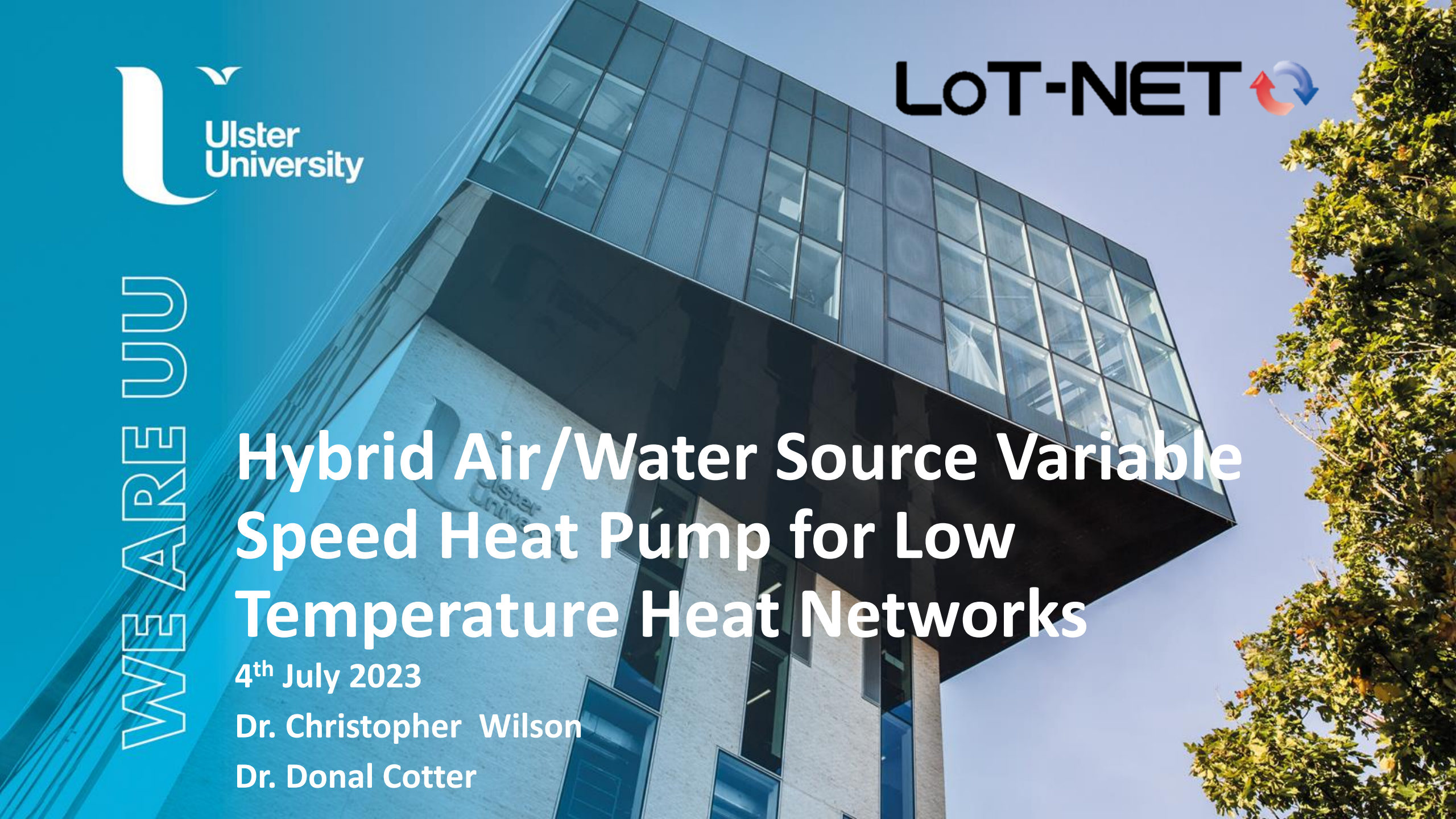

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LoT-NET

Hybrid Air/Water Source Variable Speed Heat Pump for Low Temperature Heat Networks

