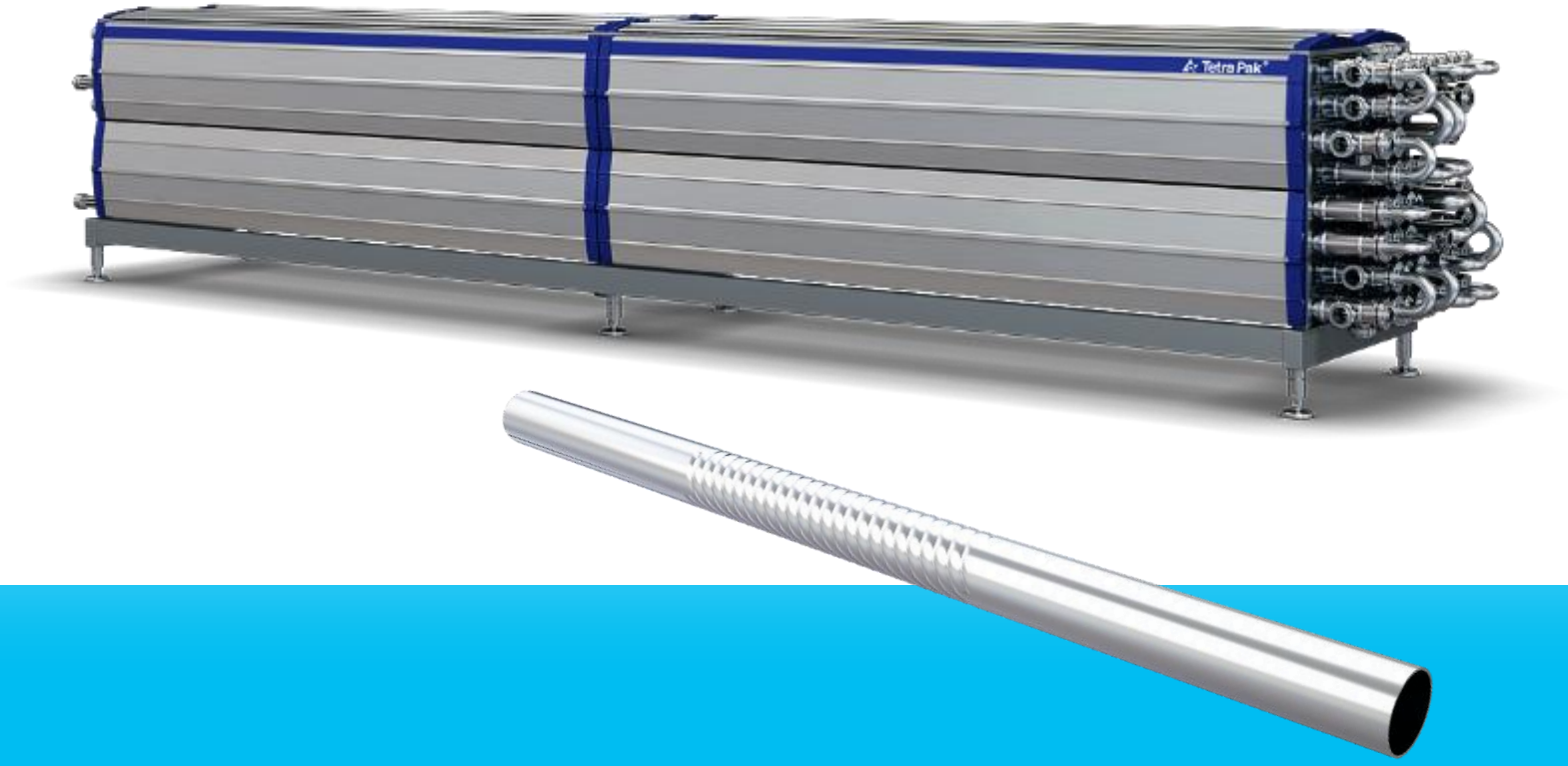


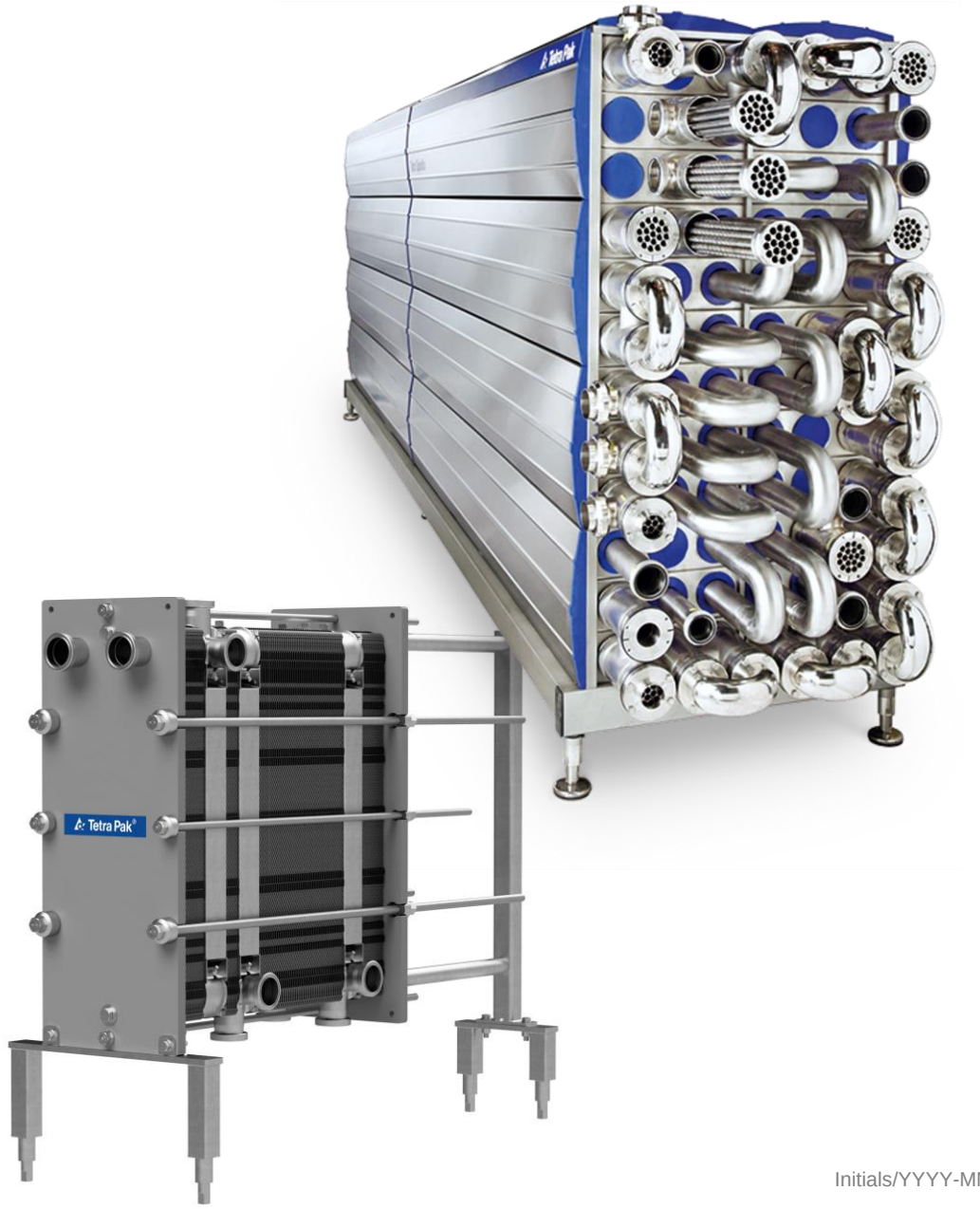
Heat Exchanger efficiency and considerations to reduce energy costs

Jimmy Moons - Tetra Pak®

Tetra Pak®
PROTECTS WHAT'S GOOD

Agenda

1. Introduction
2. Market trends
3. Pasteurization & regeneration
4. Innovations
5. Technology & Benefits



The food industry consumes almost a third of the world's energy.

