



# Brazed Plate Heat Exchangers: A Gasket Free Option

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Can Brazed Plate Heat Exchangers offer high capacities?

Can Brazed Plate Heat Exchangers be Cleaned?

Can you extend Capacity of a Brazed Plate Heat Exchanger?

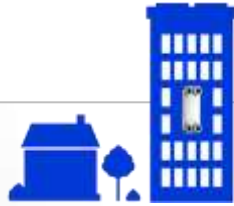
What is the main difference in on site installation?

Does PHE (Gasket Plate Heat Exchanger) saves you money?

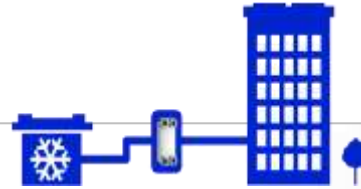
# Brazed Plate Heat Exchangers Capacity Development



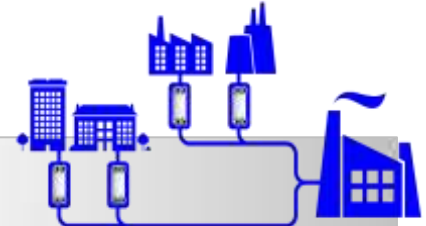
Header Stations



Pressure Breakers



Glycol Breakers /  
Intermediary HEX



District Cooling

m<sup>2</sup>

23

46

70

100

118

150

192

246

302

492

B50

B427

B439

B439

B633

B649

B649

B649

B649

2XB649

1

2

3

4

5

6

8

10

12

20

M  
W



SERIAL PARALLEL UNITS

1985

1993

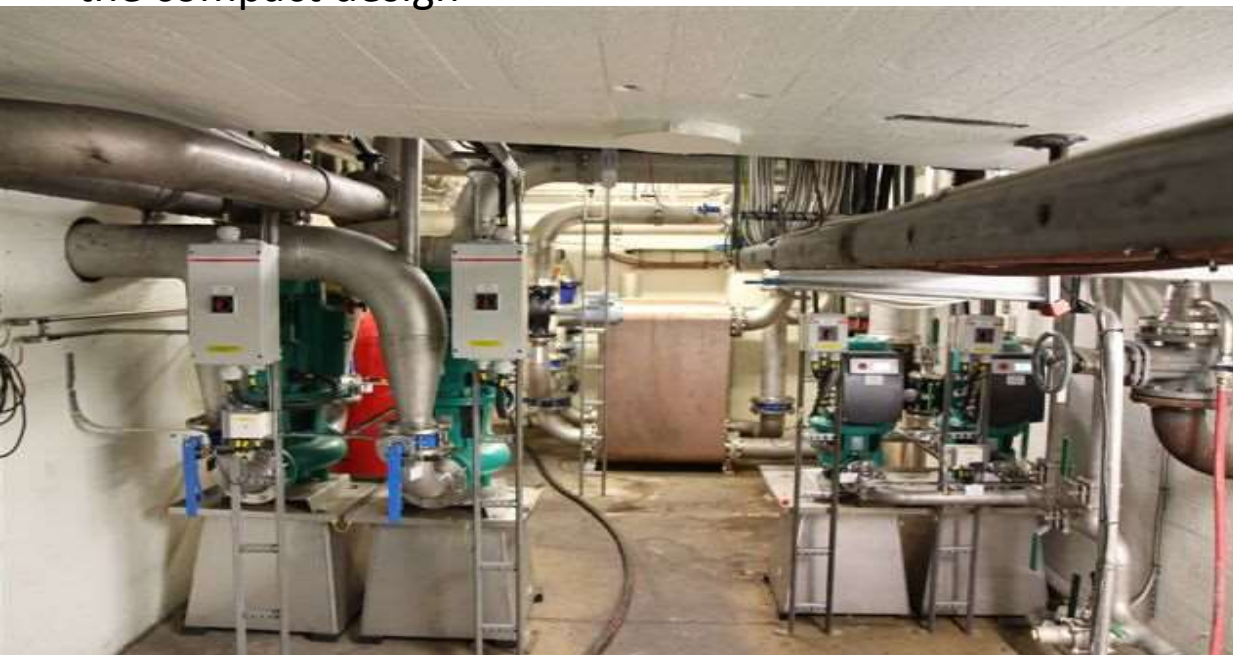
2012



- 5 BPHE each at 9 MW with supply temp of 140C/284F at 22 Bar
- High temp and high pressures allows life cycle cost savings
- Substantial space savings due to the compact design