4th July 2023

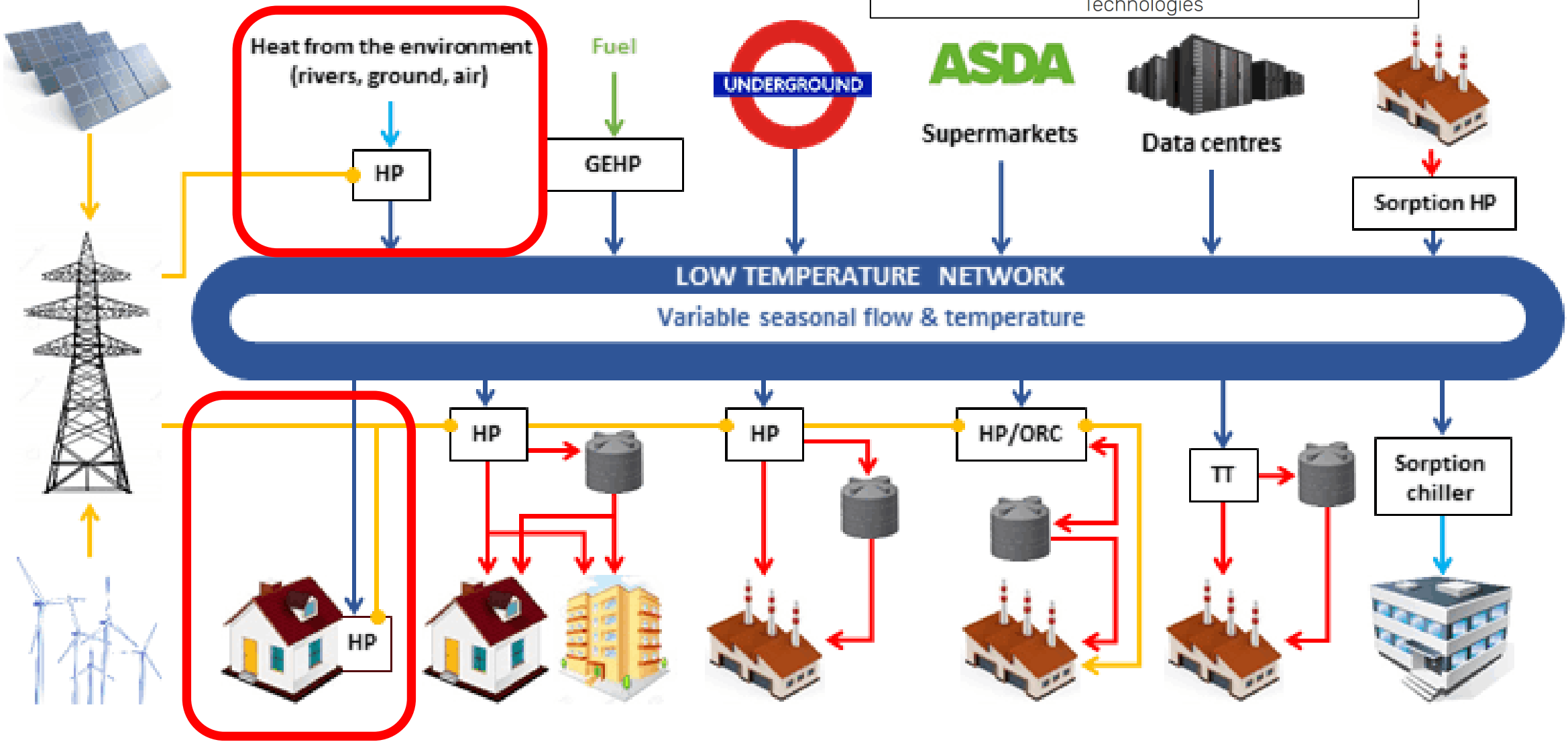
Dr. Christopher Wilson

Dr. Donal Cotter

LoT-NET

Low Temperature Heat Recovery and Distribution Network Technologies

Excess Renewables – Air to Water HP



Low Temperature Source – Water to Water HP

https://lot-net.org/home.html

LoT-NET: Low temperature lift – what source/sink?

