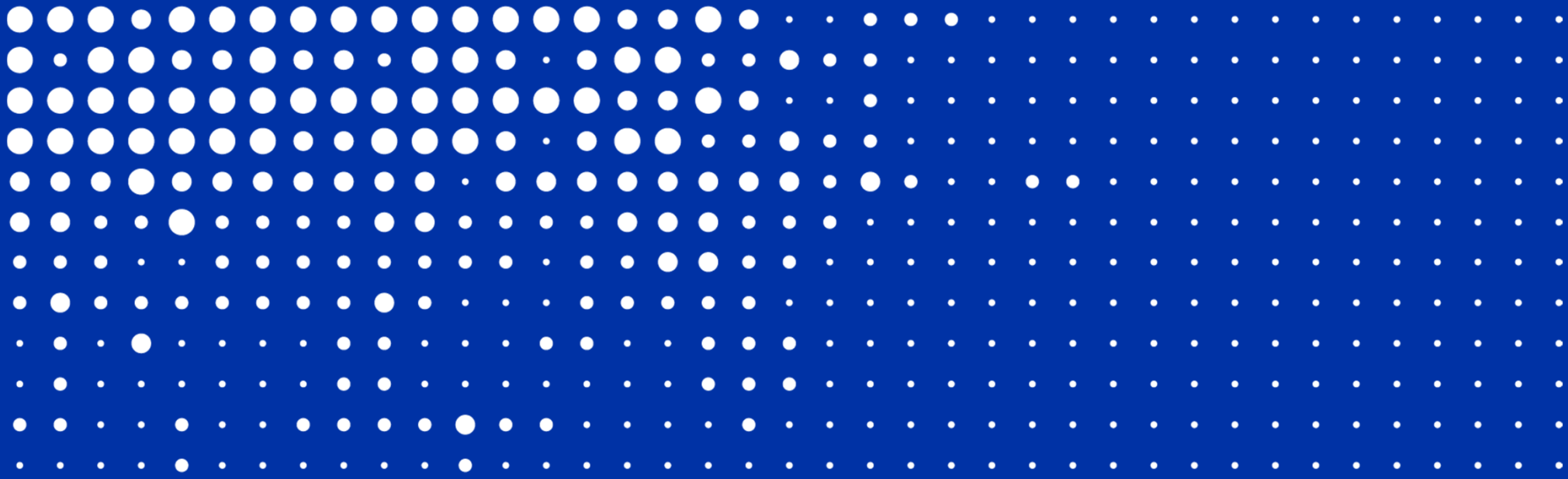
Energy Efficient School Design

SAV



Our Technology Partners

SAV | DELTA

Metering Solutions

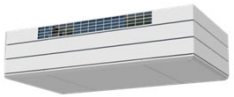
kamstrup

Hydronic Solutions

Danfoss

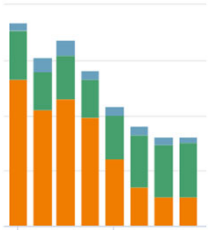
Communal and
District Heat Pumps

Thermonova



Mechanical Ventilation
with Heat Recovery
(MVHR)

