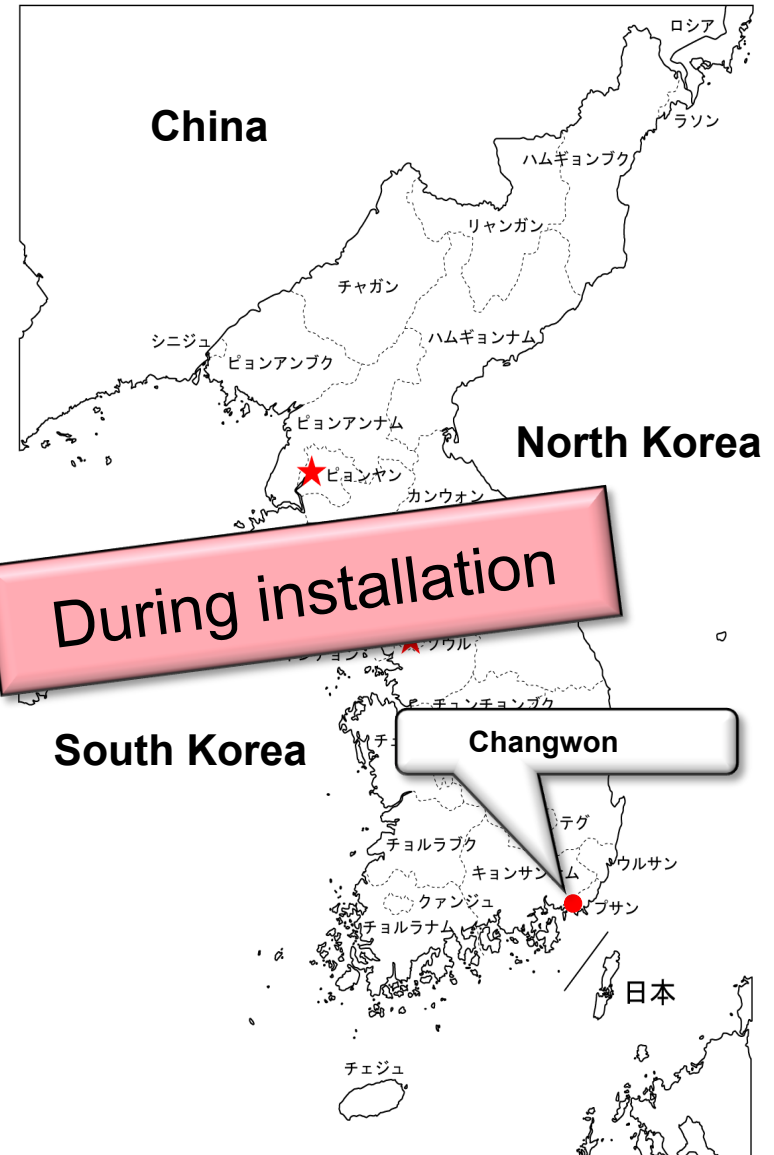
Installation Sample⑦ (Company guest house)

