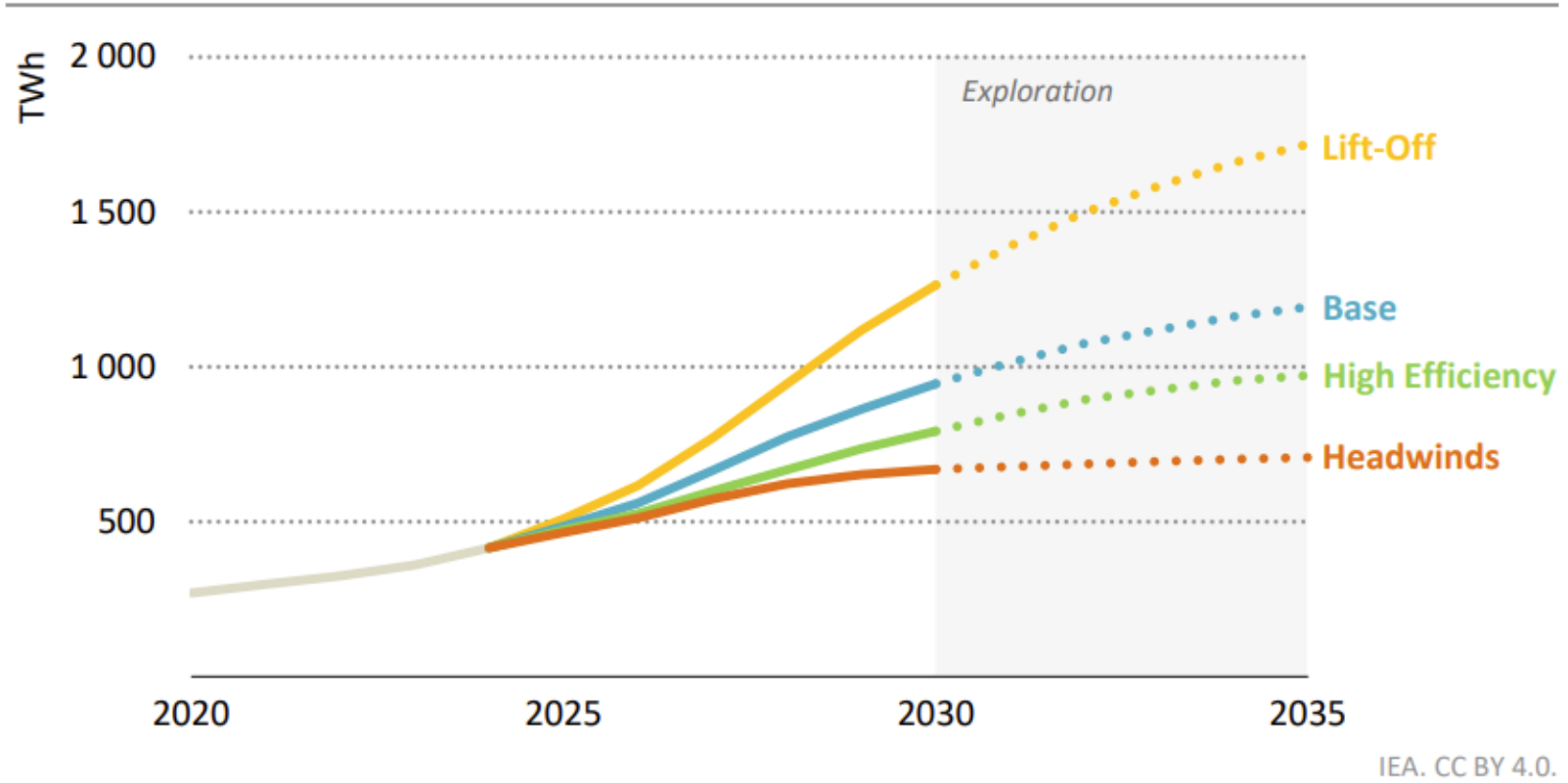
Heat transfer
The shift to liquid cooling and heat reuse

Used electrical energy ends up as heat energy…

almost 100% of the time.