AIRMASTER®



Energy Monitoring
and Management

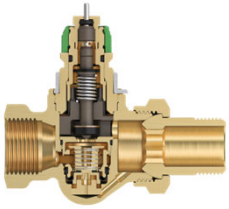
EnergiRaven

Electric Boilers

VÄRMEBARONEN

Hydronic Solutions

FloCon Watchman



Pressure Independent
TRVs

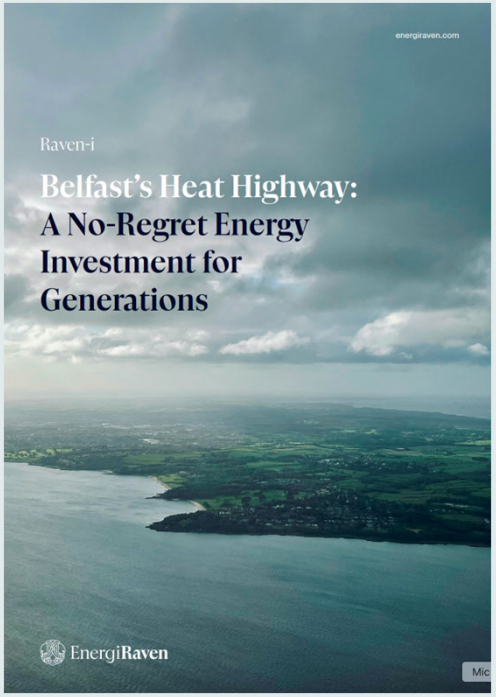
Danfoss

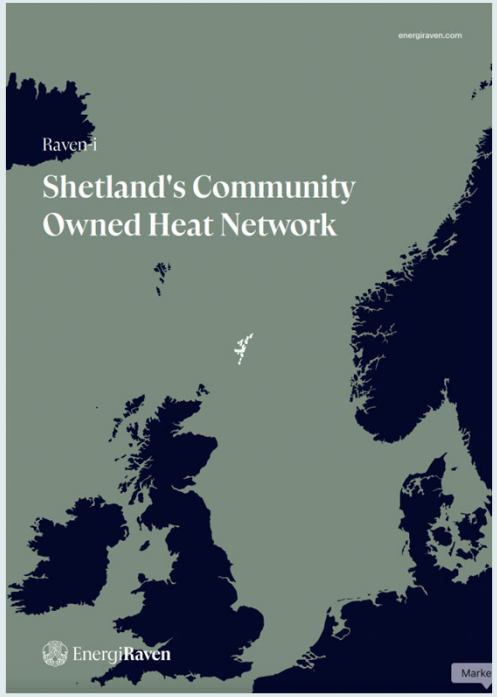
Biogas CHP

EC POWER


EnergiRaven

White Papers





NI 80% Oil

40+ White Papers

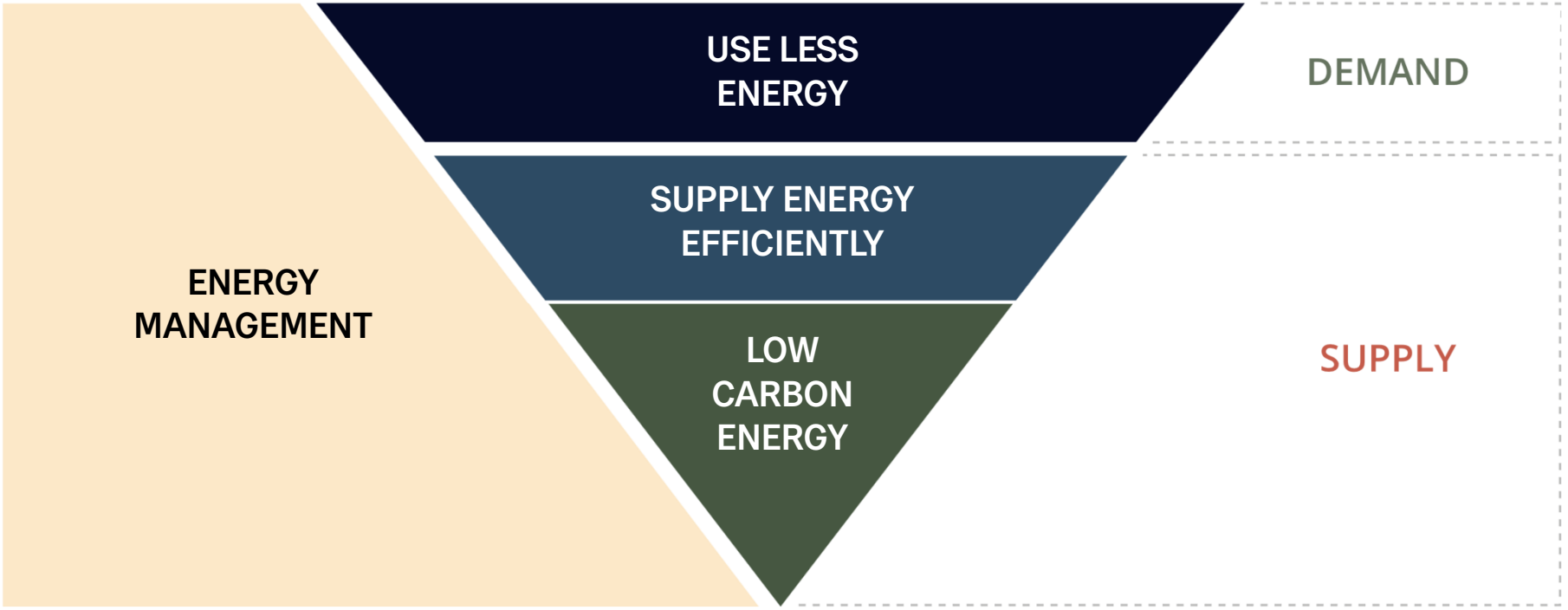
80% .gov download

EnergiRaven


East of England
Heat Transmission Highway
NOTTINGHAM
Power Plant (Gas)
Heat Reservoir
Data Centres
Power Plant (Gas)
LEICESTER
PETERBOROUGH
Heat Reservoir
Waste-to-Energy
Data Centres
BIRMINGHAM
NORTHAMPTON
BEDFORD
CAMBRIDGE
Data Centre
Power Plant (Gas)
Data Centre
NORWICH
Power Plant (Gas)
Data Centre
Nuclear Power Station
Power Plant (Gas)
OFFSHORE WINDFARMS
OFFSHORE WINDFARM
Waste-to-Energy
IPSWICH
Data Centre
CHELTENHAM
LUTON
Data Centres
COLCHESTER
Data Centre
NORTH SEA
OXFORD
CHELMSFORD
Heat Reservoir
SOUTHEND-ON-SEA
OFFSHORE WINDFARM
LONDON
Power Plant (Gas)
CANTERBURY
Electric Thermal (ET) Power Junctions
New Electricity Network Infrastructure
Heat Transmission Highway

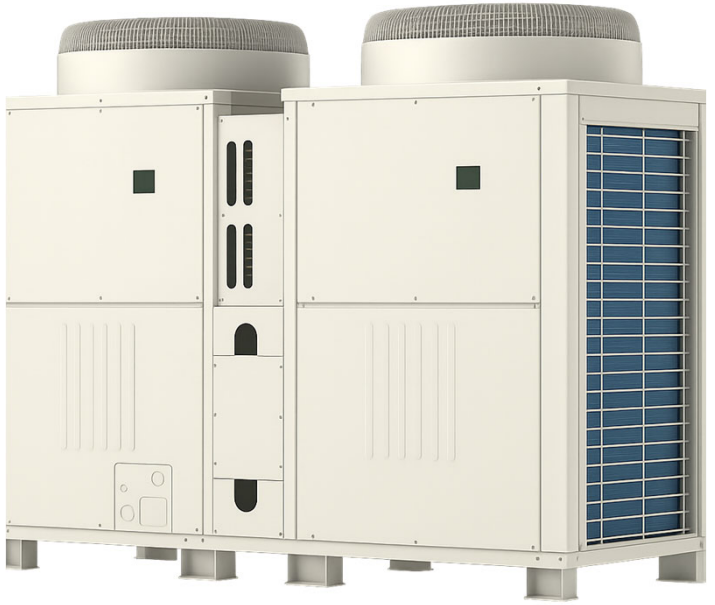
Making Schools Heat Network Ready

Energy Efficient Schools



1st Generation Heat Pumps

- Designed for cooling
- Small delta T
- Poor COP in heating systems



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Minimising Return Temperatures

- Maximising heat pump COP

Minimising Flow Rates

- Decreasing pipe sizes
- Decreasing pump sizes
- Decreasing pumping energy

Maximising Thermal Storage Capacity

2nd Generation
60/30 Heat Pumps

- Designed for **heating**
- **High** delta T
- **High** COP for heating system

Natural Refrigerants

R744 – CO_2

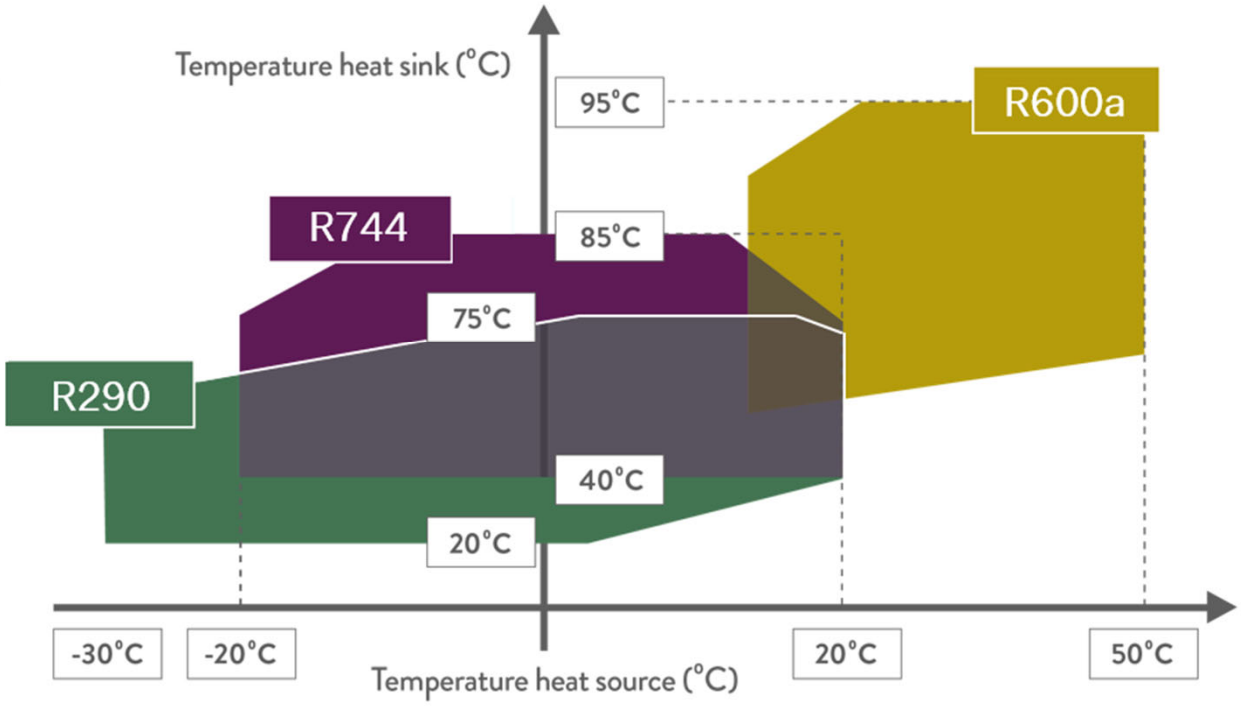
- Needs large delta T at heat sink.
- DHW applications 10/60.
- High pressures = cost and complexity.