# Outokumpu, Sweden 1200 kW Free Cooling Installation

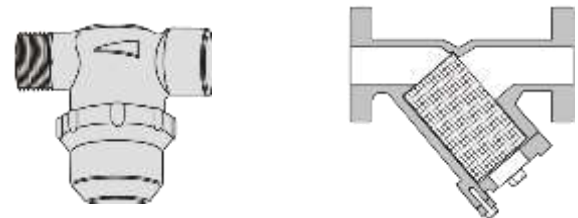
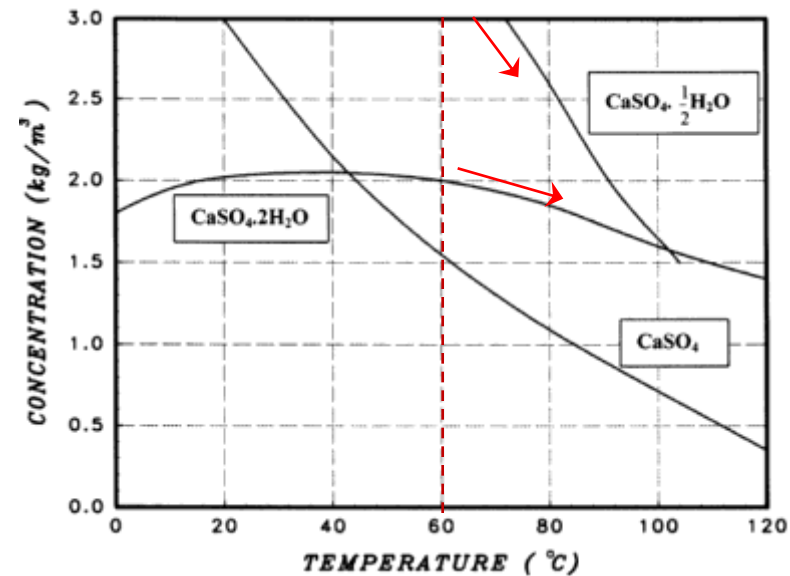
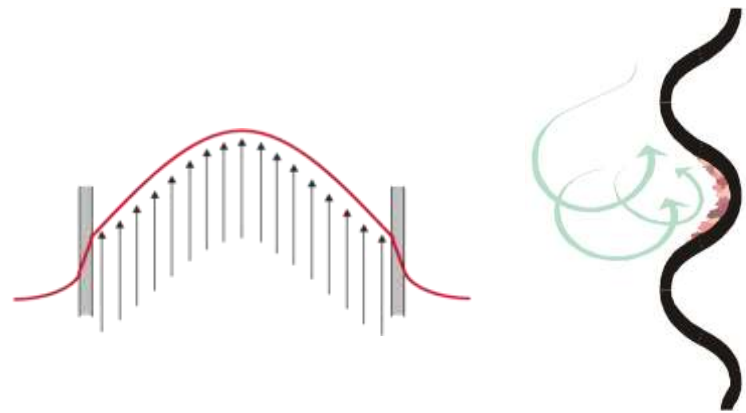
- Free Cooling for a process plant directly connected to the river only using a filter
- High efficiency offering constant temperature in machine shop
- Substantial space savings and easy installation due to the compact design