www.un.org/sustainabledevelopment/sustainable-consumption-production/

Market outlook/trends

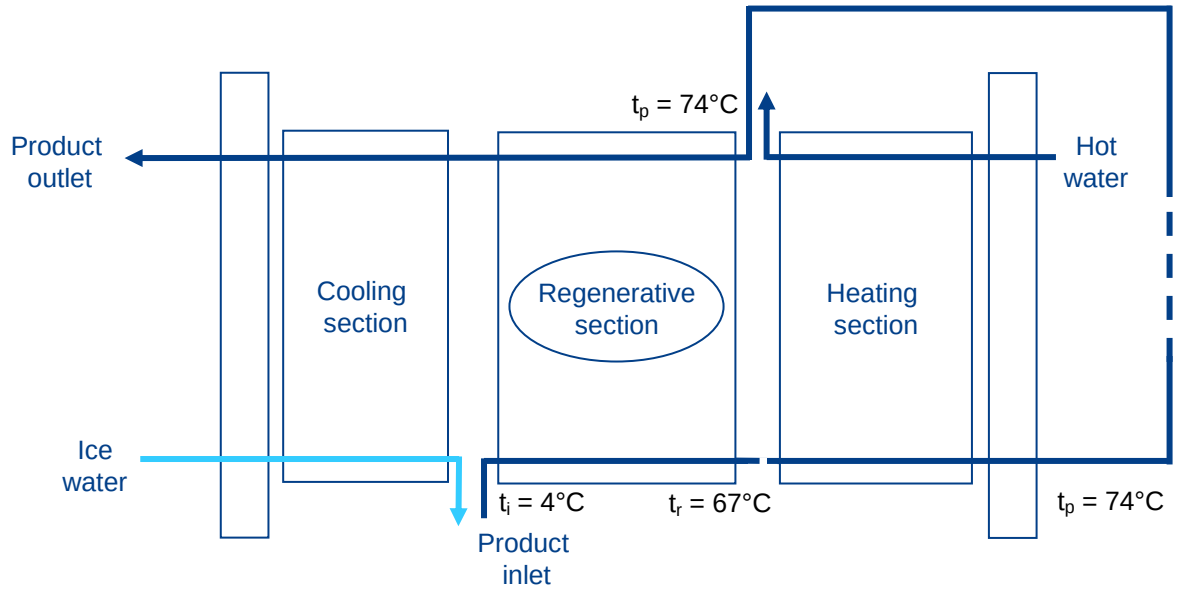
- Sustainability is now a key consideration for consumers – 50% agree that every choice they make in their daily lives affects the environment*

- Food hygiene remains a global concern, with 36% of consumers citing food safety as a significant worry*

- Unscheduled downtime and disruption can be disastrous for producers in today's tough economic climate, so reliability and durability are critical

Source: Tetra Pak® Index Consumer Research 2021

Regenerative efficiency - milk pasteurisation



$$R = \frac{(t_r - t_i) \times 100}{(t_p - t_i)}$$

R = regenerative efficiency, %
t_r = milk temperature after regeneration, °C
t_i = temperature of raw incoming milk, °C
t_p = pasteurisation temperature, °C

Regenerative efficiency in this example:

$$\frac{67 - 4}{74 - 4} \times 100 = 90\%$$

Pasteurizer

Evolution on increased regeneration

Upgrading an existing plate heat exchanger

PHE	regen factor	steam consumption		ice water capacity	
Existing pasteurizer	85%	165	kg/h	267	kWh
Upgrade pasteurizer	93%	54	kg/h	150	kWh
difference	8%	111	kg/h	117	kWh

0%0


50
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FOR THE GOVERNOR AND COMPANY OF
THE BANK OF ENGLAND
CHIEF CASHIER
Bank of England
I PROMISE TO PAY THE BEARER ON DEMAND THE SUM OF FIFTY POUNDS
Fifty
Pounds
50
50
50