Power needs are climbing

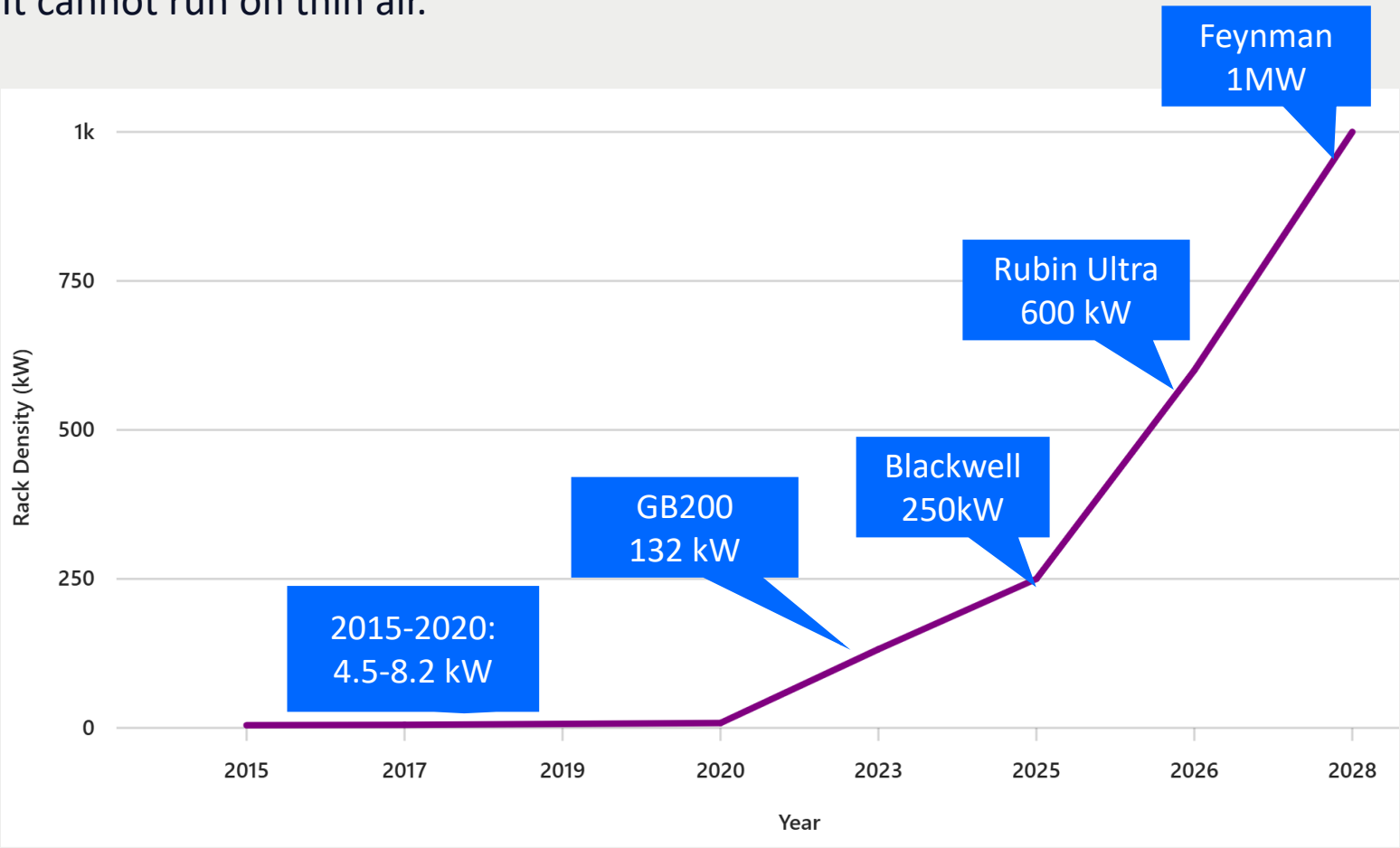
Figure 2.14 ▷ Global data centre electricity consumption by sensitivity case, 2020-2035



The outlook for data centre electricity demand is highly uncertain, driven by factors including efficiency improvements, AI uptake and potential energy sector bottlenecks

Future rack density

It cannot run on thin air.