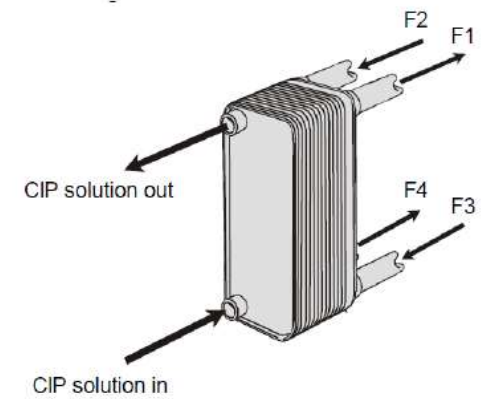


# Fouling of Heat Exchangers

- Poor water quality
  - Calcium
  - Corrosive
  - Particulates
- Low flow turbulence
  - Reynolds  $< 150$
  - Shear stress  $< 50$ ,  $< 100$  Pa
- Temperatures
  - Scaling:
    - Cold  $\rightarrow$  Hot
    - Max reachable temp.  $> 60^{\circ}\text{C}$  ( $< 140^{\circ}\text{F}$ )
  - Corrosion rate
  - Biological growth
- Maintenance
  - Filters
  - Inhibitors-type, concentration, reaction
  - Bleed-off in open recirculated systems