- **System composition**

Q-ton 1unit,
Upright closed tank 5,000L

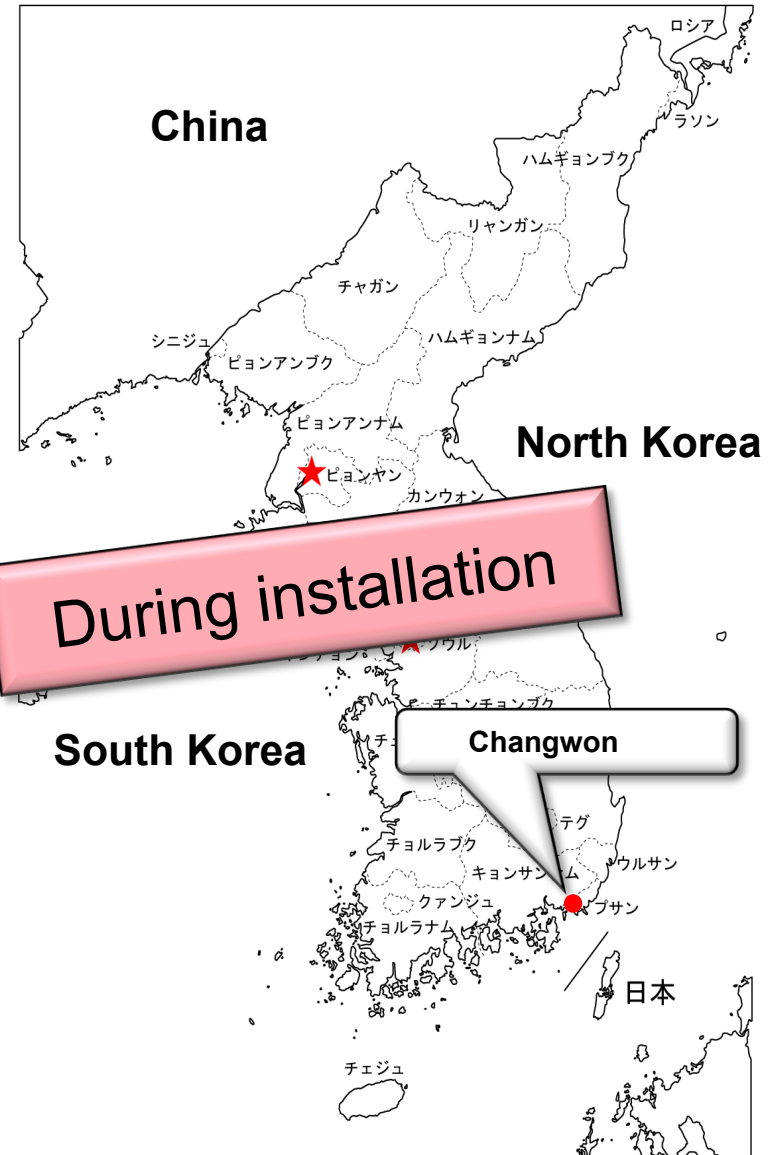
- **Purpose of use**

Bathroom, shower, faucet Utilizing existing tank and boiler.



Installation Sample⑧ (Company Learning Center)

- **System composition**
Q-ton 1unit,
Horizontal closed tank 5,000L
- **Purpose of use**
Bathroom, shower, faucet Utilizing existing tank and boiler.