R600a – Isobutane

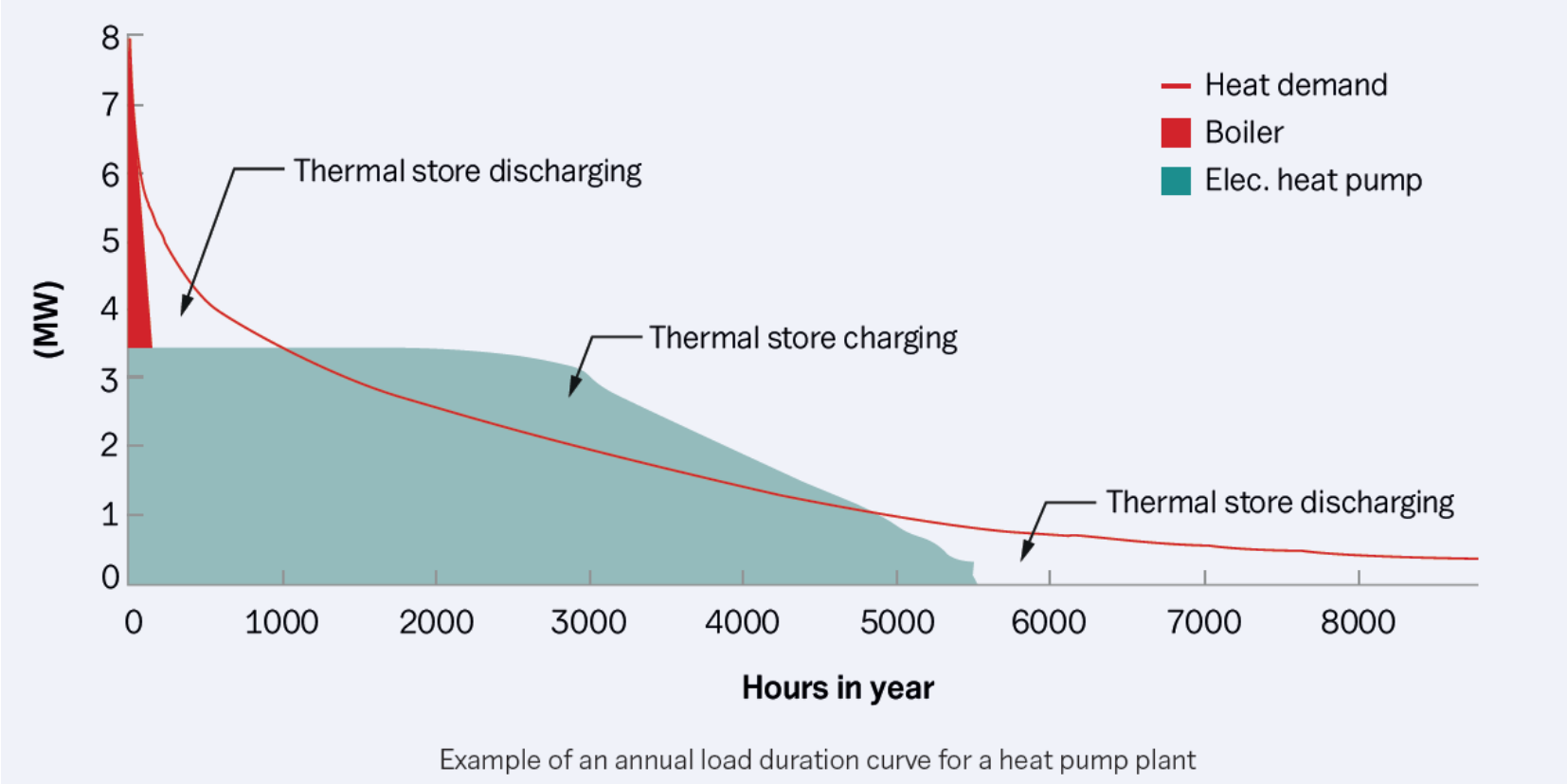
- High source and sink temperatures.
- Second stage of cascade.
- Water to water – high source temp.
- Flammability class A3.

R290 – Propane

- ASHP in colder climates.
- Compatible with heat network flow/return temps.
- Flammability class A3.