# CIP Cleaning works fine also for BPHE



On site Cleaning for larger Units  
Dismantled for Smaller Units

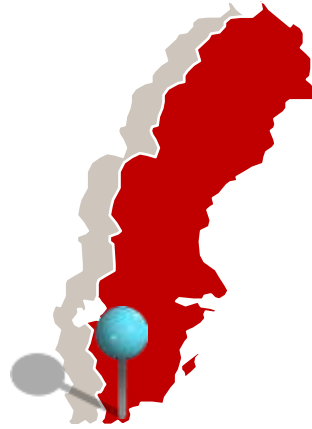


# CIP Cleaning Results





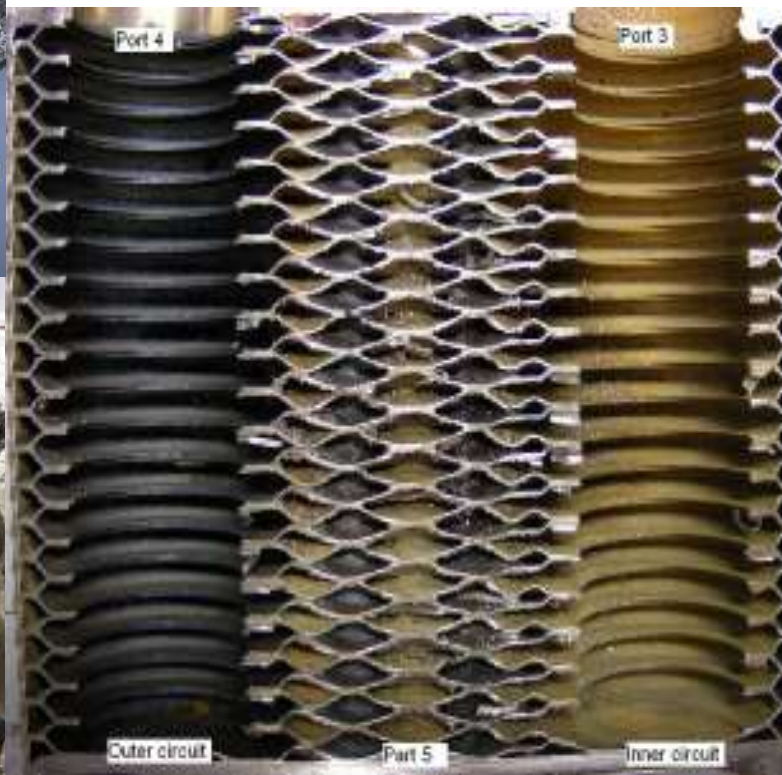
# Ringsjön case story



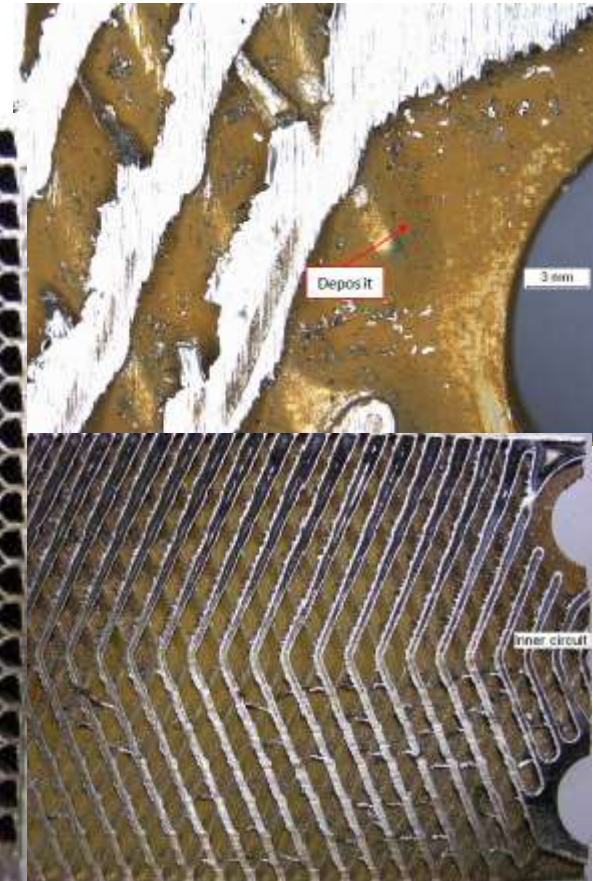
- 4 BPHEs used for tap water (dH 11) heating between 4 to 6 years
- Mild lime scale
- The units showed signs of mild fouling, but were still **fully** functional.



Plant side



Tap-Water side



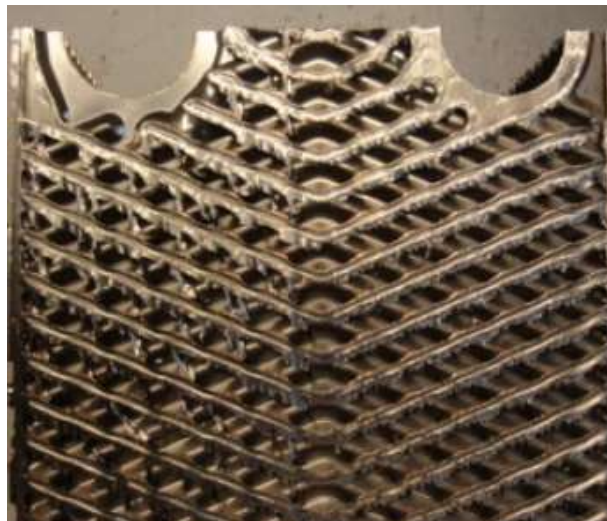


# Ringsjön case story

- Thermal and hydraulic performance tests were conducted before and after CIP treatment on the tap water side on all units
- The test results showed improvements in thermal performance by 5% and in hydraulic performance by 2%.



**Plant  
side**



**Tap Water  
side**



**Reference in CIP Guidelines & CIP Brochure**

## Capacity extension to 3 MW (10,2M BTU/Hr)





## Easy access with BPHE



- 8 BPHE entered in standard door way and erected very short period of time





# Swift Installation and positioning



# Brazed Plate Heat Exchanger vs PHE



## BPHE advantage

### Size

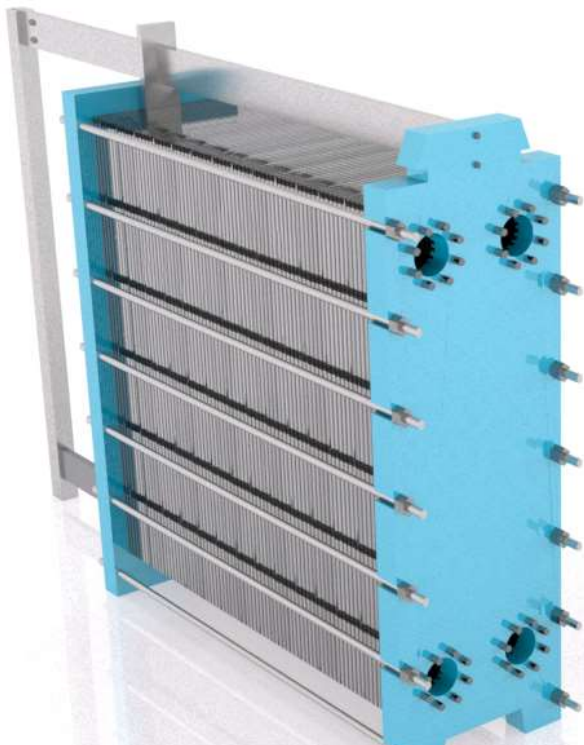
- Large BPHE Units occupies less than half the footprint of corresponding PHEs.
- A PHE weights at least twice as much