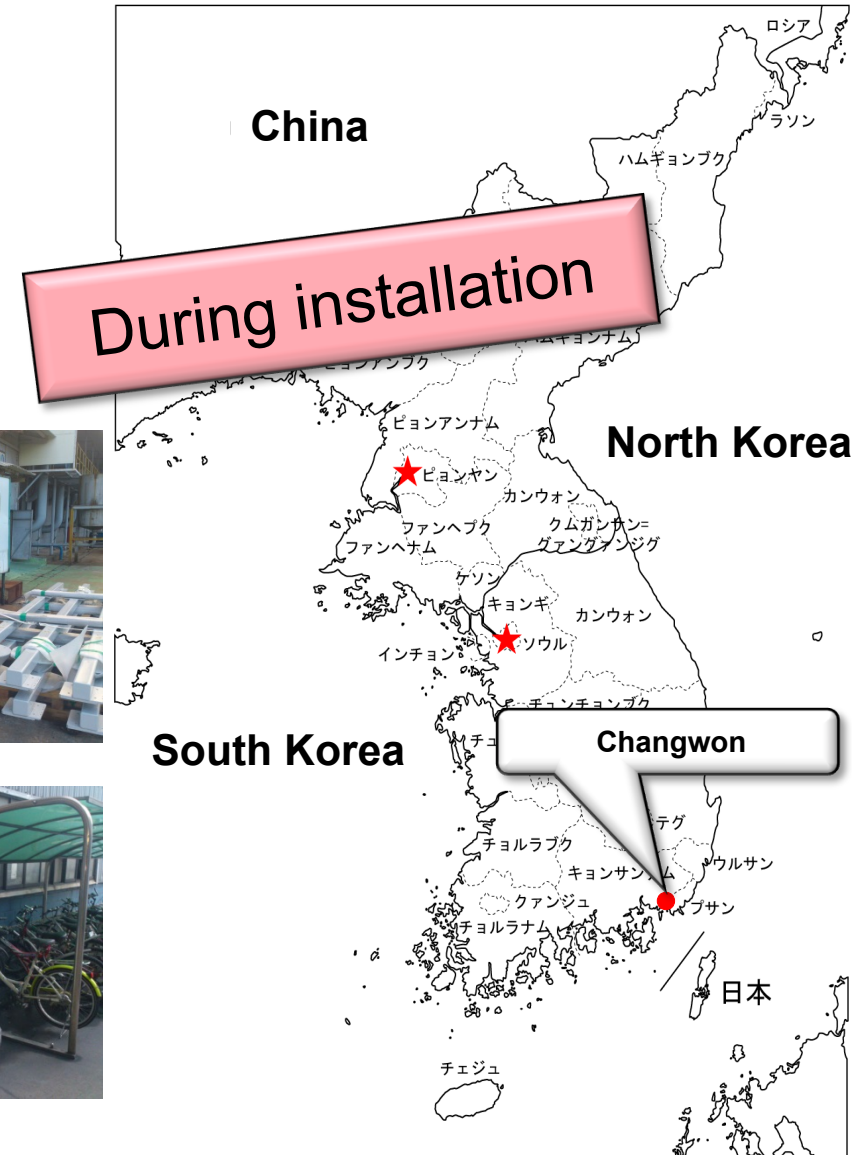
Installation Sample⑨ (Doosan Heavy Industries)