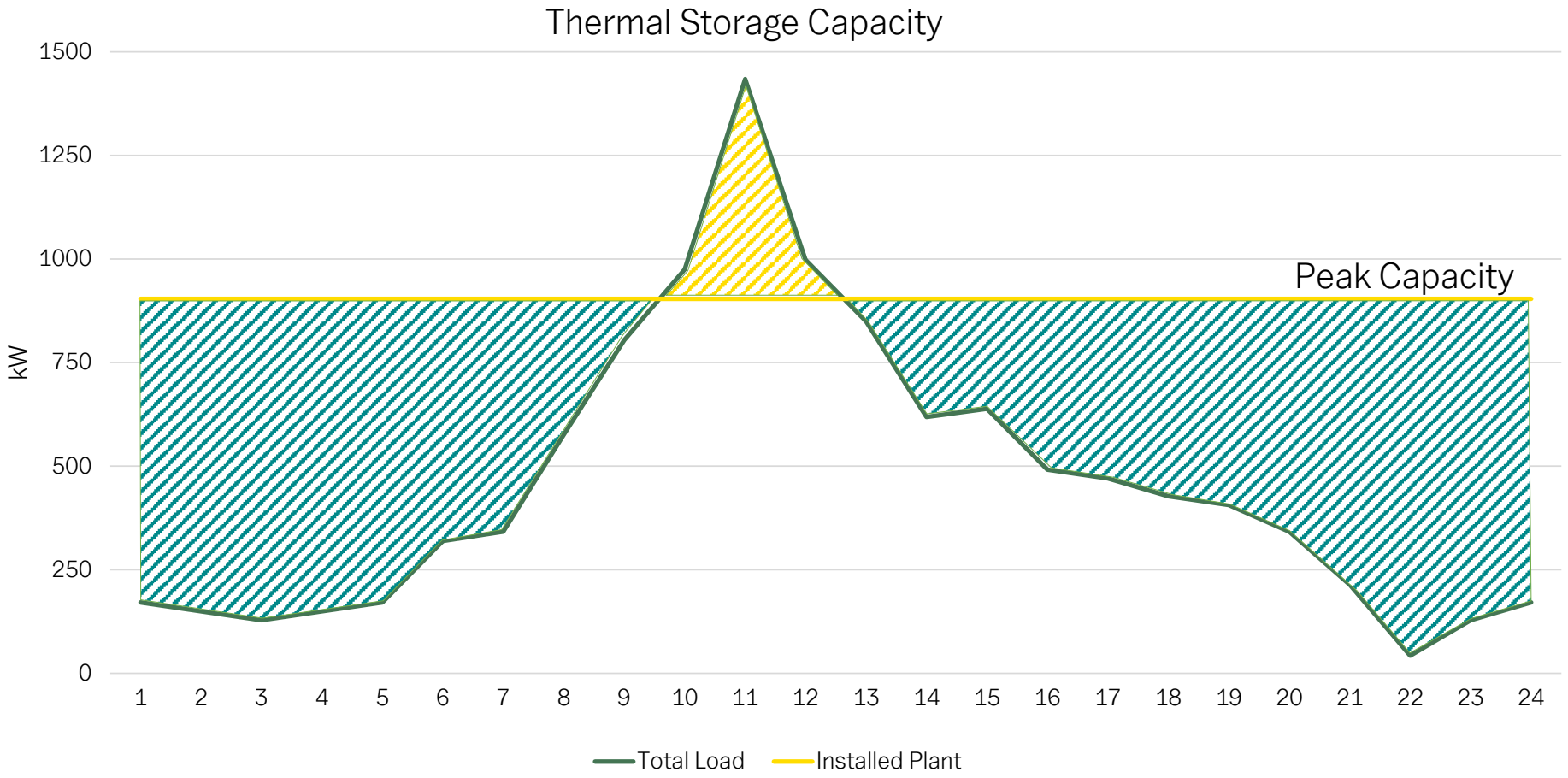


Hybrid Heat Pump and Electric Boiler



Example of an annual load duration curve for a heat pump plant

Thermal Storage



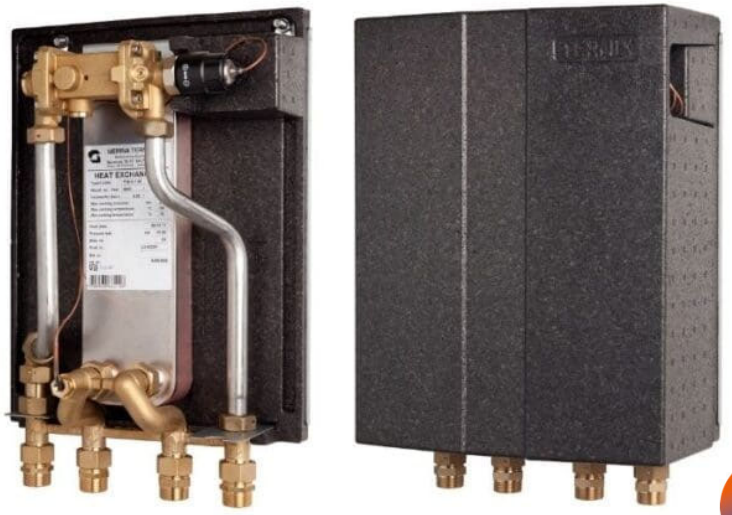
Thermal Storage

- Optimising heat pump production
- Lean heat production
- DHW store