Source

- Water source heat pump drawing from 5G heat network: **10°C - 35°C?**
- Air source heat pump charging network: **-10 °C to 15 °C?**

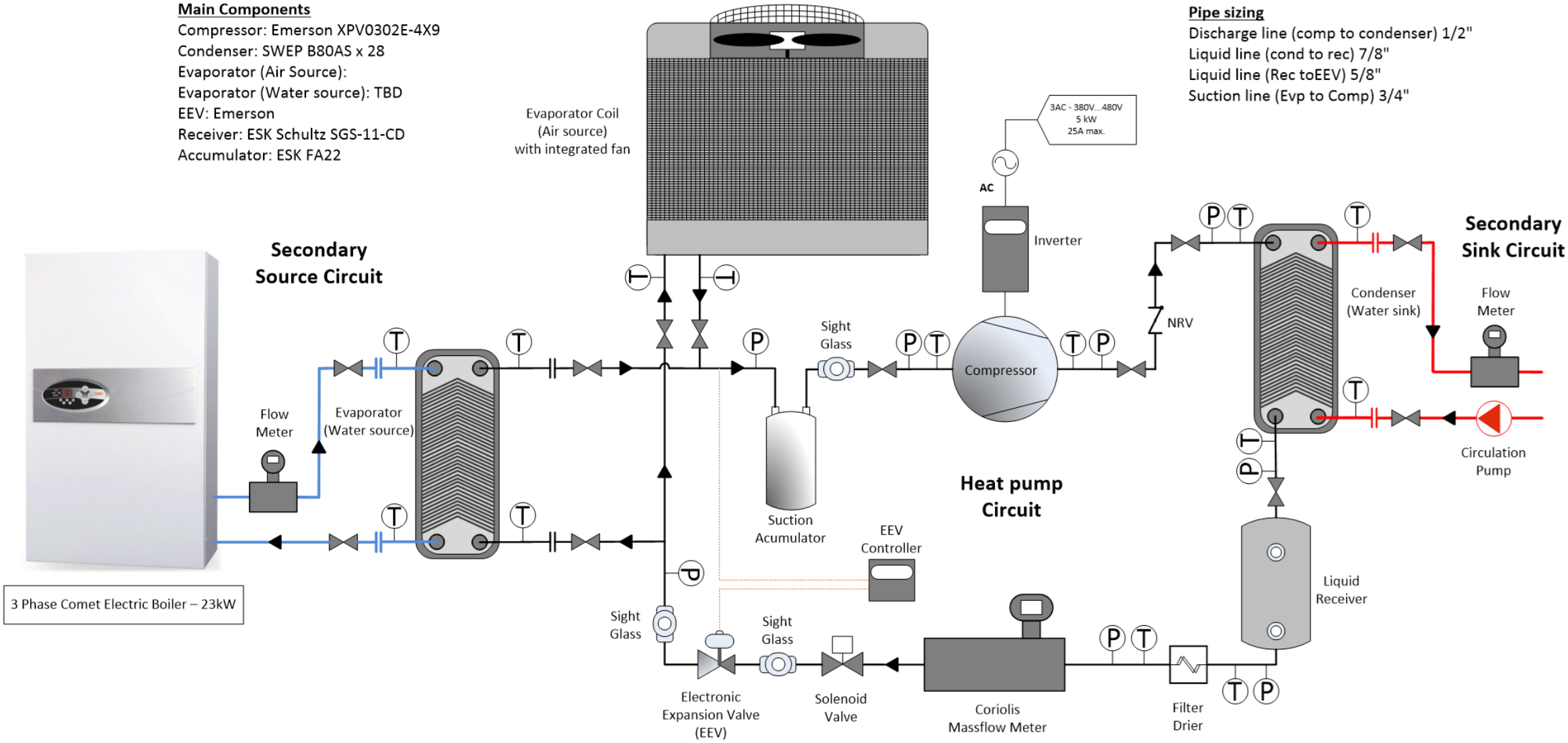
Sink

- Underfloor heating:
  - Max surface temperature of floor 29°C (BS EN1264-2)
  - Flow temperatures: **35°C – 45°C**
- Radiators:
  - Low: **45°C – 65°C**
  - High: 65°C – 80°C
- Hot Water
  - Shower supply **41°C**
- Heat network as sink:
  - **10°C - 45°C**