Air vs. Liquid cooling

3000 higher volumetric heat capacity and easy to distribute

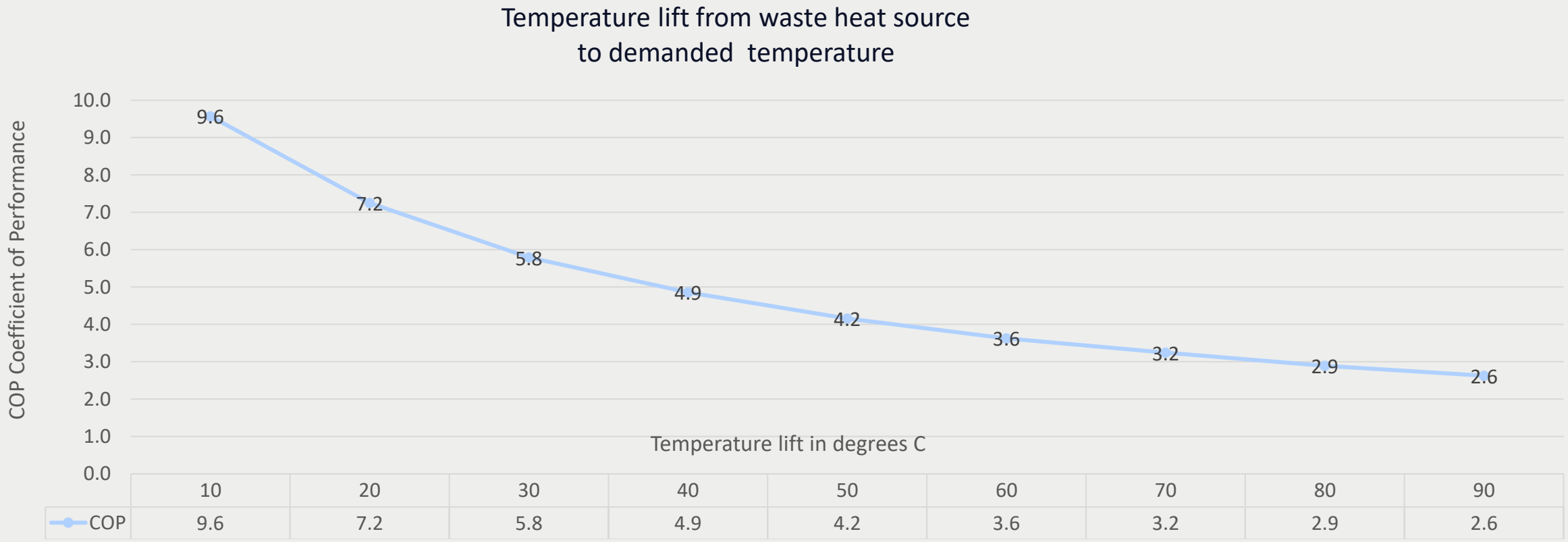
Liquid cooling methods
- Direct-to-chip
- Immersion cooling “bath”

Heat reuse from data centers

A data center is a heat source, whether we use it or throw it away.