Instantaneous DHW Performance

Point of use electric DHW

COP = 1

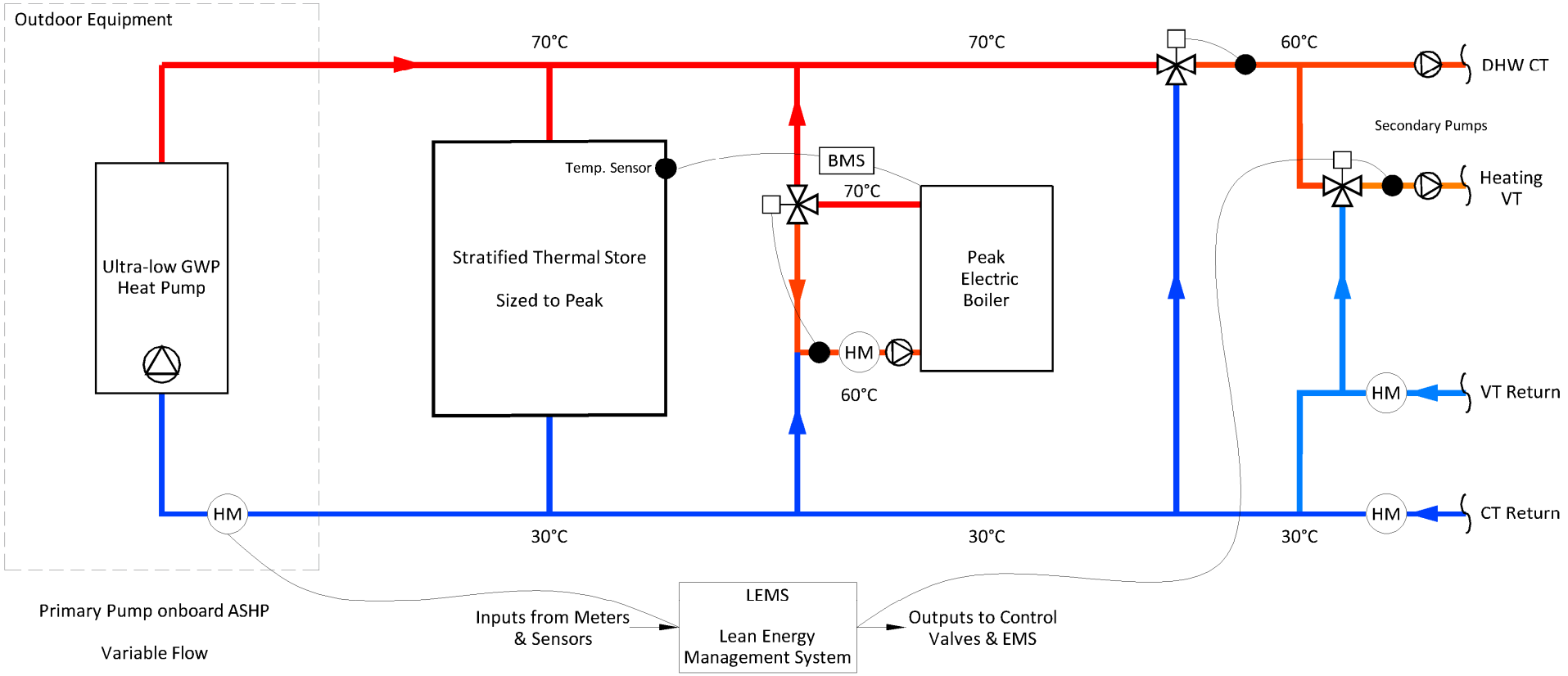


Point of use mechanical DHW

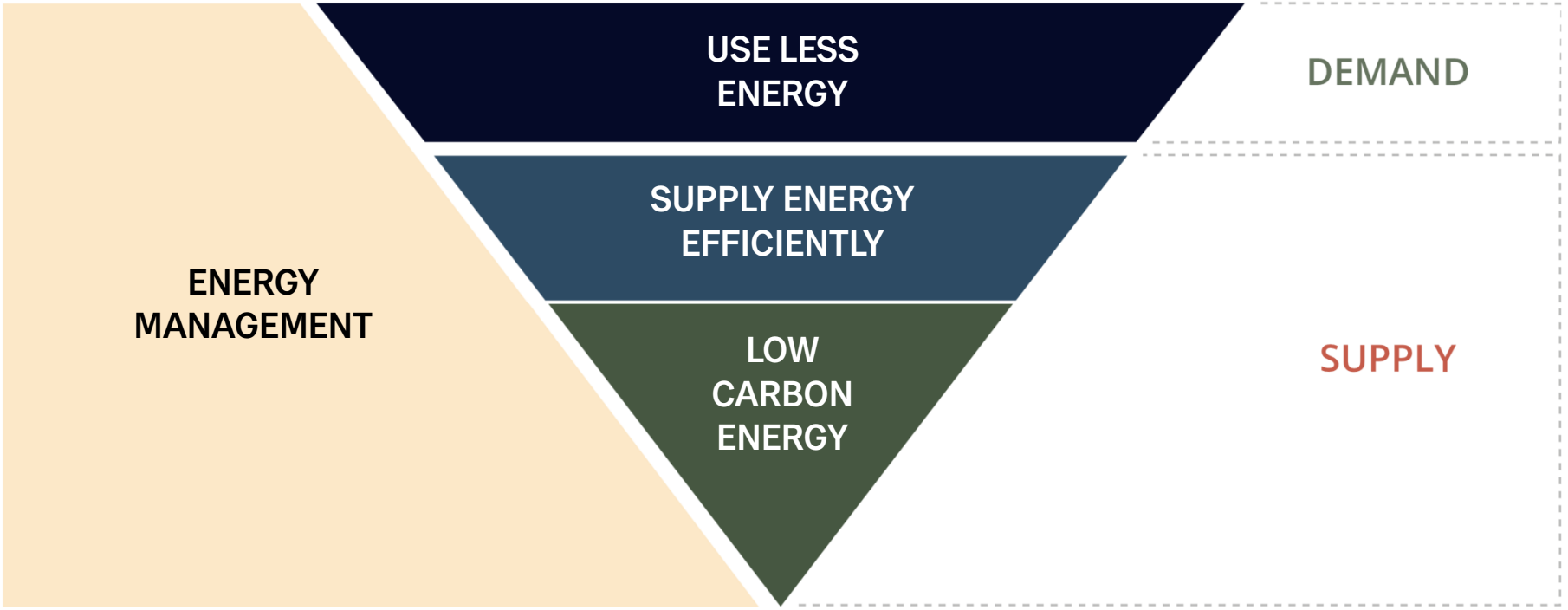
COP > 3.5

60 30

70/30 Energy Centre | SCOP 3.5

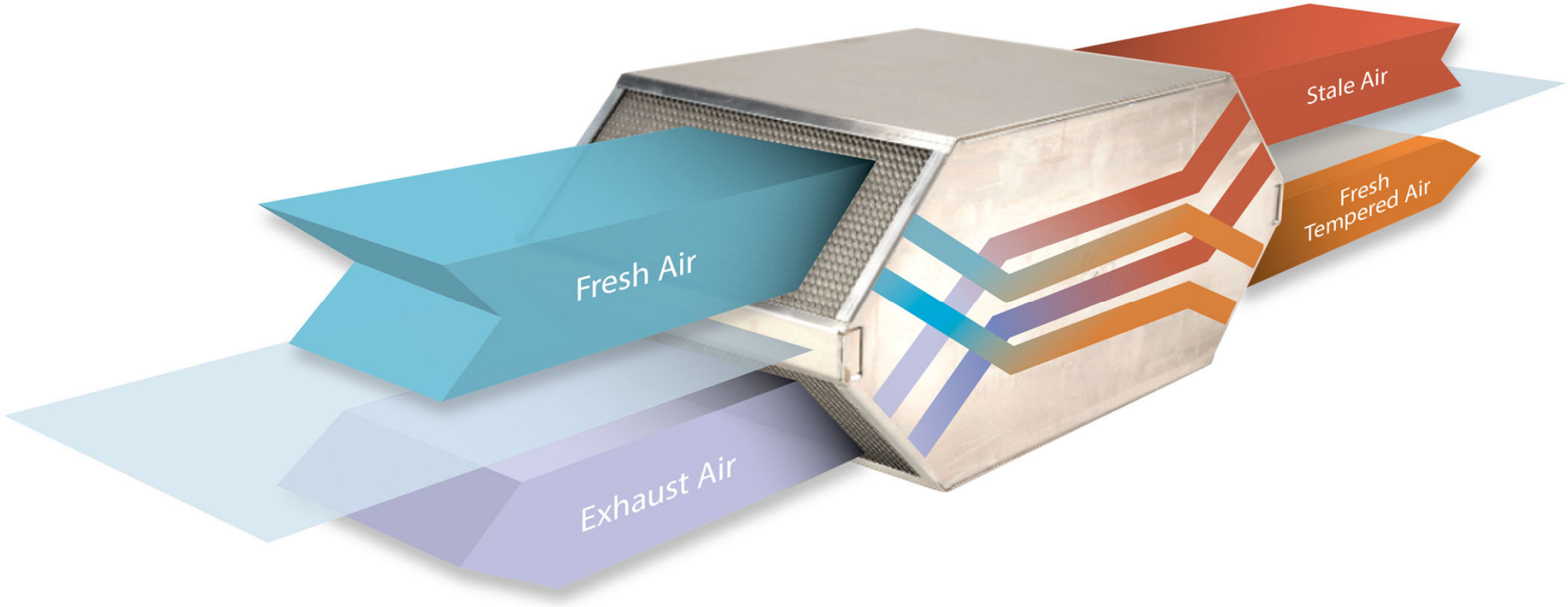


Energy Efficient Schools