Savings in money rather than percentage

cost steam
cost ice water

anual production days
production hours
production hours per year

- Reduction in steam consumption
- Reduction in ice water energy consumption

= savings

Secure your production with Tetra Pak® Plate Heat Exchangers

Specially developed plates for hygienic duties

Tetra Pak®
Plate Heat Exchanger H4 and H8

Secure path to hygienic heating and cooling

Tetra Pak®
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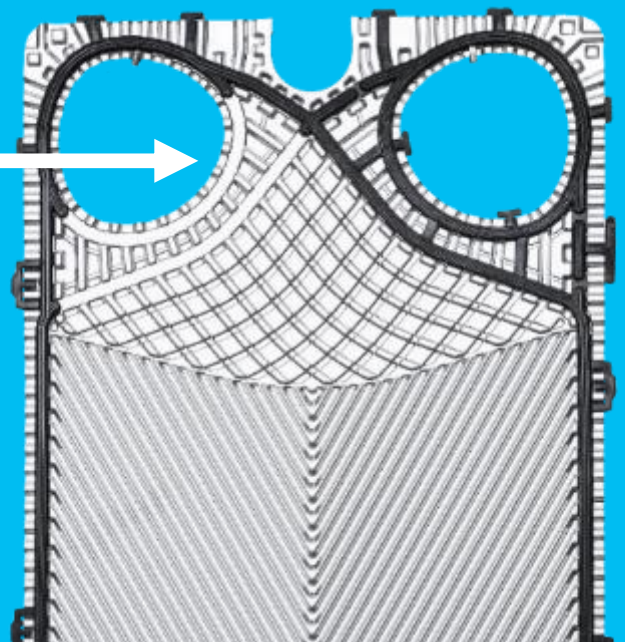
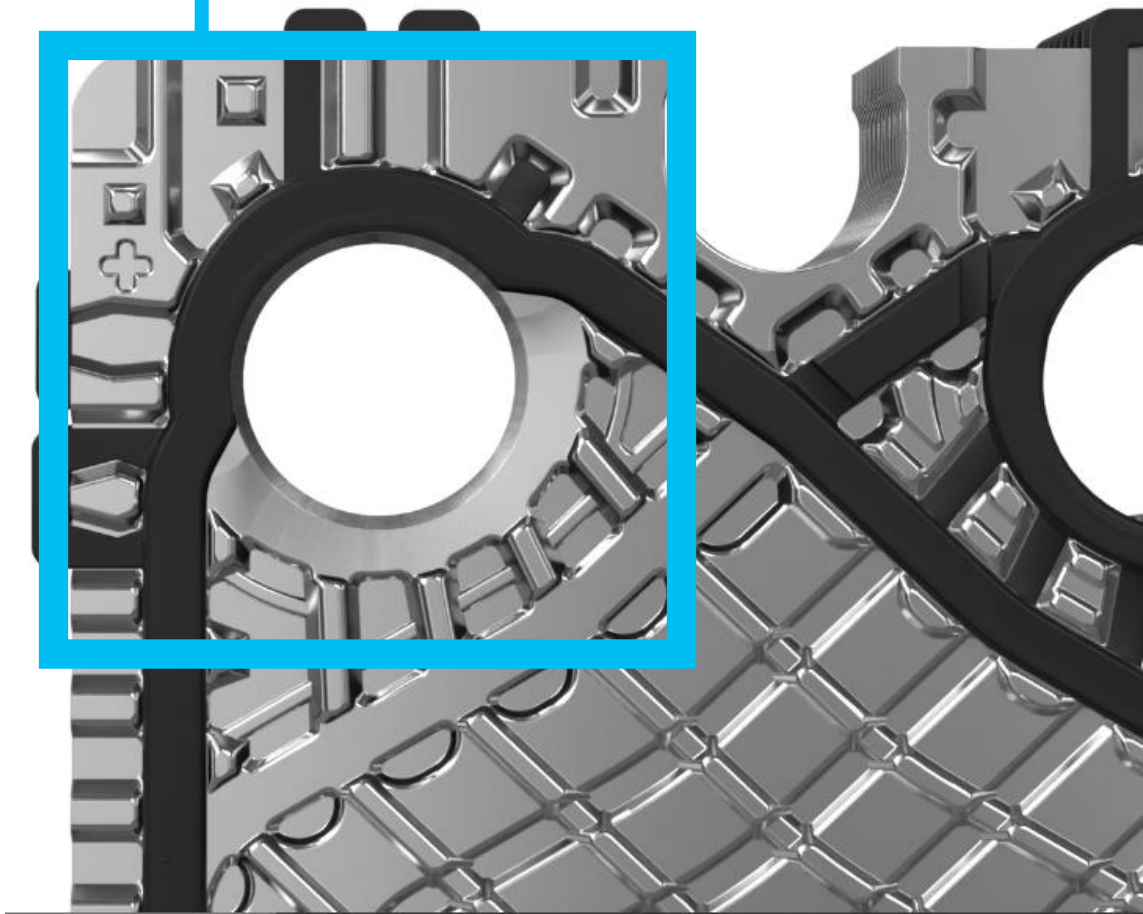
Maximise cleanability

The streamlined SmoothPort™ prevents buildup and maximizes cleanability and drainability.