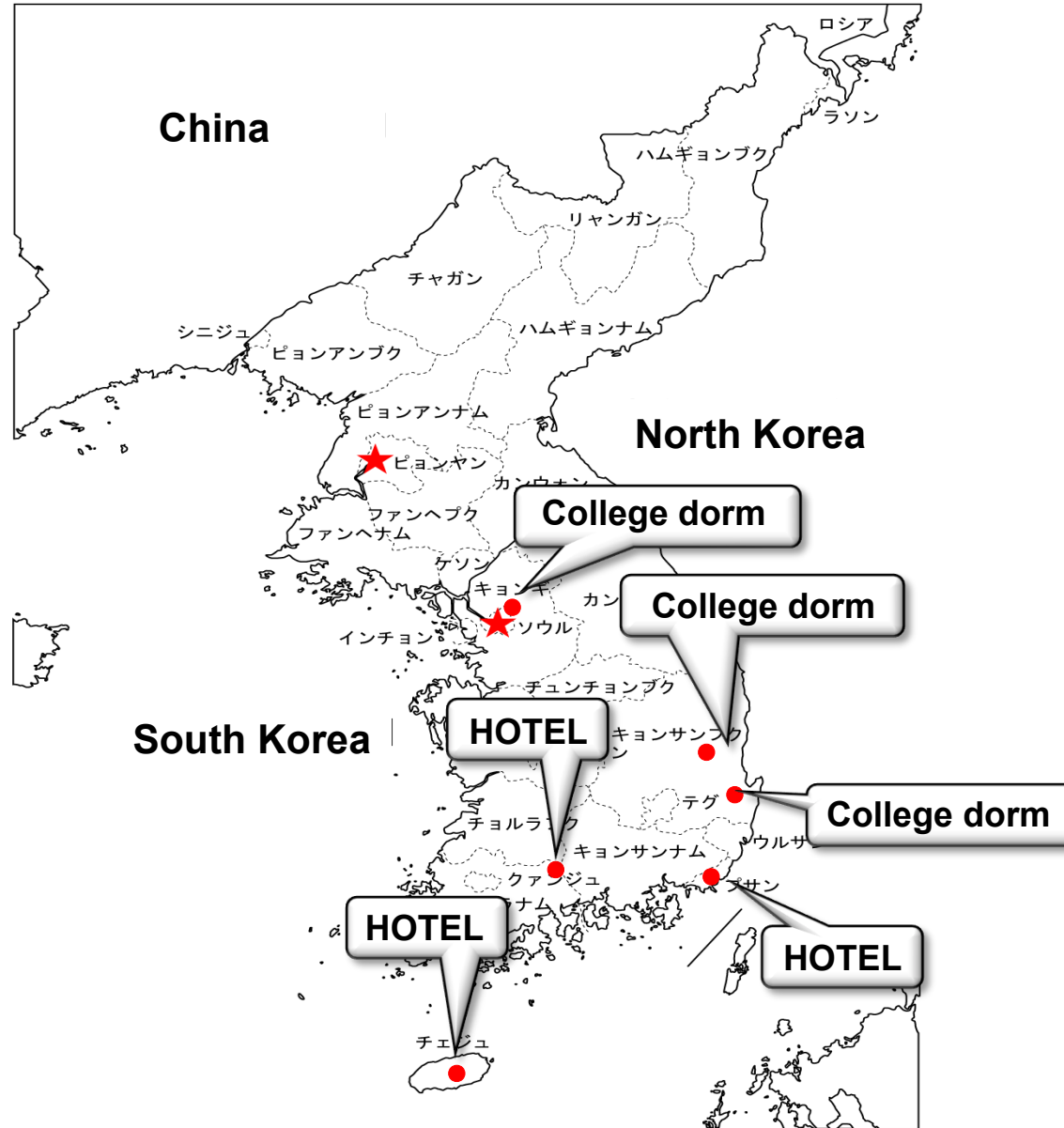
- **System composition**

Q-ton Total 12units,
Canning factory 2units, Boiler plant 2units, Forge shop 2units,
Casting plant 1unit, Auxiliary equipment factory 2units,
Administration Bld. 1unit, Main office Bld. 2units

- **Purpose of use**

Shower, faucet Utilizing existing tank and boiler.