Passivhaus Heat Recovery | 75+%

SAV DELTA

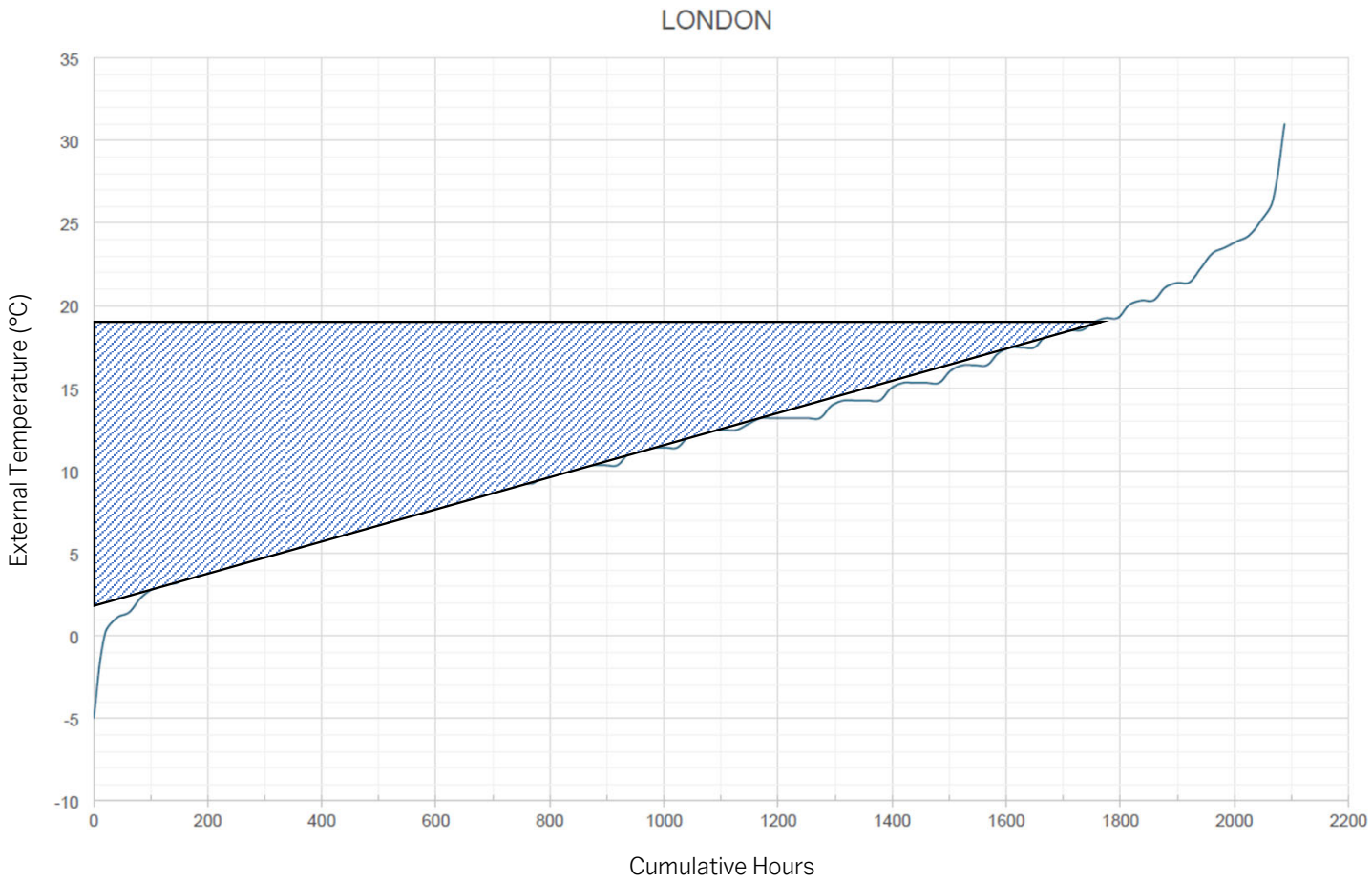


Supply Air Temperatures

Outdoor Temperature (°C)	Room Temperature (°C)	40% Heat Recovery Efficiency (°C)	84% Heat Recovery Efficiency (°C)
0	21	8.4	17.6
5	21	11.4	18.4
10	21	14.4	19.2
15	21	17.4	20.0