System Design

Main Components
Compressor: Emerson XPV0302E-4X9
Condenser: SWEP B80AS x 28
Evaporator (Air Source):
Evaporator (Water source): TBD
EEV: Emerson
Receiver: ESK Schultz SGS-11-CD
Accumulator: ESK FA22

Pipe sizing
Discharge line (comp to condenser) 1/2"
Liquid line (cond to rec) 7/8"
Liquid line (Rec toEEV) 5/8"
Suction line (Evp to Comp) 3/4"



Dual Source Heat Pump

Evaporator – Air Source

Evaporator – Water Source

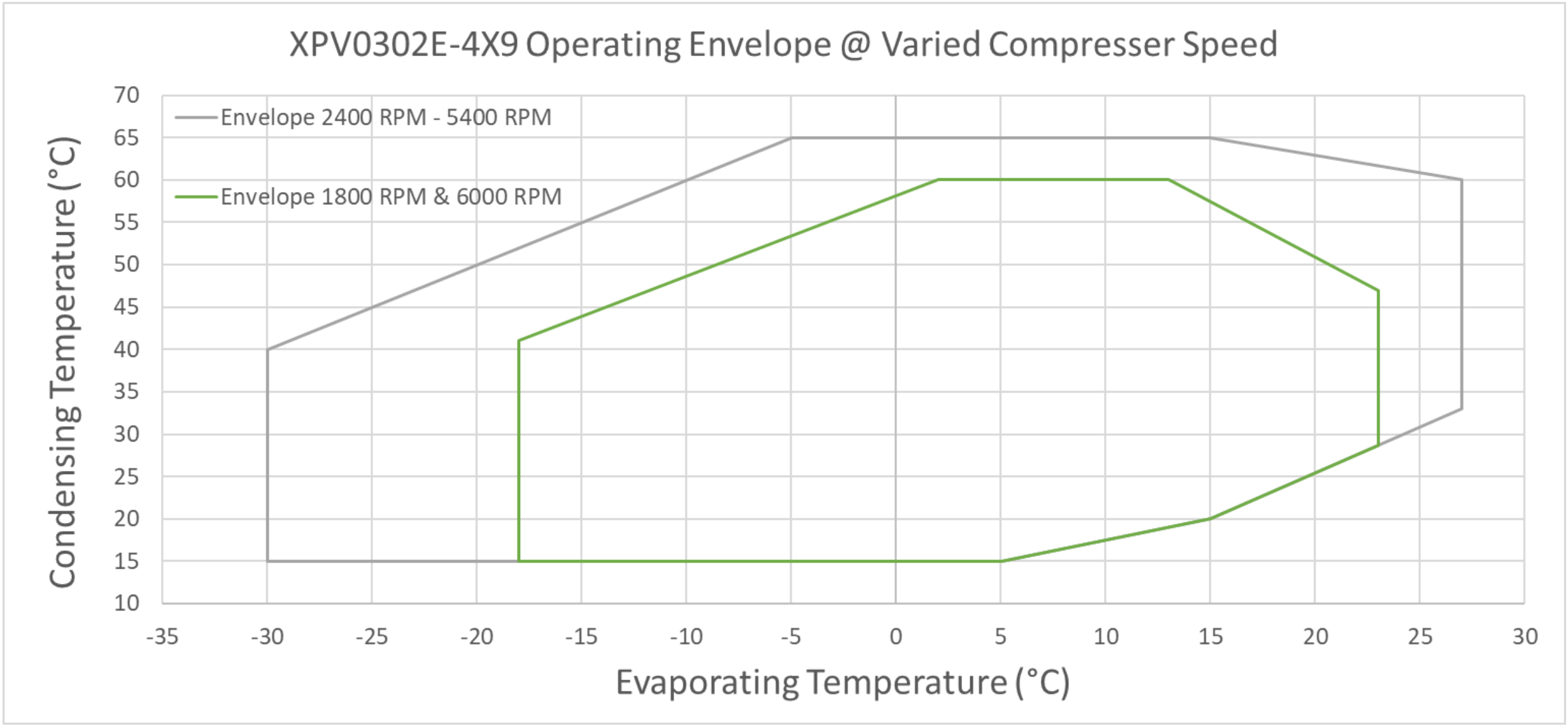