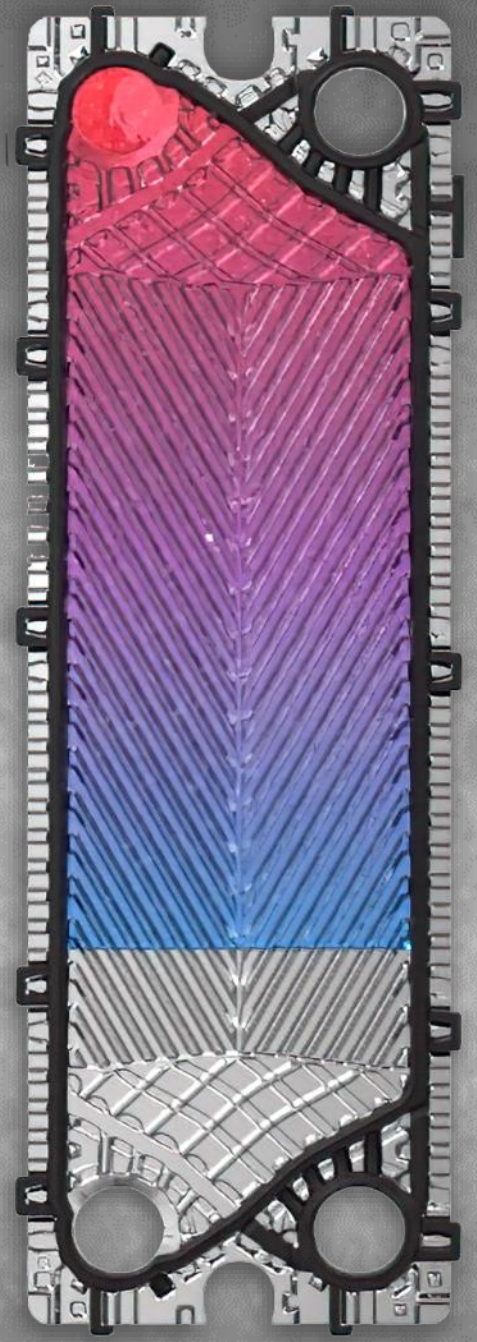
Standard port





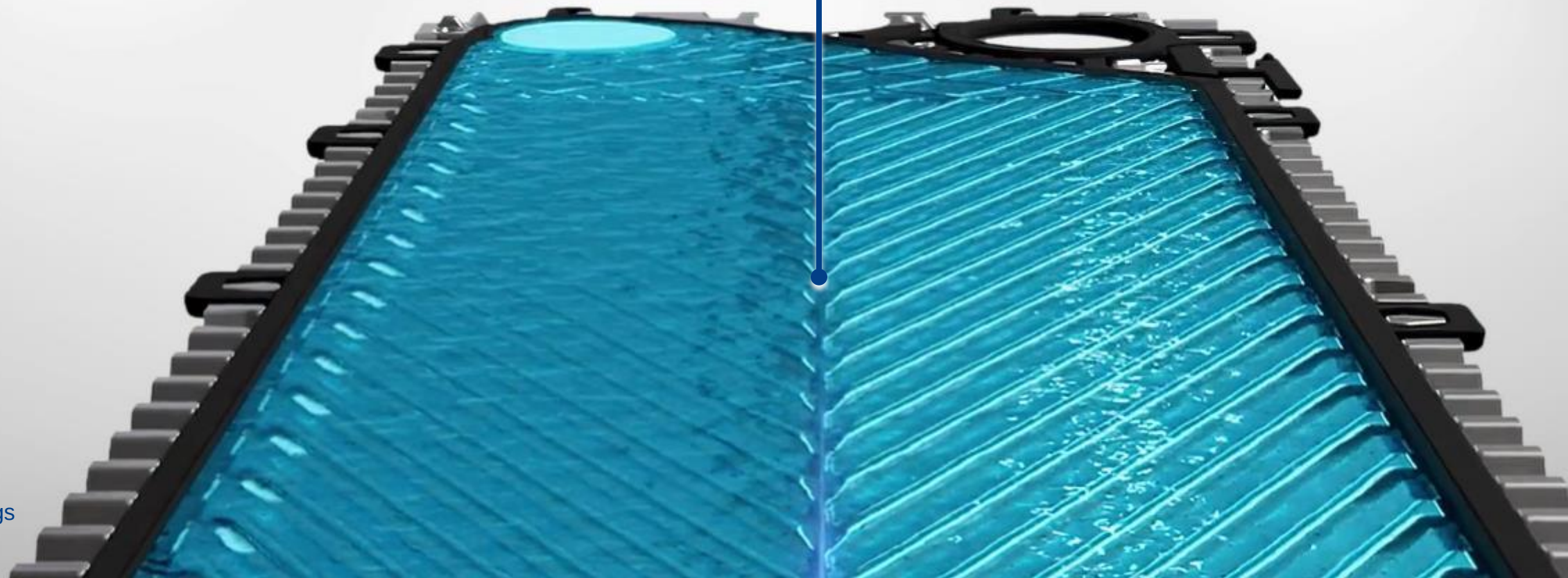
Achieve uniform heat treatment

EquiFlow™ plate pattern optimizes media flow, enabling uniform heat treatment with minimal fouling.



Easy cleaning

CleanChannel™
facilitates the removal of particles during cleaning, securing the highest standards of hygiene.