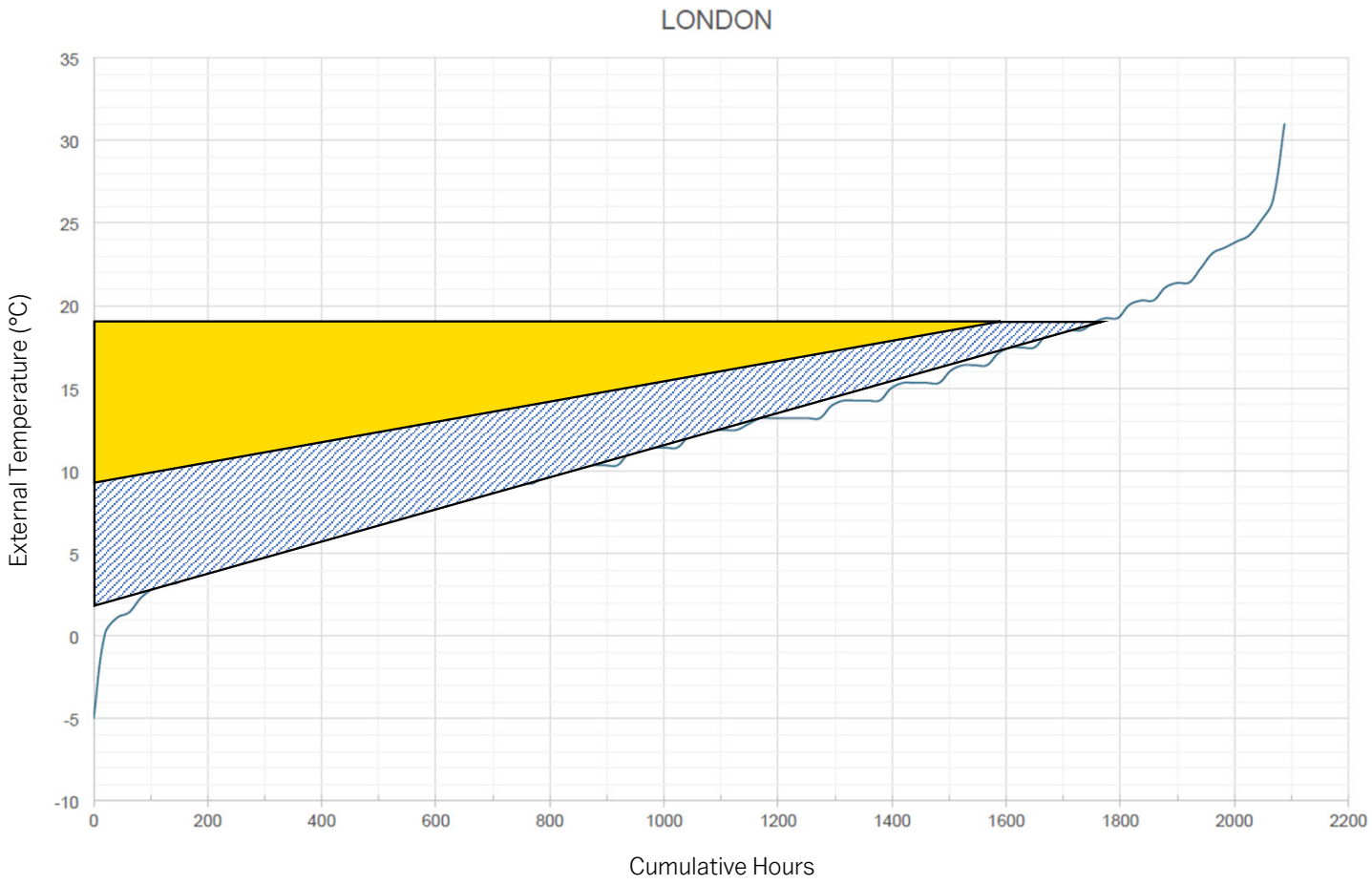
Natural Ventilation

60 kWh/m²/year



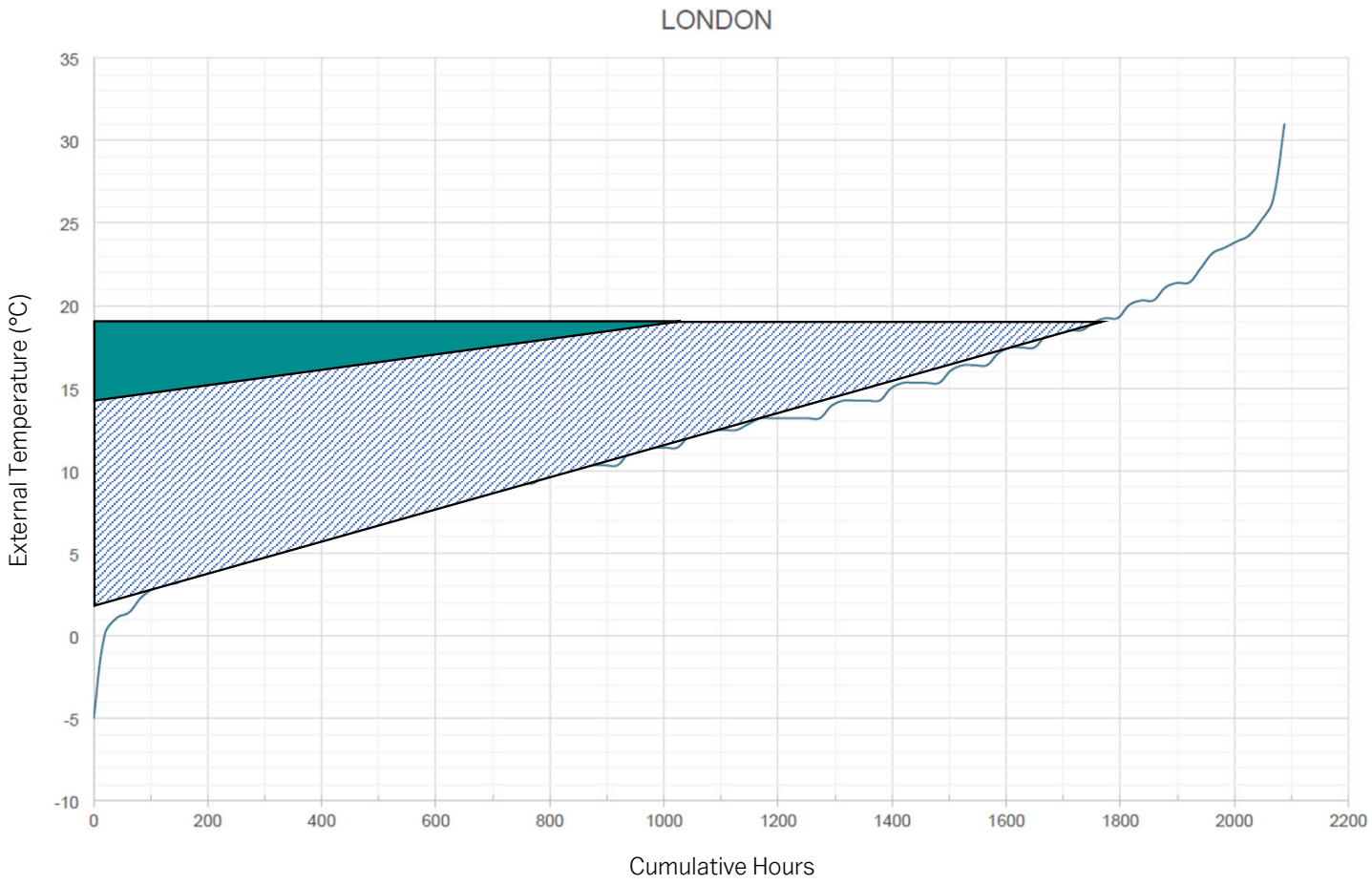
40% Heat Recovery Efficiency

33 kWh/m²/year



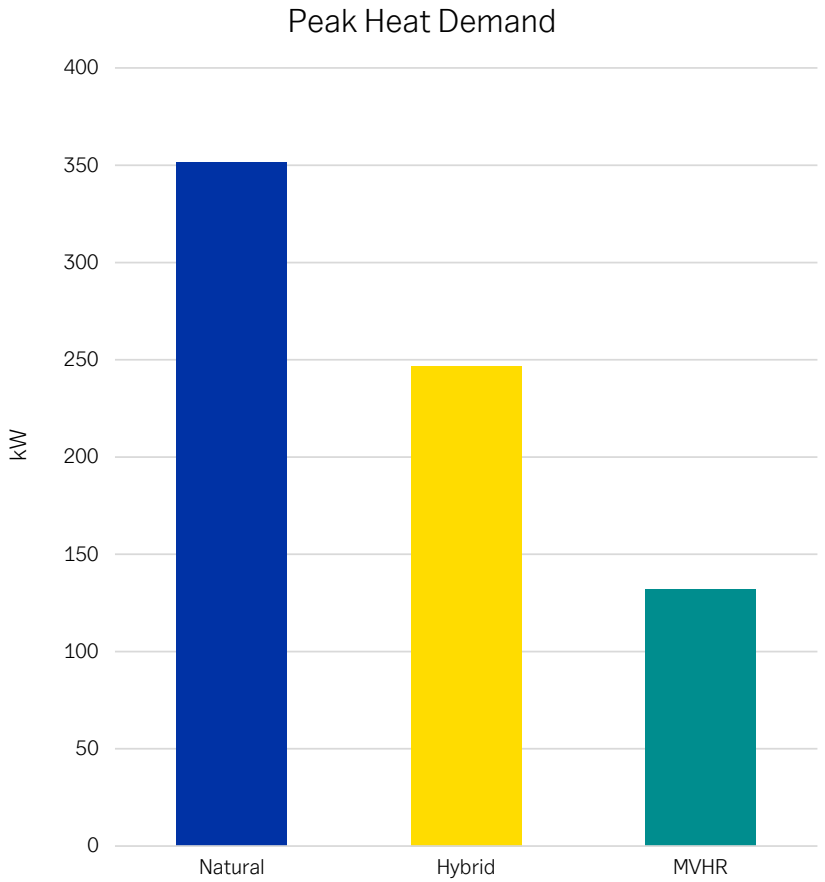
84% Heat Recovery Efficiency

10 kWh/m²/year

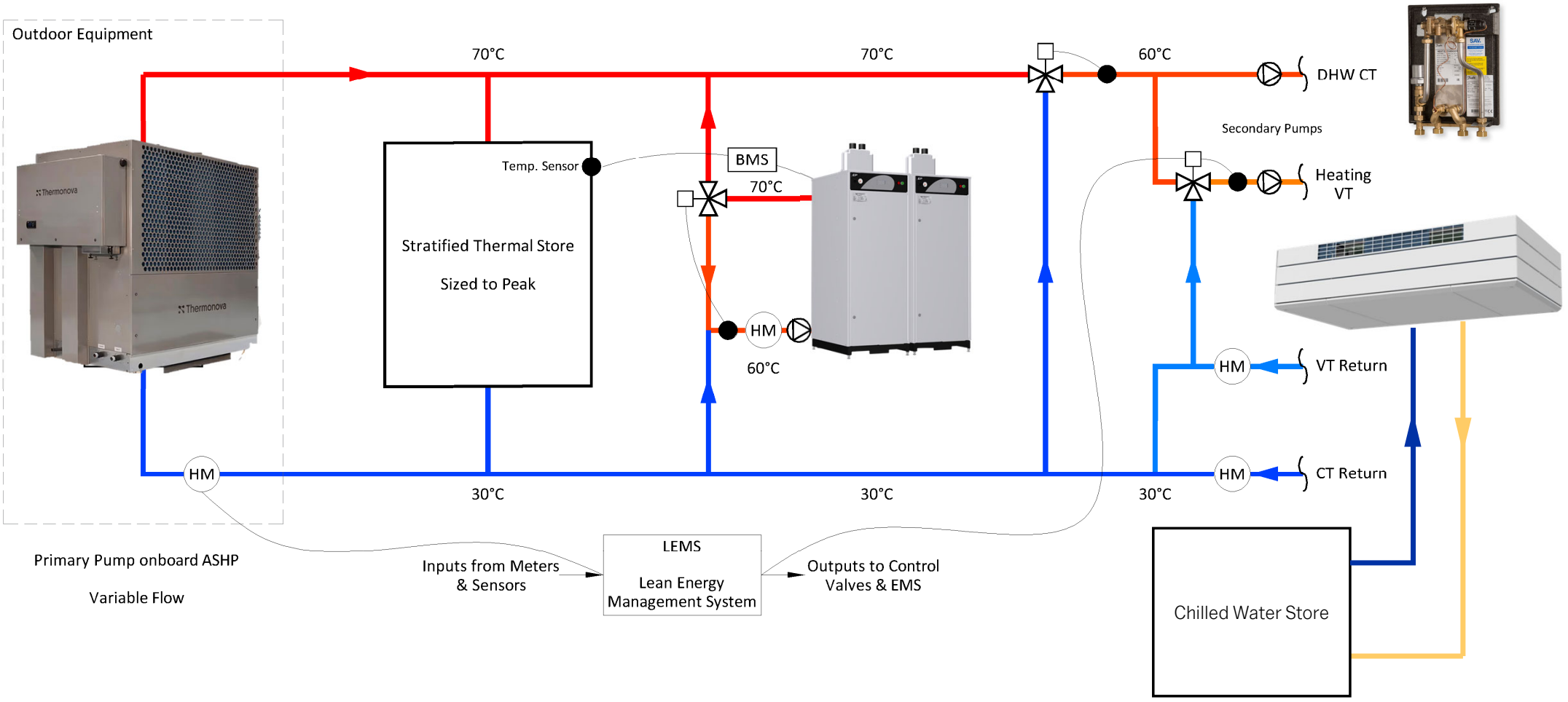


Heat Pump CAPEX & MVHR

- Increasing from 40% to 84% heat recovery efficiency reduces peak heat demand in classrooms by 47%



Energy Efficient School Design



Assessment Input

- Geographical location
- Heat recovery efficiency
- Heating profile
- DHW profile
- Peak heat demand

HYBRID ENERGI | SAV

Heat Pump Sizing Assessment

Project Ref	SAV/HP/116518/IS/22 Jan 2025
Project Name	Holloway Park - Blocks C, D & E Combined
Proposal	3no SAV DELTA-HP4 Heat Pump sized to peak
Assessor	TP

Headlines

Source of emission factors: SAP 10.2