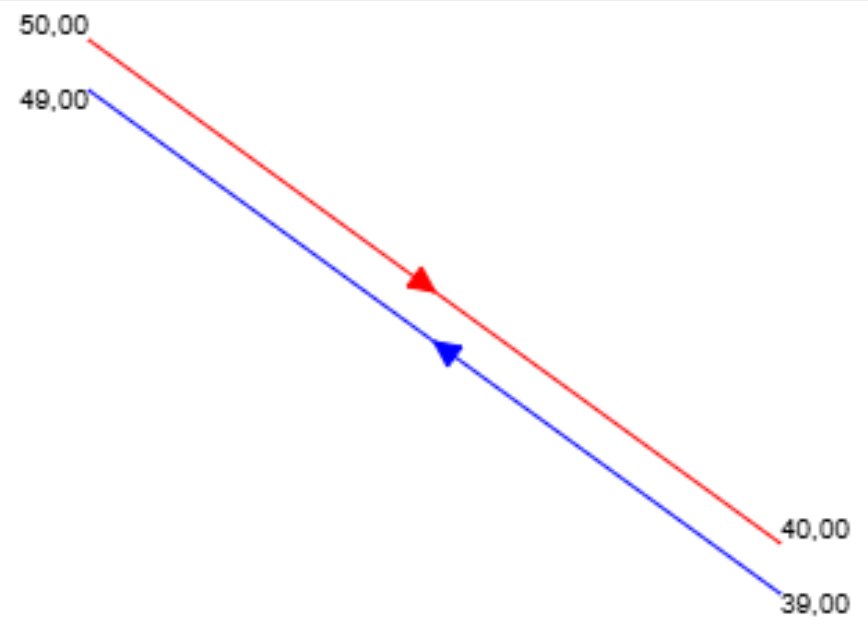
Heat reuse via heat pump

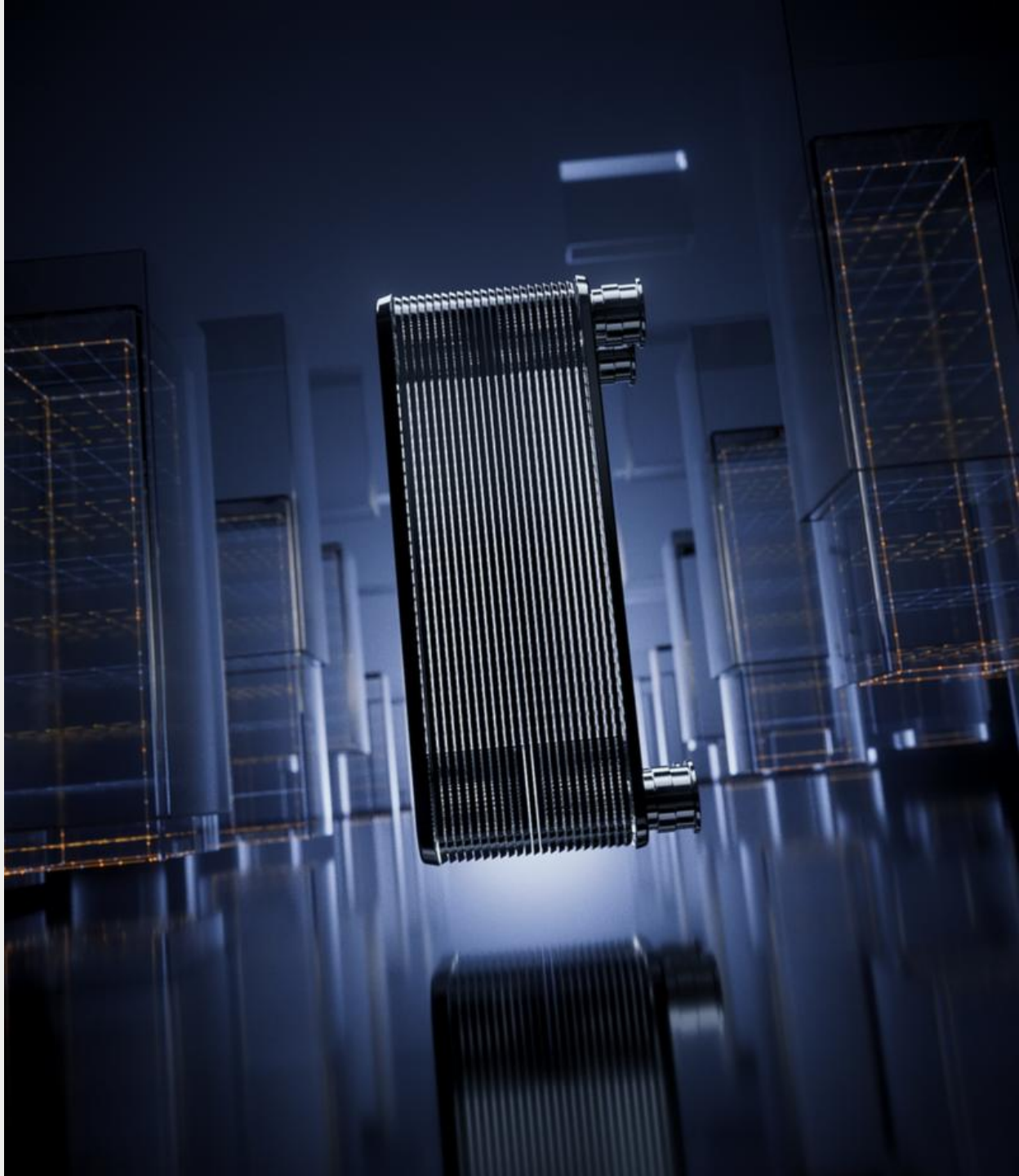
Every extra degree matters.