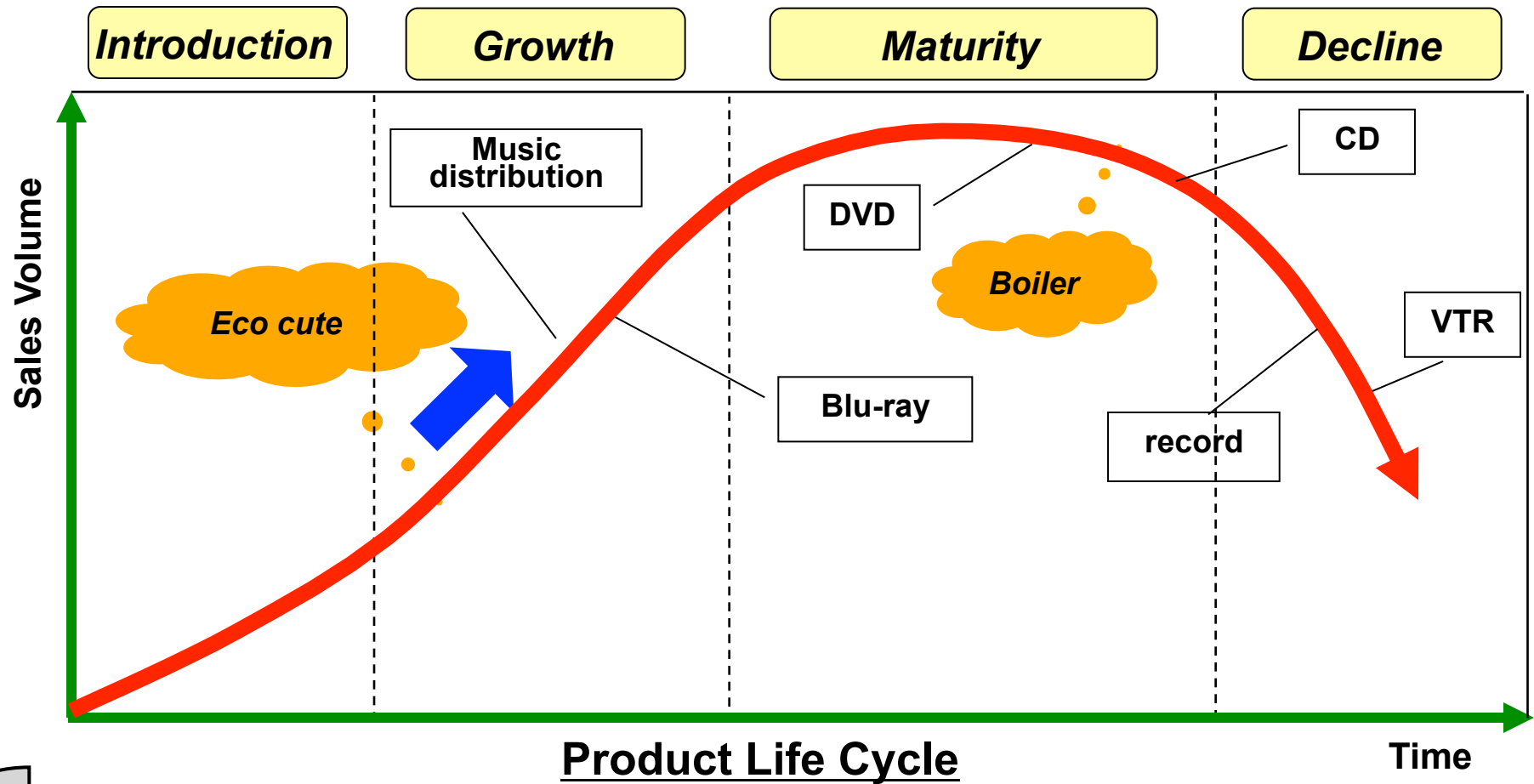


The rated heating capacity of 30kW is sustainable at ambient air temperature as low as -7°C

In the field-test, the Q-ton operational cost was really lowered by almost half.

Q-ton came to be used in the various fields and in various areas including Korea as well as Japan

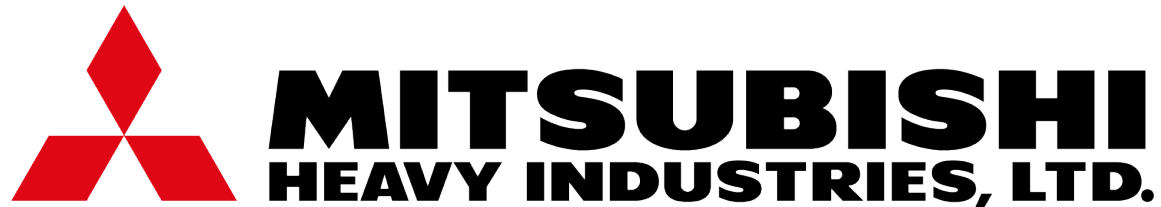
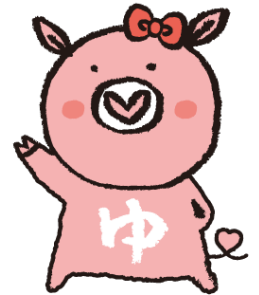
The prospects of the transition of “Eco Cute”



We want to expect the growth of “Eco Cute” in the product life cycle

 **ATMO**
sphere
solutions for asia
natural refrigerants
3-5 February 2015 in Tokyo

Thank you for your kind attention



Our Technologies, Your Tomorrow