Weather Data Used (CIBSE TRY): 1 London - South East

Project Estimated Heat Demand: 1,463,748 kWh

Site Temperatures: Flow: 60°C, Return: 34°C

Heat Pump Constant Outlet Temperature: 60°C

Project Specific COP/SCOP: SCOP = 3.33

Heat Pump Share: 100.0%

Comparison with Notional Building

Carbon Footprint (kg/CO_2): -82%

Primary Energy kWh: -65%

Operating Cost (£): -1%

* Notional building with gas boiler

DELTA Plant Assessment

Heat pump only

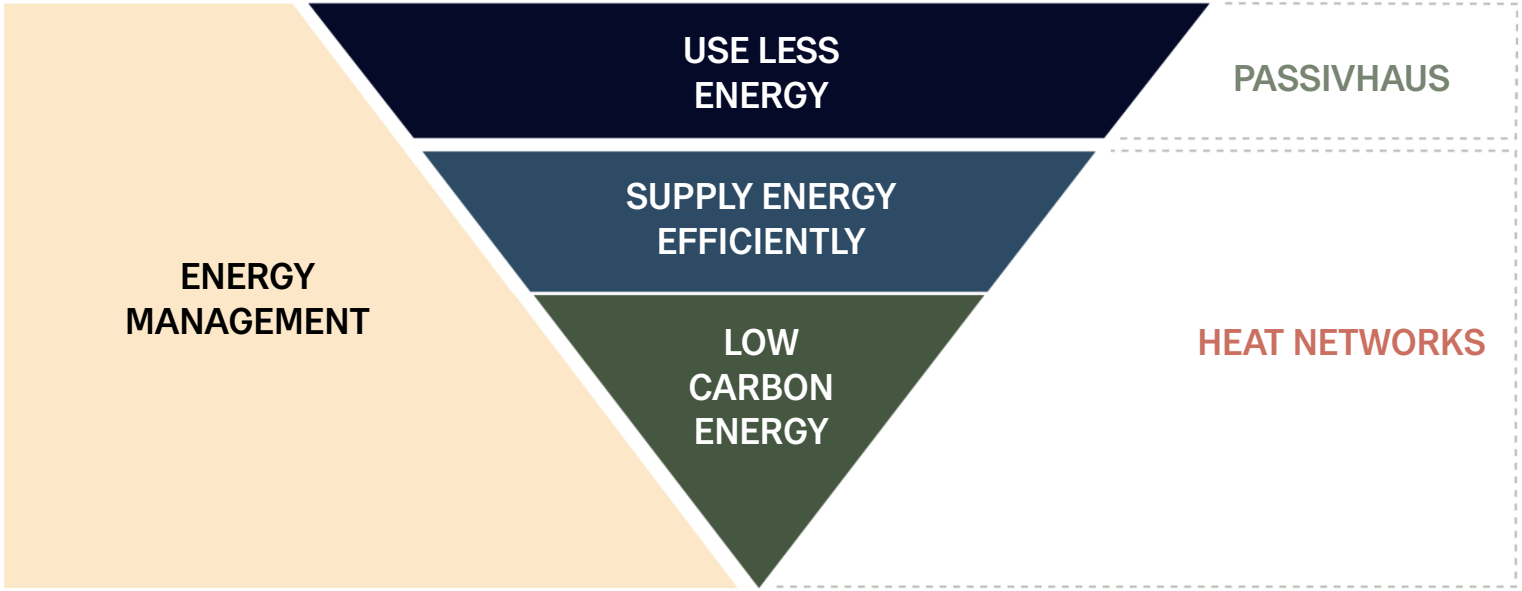
- Highest CAPEX
- Lowest OPEX
- SCOP 3.33

Hybrid Plant Assessment

Hybrid – Heat pump + E-Boiler

- **62%** lower CAPEX
- Increased OPEX
- **SPF 3.00** incl. boiler

Energy Efficient School Design



80% heat recovery efficiency

Large delta T heat pumps

Peak shaving with electric boilers

Substantial thermal storage

Point of use mechanical DHW