### Operational reliability

- Elimination of gaskets ensures unparalleled up-time and maintenance costs.
- Fixed plate package means stable performance

### Maintenance need and LCC

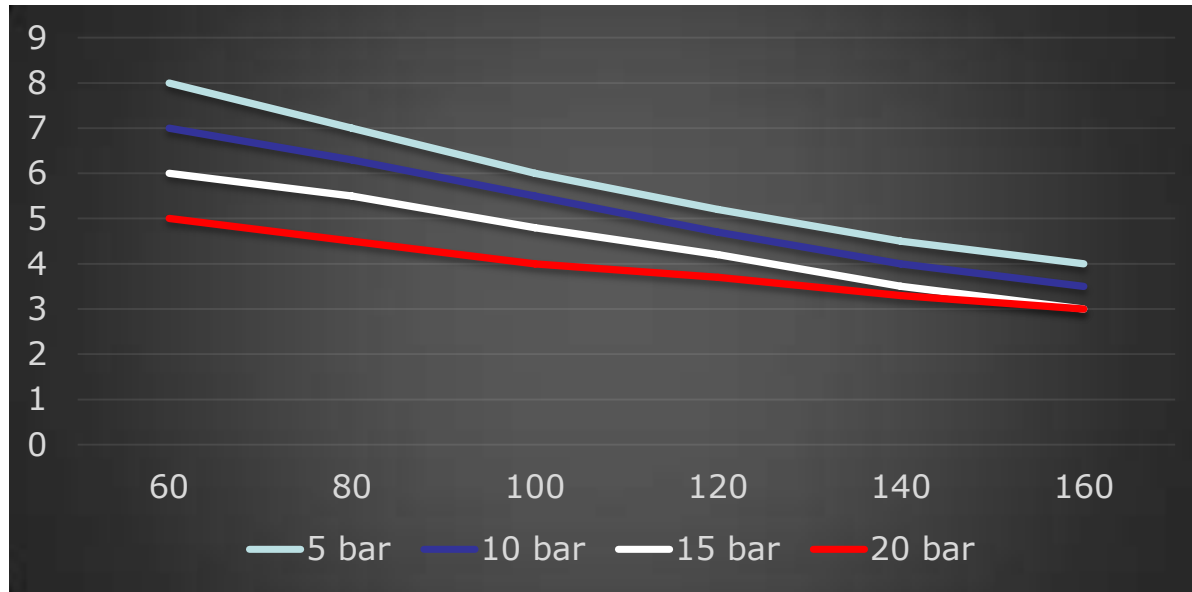
No gaskets or stud bolt mean no maintenance for tightening plate package or servicing gaskets