Electric Enclosure

Scroll Compressor

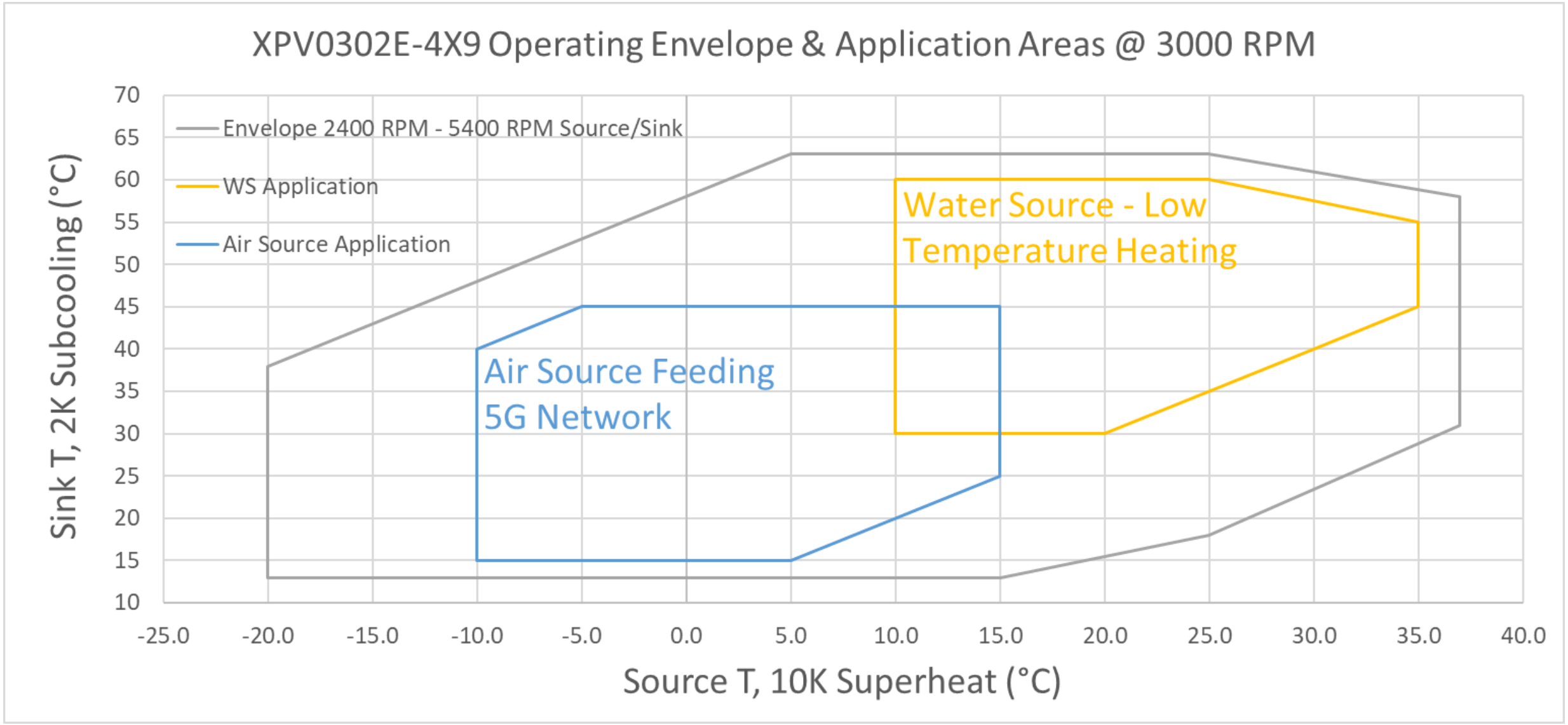
Condenser

Expansion Valve

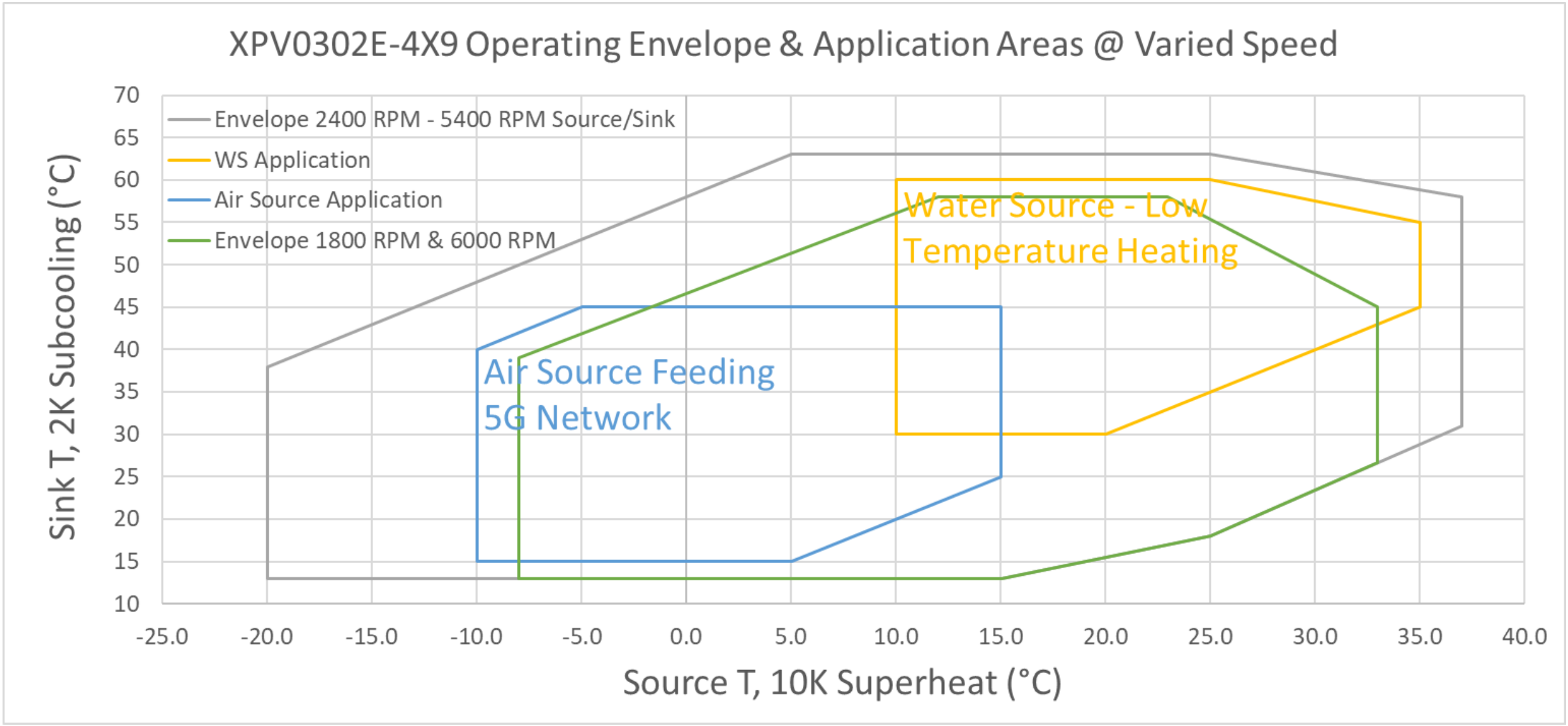
What are the possible application areas within the compressor envelope?