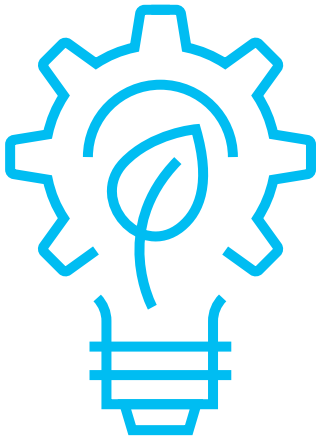


Sustainability

Supporting the customer to make a difference

Increased energy efficiency:

- ► Improved heat transfer
- ► Reduced pressure drop



Reduced impact on environment

- ► 20% less impact than alternative, less steel used

More efficient CIP – reduced consumption of:

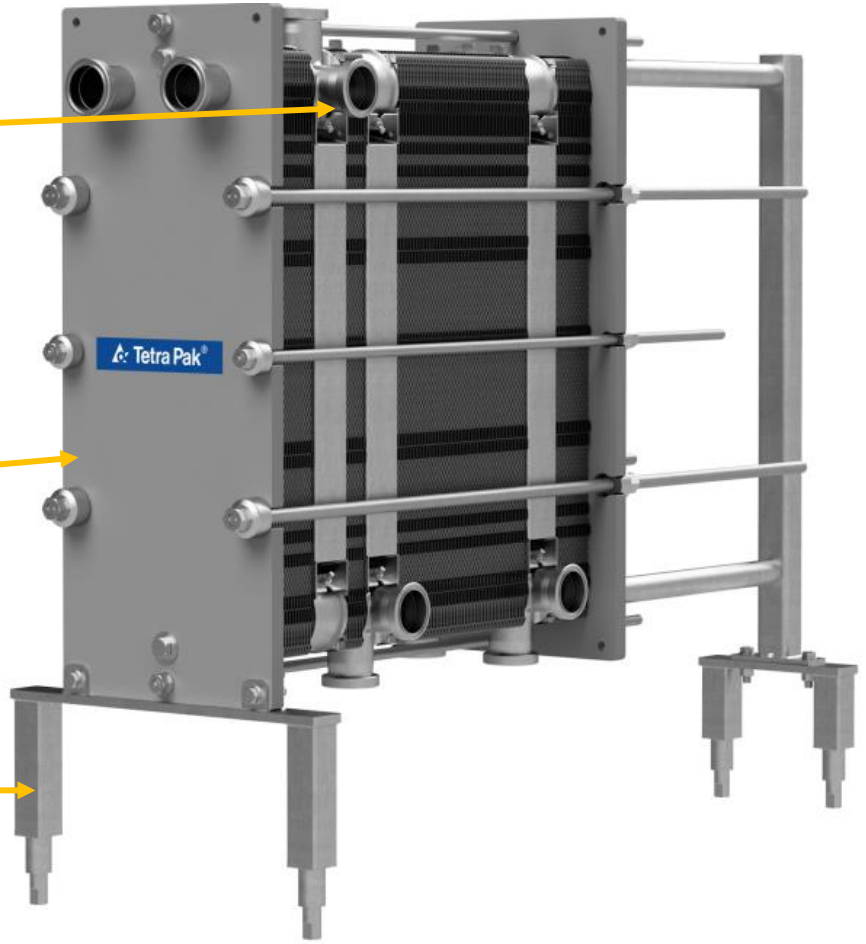
- ► Water
- ► Chemical
- ► Energy

H4 and H8 frame features

Interchangable corners

Frame and pressure plate interchangeable

Hygienic adjustable feet



Tetra Pak® Tubular Heat Exchanger

Industry-leading efficiency and exceptional reliability

Tetra Pak®
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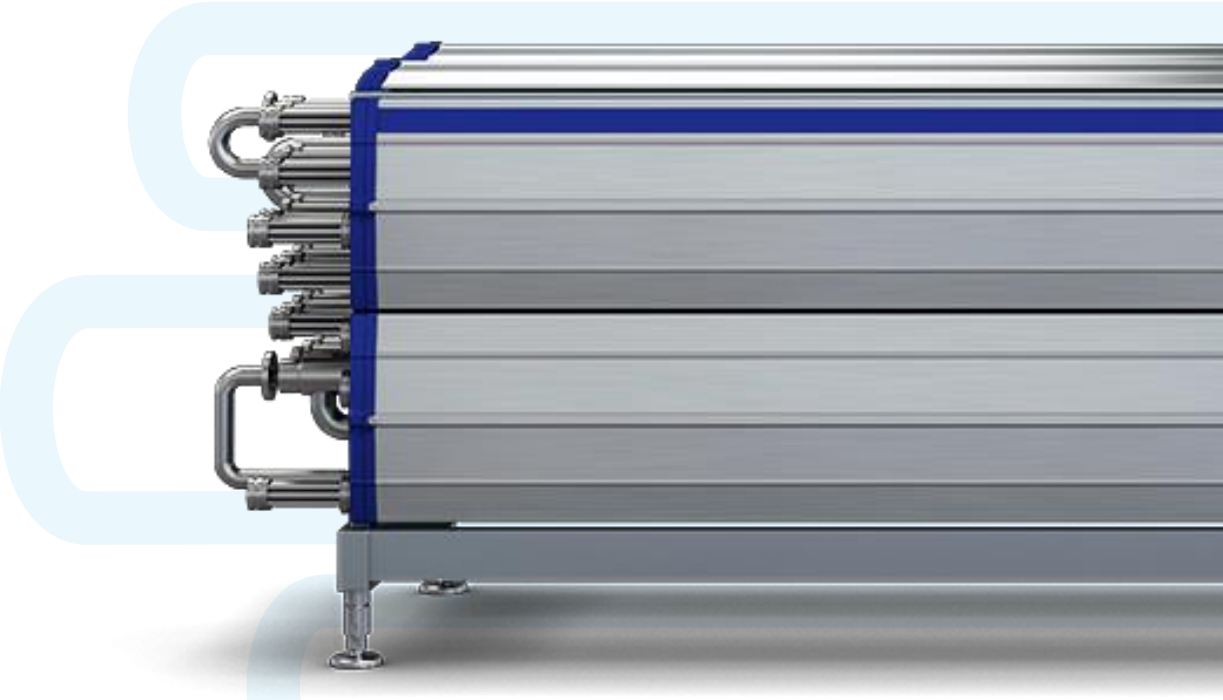