**Brazed Plate Heat Exchangers are always factory assembled and helium tested**

# Savings vs PHE in District Heating Applications

Years



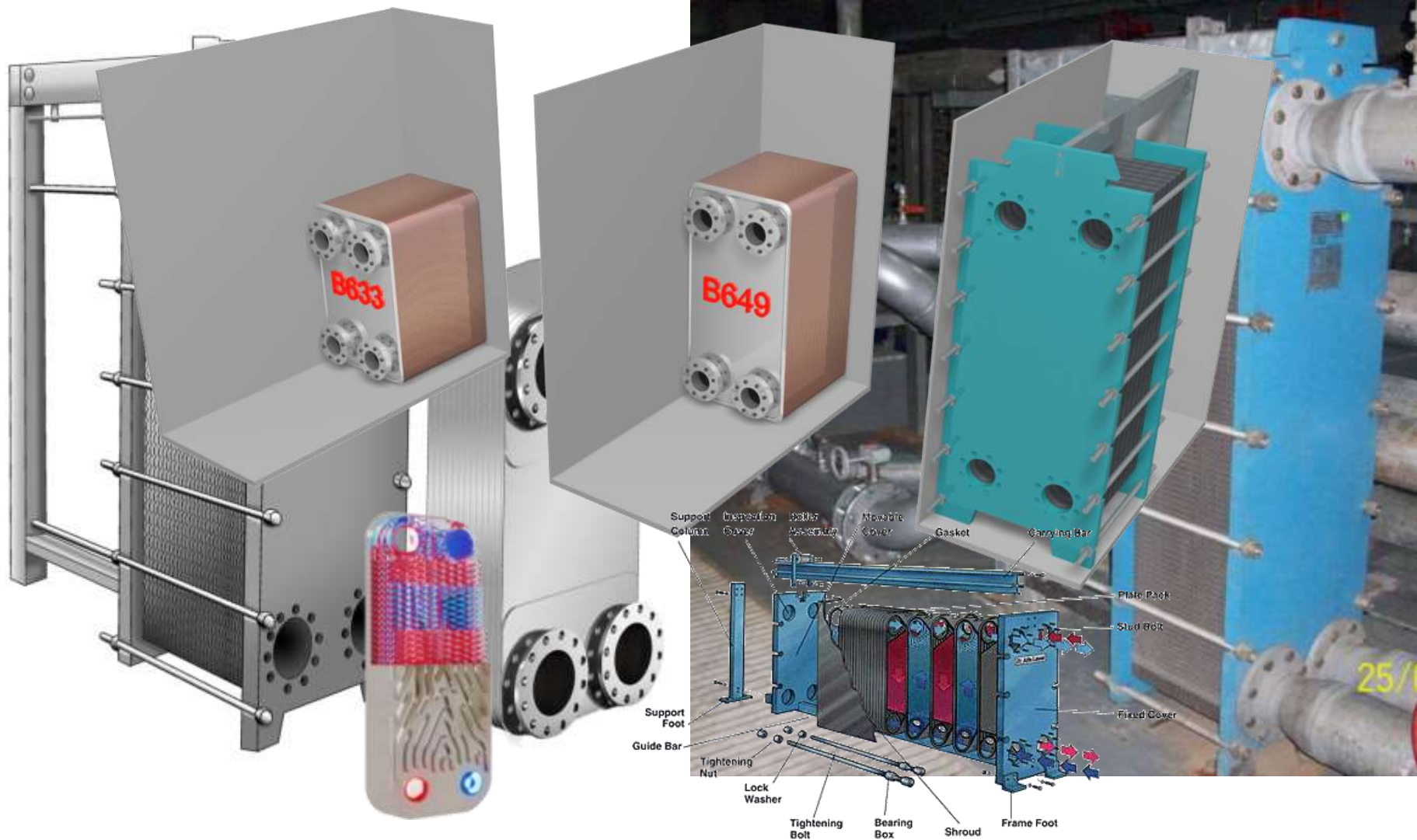
Temp

- District Heating PHE 1800 kW/6,1M BTU/HR
- Price for exchange of gaskets: € 7500 (Pending local market price)
- District Heating BPHE 1800 kW
- Price for a new BPHE: Lower





# Size Comparison BPHE vs PHE





# Modular redundancy set up saves space and capacity

## Redundancy

- N + 1 redundancy for a conventional system is usually another set of PHE of similar capacity. N + 1 is simply one more module rather than an additional separate PHE. This makes N + 1 a much more affordable proposition. Also, because of the compartmentalized nature of a modular system, the risk of failing enough components to lose control of the load is very small.