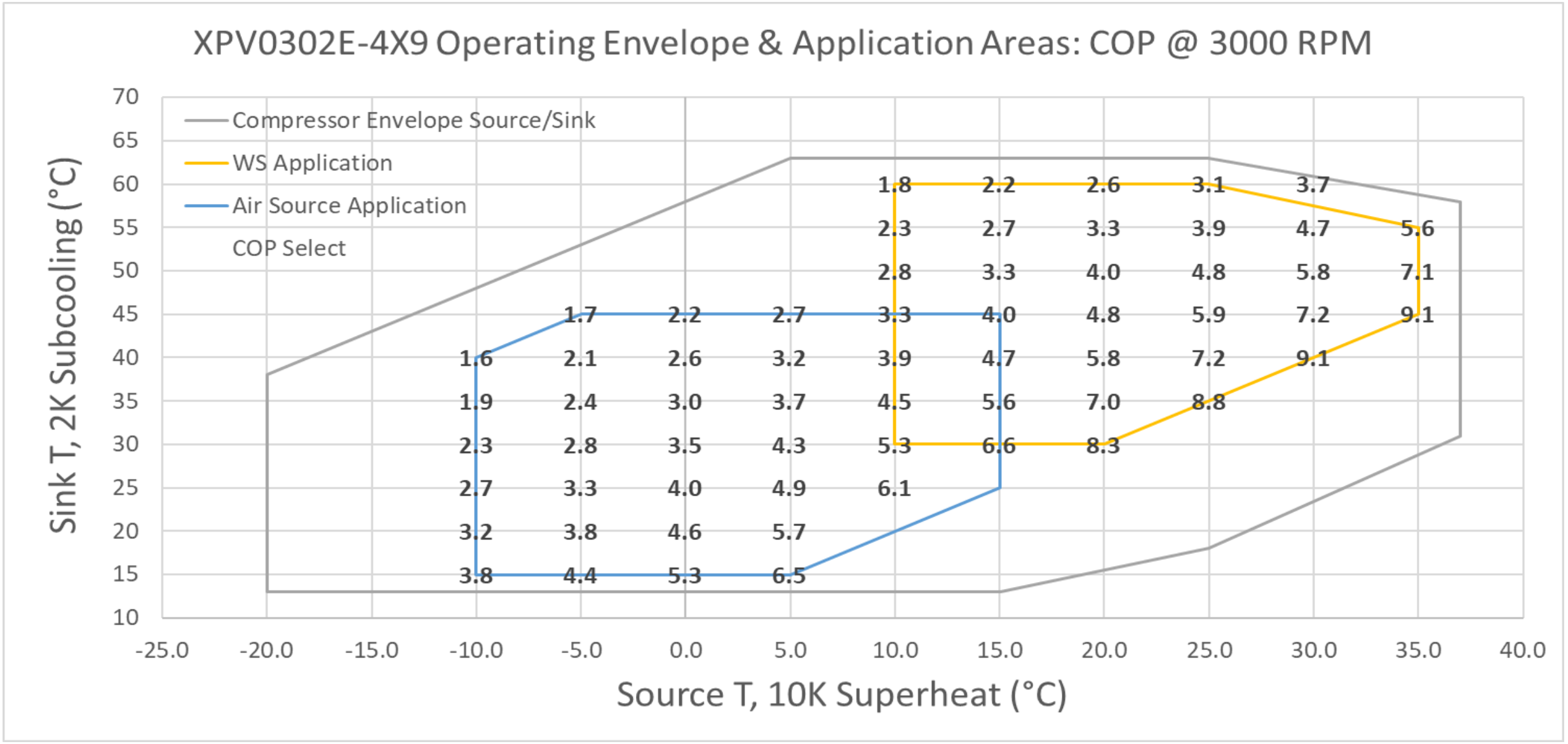
Most likely application areas considering source and sink temperatures