Why efficient heat transfer matters

Without high-performance plate heat exchangers there is no efficient cooling or heat reuse.





Innovations for efficient heat transfer

Port size

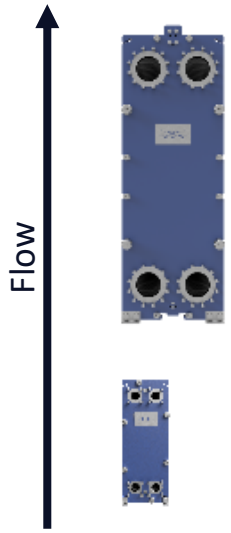


Plate geometry

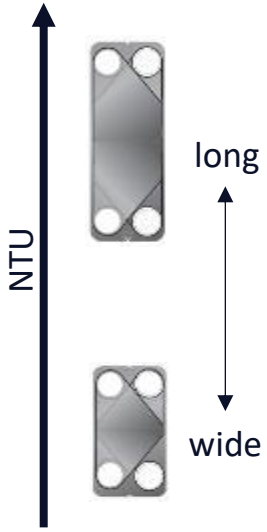


Plate pressing depth

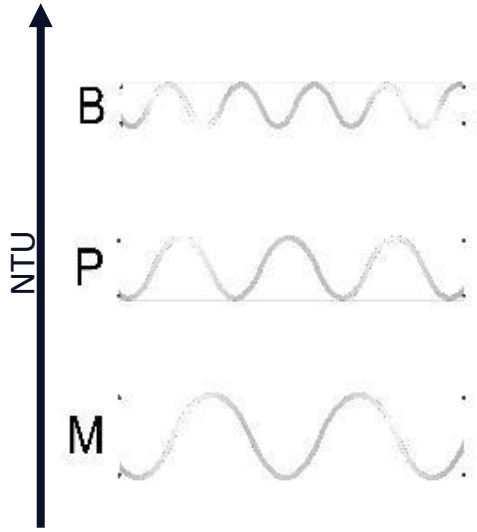


Plate design

Asymmetric Channels
Optimises efficiency with varying liquid flow/ media

Curve-flow Distribution
Improves media flow and minimizes risk of fouling

Omega Ports
Enhances media flow and thermal efficiency

Offset gasket grooves
Ensures plate utilization for maximum heat transfer efficiency

For increased heat transfer efficiency

Performance certification

Eliminate the guesswork.
Specify **AHRI-certified** performance.

It is easy to do:
”Heat exchangers shall be performance certified in the AHRI Liquid to Liquid Heat Exchangers Certification Program”.

Performance certification

Select Cooling/Heating — Cooling

	Design HEX		Market tolerances HEX	
Duty	10,000	kW		
HEX hot side T in	28.0	°C	28.0	°C
HEX hot side T out	20.0	°C	21.0	°C
HEX cold side T in	18.0	°C	18.0	°C
HEX cold side T out	26.0	°C	25.0	°C
T approach (pinch, approximate LMTD)	2.0	°C	3.0	°C
Flowrate cold side	1,075	m3/h	1,229	m3/h
Specified pressure drop	30	kPa		
Additional pressure drop used in sizing			10	kPa
Additional pressure drop due to higher flow			9	kPa
Total additional pressure drop			19	kPa
Design pump head	20	m	21.9	m
Design pump power	73.2	kW	91.7	kW

Investment costs

AHRI performance certified Gasketed PHE	€ 30,000	
HEX selected with market tolerances		€ 23,100
Extra investment for AHRI performance certified		€ 6,900

Payback period and savings for 18.5 kW

Annual Running cost	€ 11,100.0
Savings in CO_2 emissions	9.4 ton/year

Increased OPEX due to higher flowrate and pressure drop

Extra power	18.5	kW
Running time	6,000	h/year
Cost of electrcity	€ 0.10	/kWh
Annual Running cost	€ 11,100.0	
Over how many years	10	years
Over life cycle	€ 111,000	