Industry-leading efficiency & exceptional reliability

The Tetra Pak® Tubular Heat Exchanger

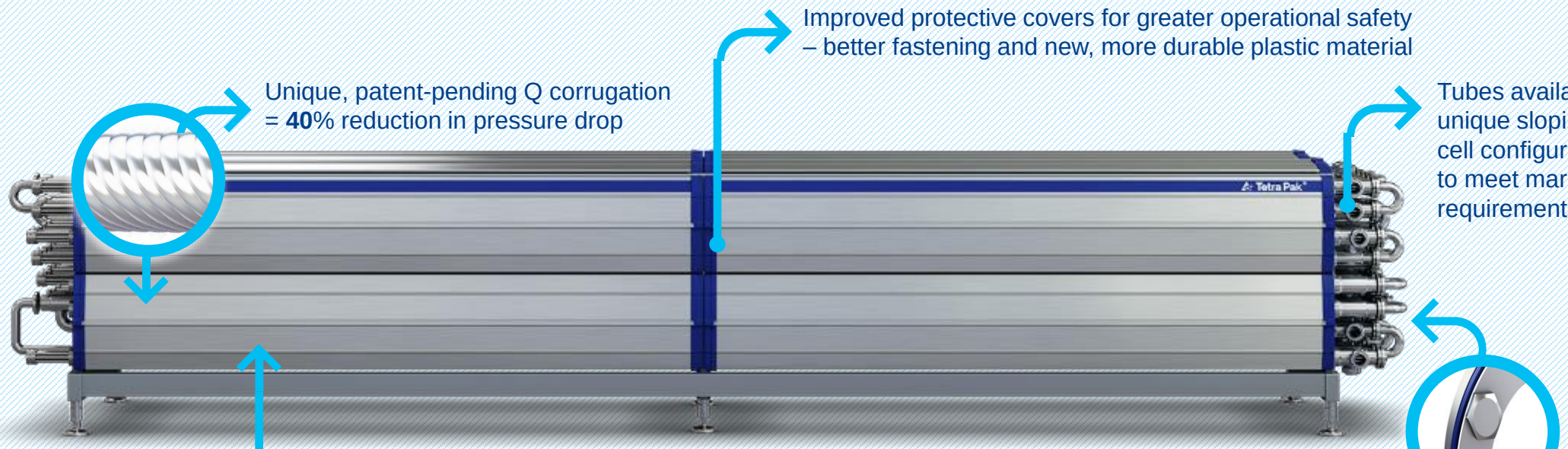
Get higher capacity, and greater robustness, flexibility, and reliability, with up to 40% loss in pressure drop (saving you up to 40% on your electricity costs*) Offers lower total cost of ownership along with a lower overall carbon footprint too.



*electricity costs of the tubular heat exchanger pump only

The next generation of Tubular Heat Exchangers

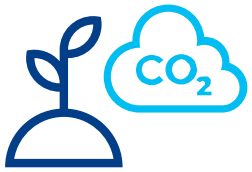
Our tubular heat exchangers were already industry-leading. But we've made them even better.



Why the Tetra Pak® Tubular Heat Exchanger?