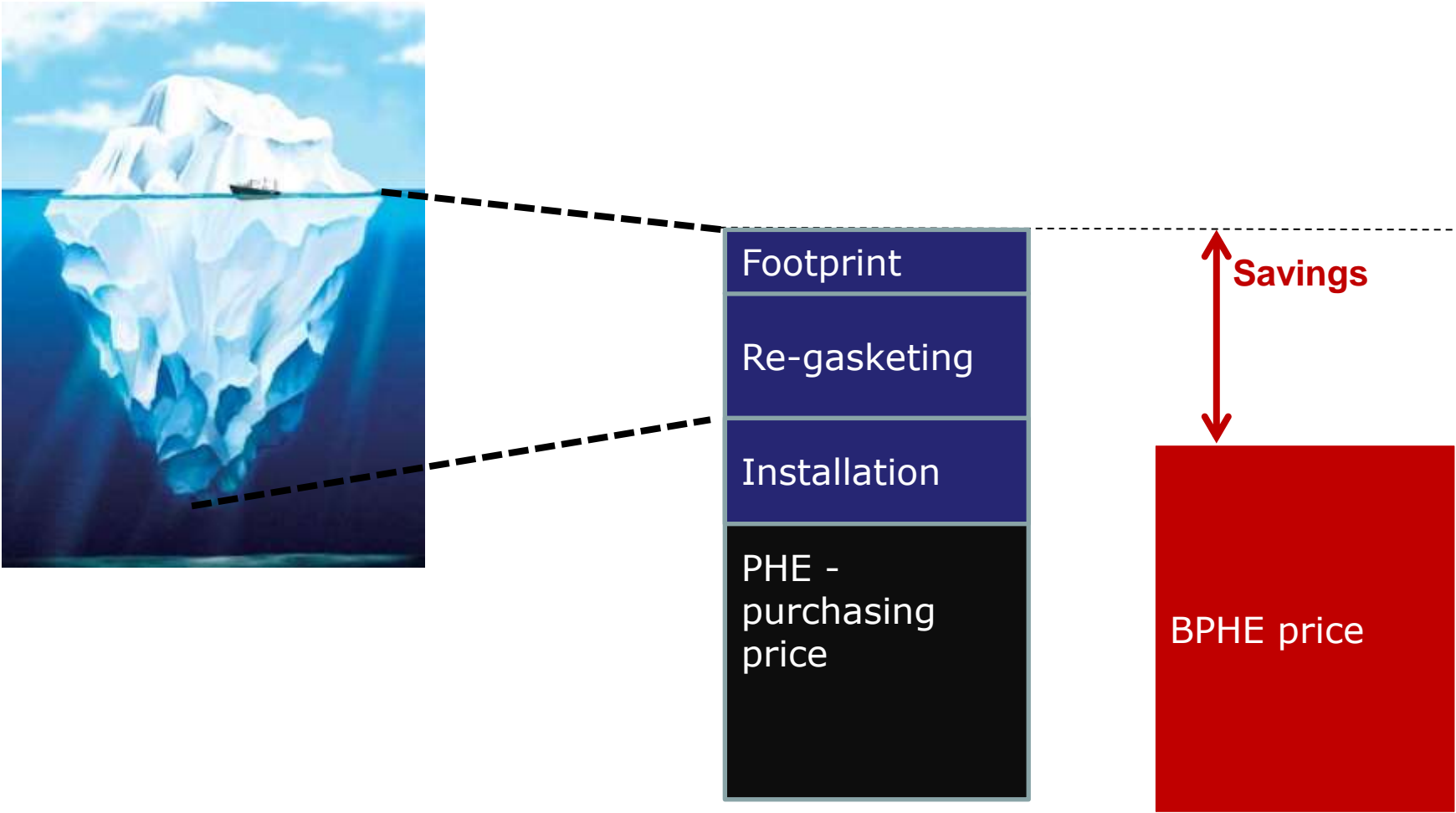
### Example 540 TR

- **Traditional Design:**
  - $540 + 540 = 1080$  TR
  - If one unit fails: 540 TR is available
  - If 2 units fail: System down!
- **N+1 Design:**
  - $270 + 270 + 270 = 810$  TR
  - If 1 unit fails: 540 TR is available
  - If 2 units fails: 270 TR available



**BPHE offers redundancy to a lower cost and footprint!**

# Does Gasket Plate and Frame Heat Exchanger Saves Money?



Thank You!  
[www.swep.net](http://www.swep.net)