Carbon emission savings

Electricity Maps | Live 24/7 CO2 emission of electricity consumption

Carbon emission factor (CO2)	85	g/kWh
Carbon emission savings	9,435	kg/year

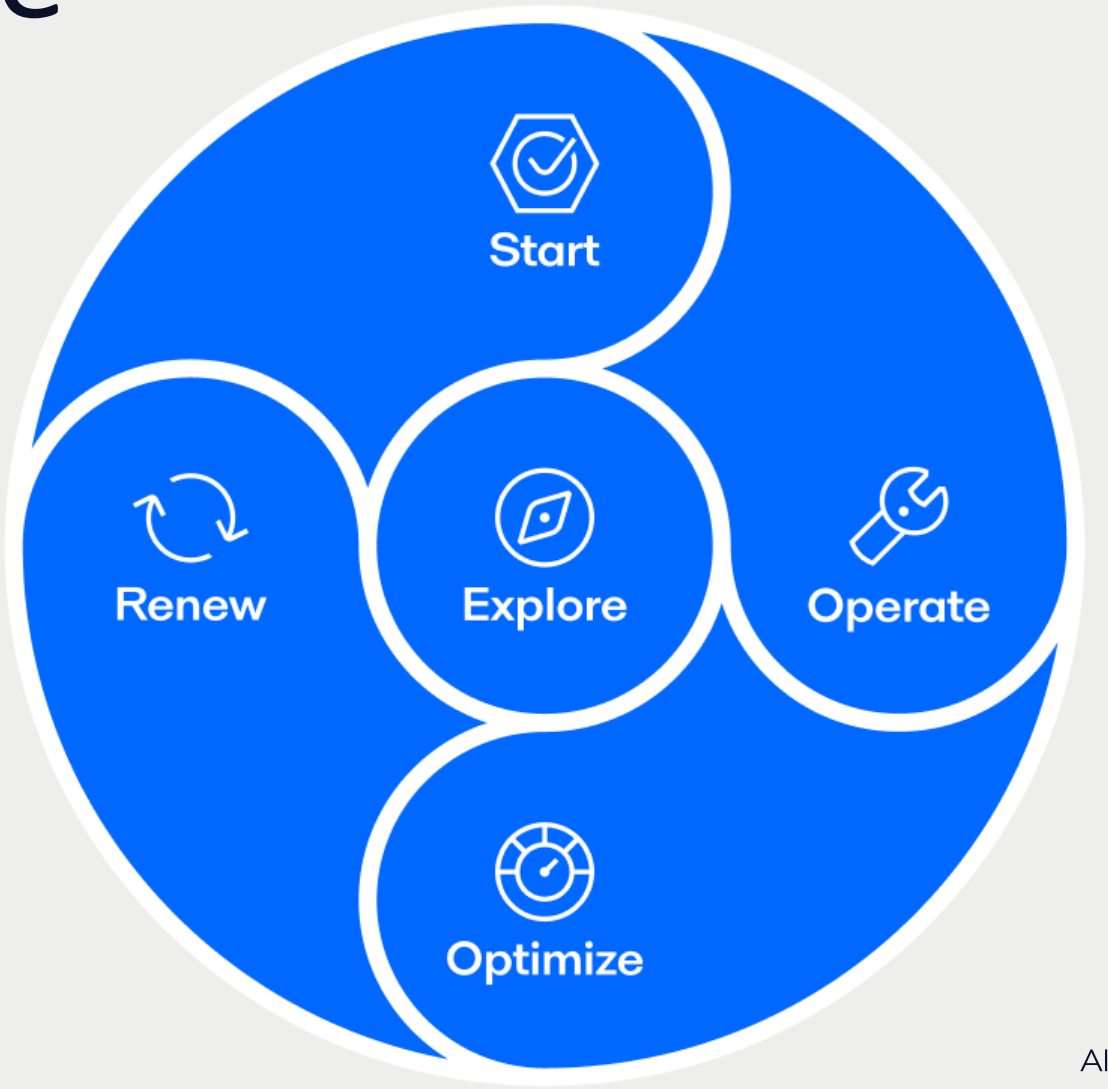
High-performance heat exchangers in data centers

Plate heat exchanger positions

- As interchanger with an open or closed cooling tower
- Free cooling with water
- Heat reuse connection and in heat pumps
- In CDUs/CCDUs

Service, Maintenance & Lifecycle Performance

Efficient cooling and heat reuse rely on ongoing heat transfer performance and that requires proper service.