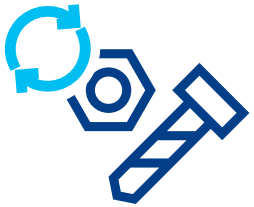
Cost efficient, reliable & flexible, and class-leading food hygiene

BENEFITS AT A GLANCE



IMPROVED SUSTAINABILITY & COST EFFICIENCY

40% reduction in tubular heat exchanger electricity costs, lower carbon footprint, lower total operating cost.



GREATER ROBUSTNESS, RELIABILITY & FLEXIBILITY

Durable design, easy inspection and exchange of parts. Easy to configure, modify, and expand – endlessly customisable.

BEST-IN-CLASS FOOD HYGIENE/SAFETY

The only tubular heat exchanger with EHEDG certification. P2P also complies with US 3-A sanitary standard.

Energy savings

Unique, patent-pending Q corrugation

↓ = **40%**

reduction in pressure drop

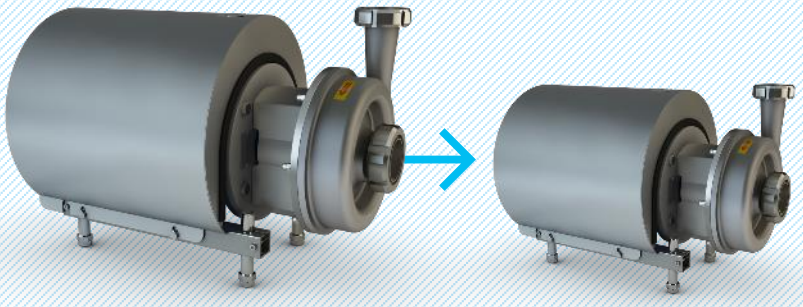
↓ = up to **40%**

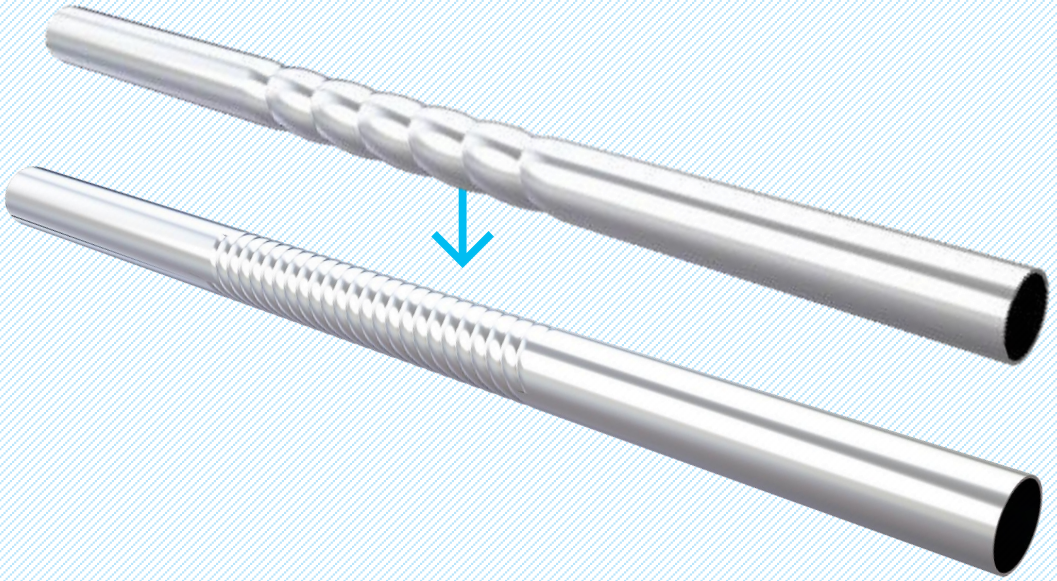
reduction in tubular heat exchanger electricity costs*

- *Power calculated with the following formula: **P(kW) = Q*(H/10)*(Overall efficiency factor)**
- Q = Capacity in litre per hour H = Total head (bar)

P2/P1 = 6/10 = 60% therefore in the second scenario we can save 40% on the electricity consumption

Energy savings





Less pressure
= smaller, cheaper pump required

Higher capacity means smaller, cheaper tubular heat exchanger can be used

Floating protection system

Unique thermal stress absorbing design

The floating protection system is a unique design with multiple, independently moving, floating (not fixed or welded) parts.

Key benefits

- No bellow, not fully-welded
- Eliminates risks of cracking
- Ensures uncompromising food safety
- Enables product-to-product heat regeneration for exceptional efficiency
- Improves equipment lifetime