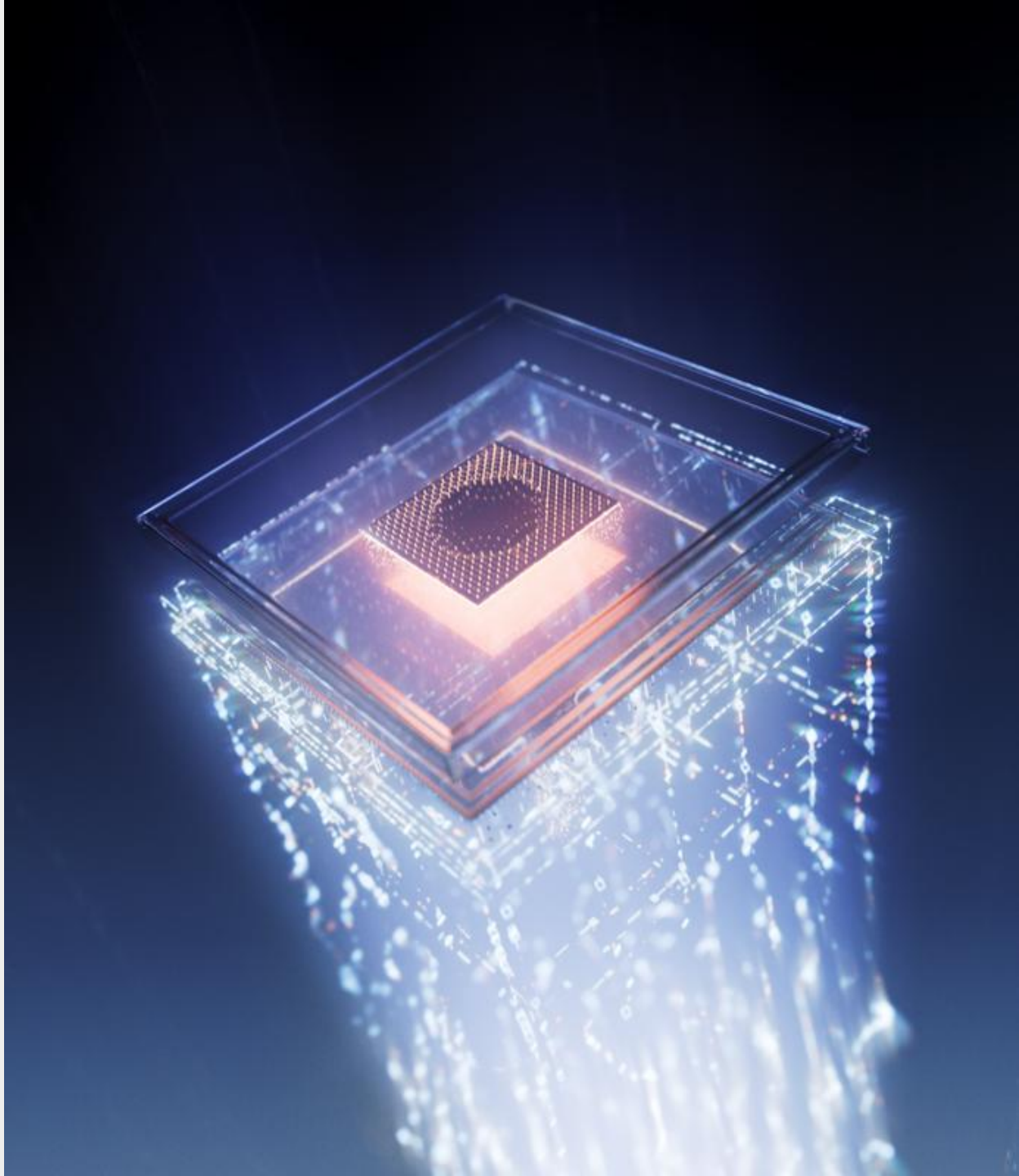


Key take-aways

Power density is skyrocketing, and **liquid cooling is becoming the new standard.**

Liquid cooling produces valuable heat, **making heat reuse essential.**

Efficient heat transfer enables both and Alfa Laval leads in **performance and lifecycle reliability.**




If we want sustainable data centers, we must stop wasting their most valuable output, **HEAT.**

Questions?

Let’s connect!

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