Higher or lower operating speeds may reduce application areas



What is the expected COP within the application areas (source/sink temperatures)



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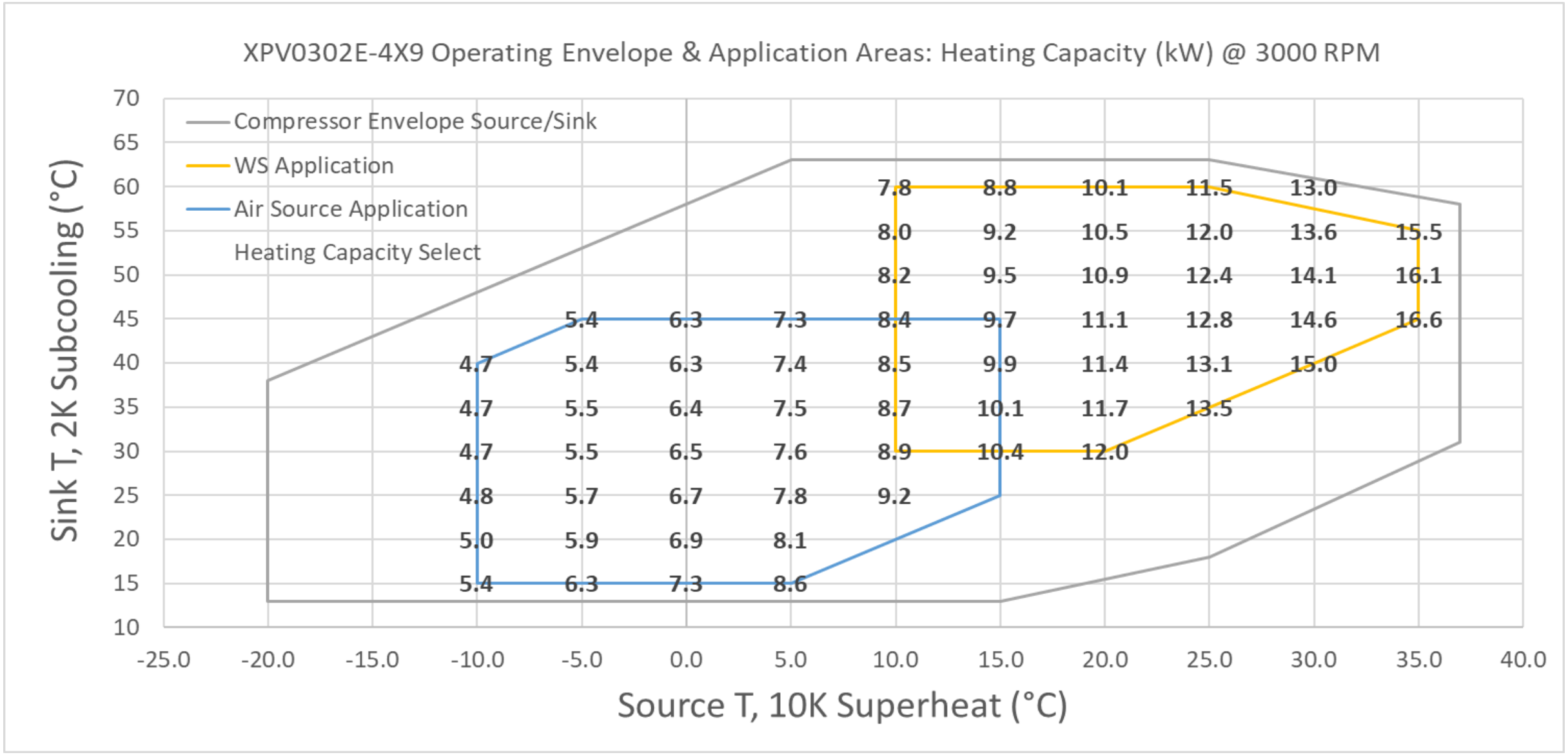
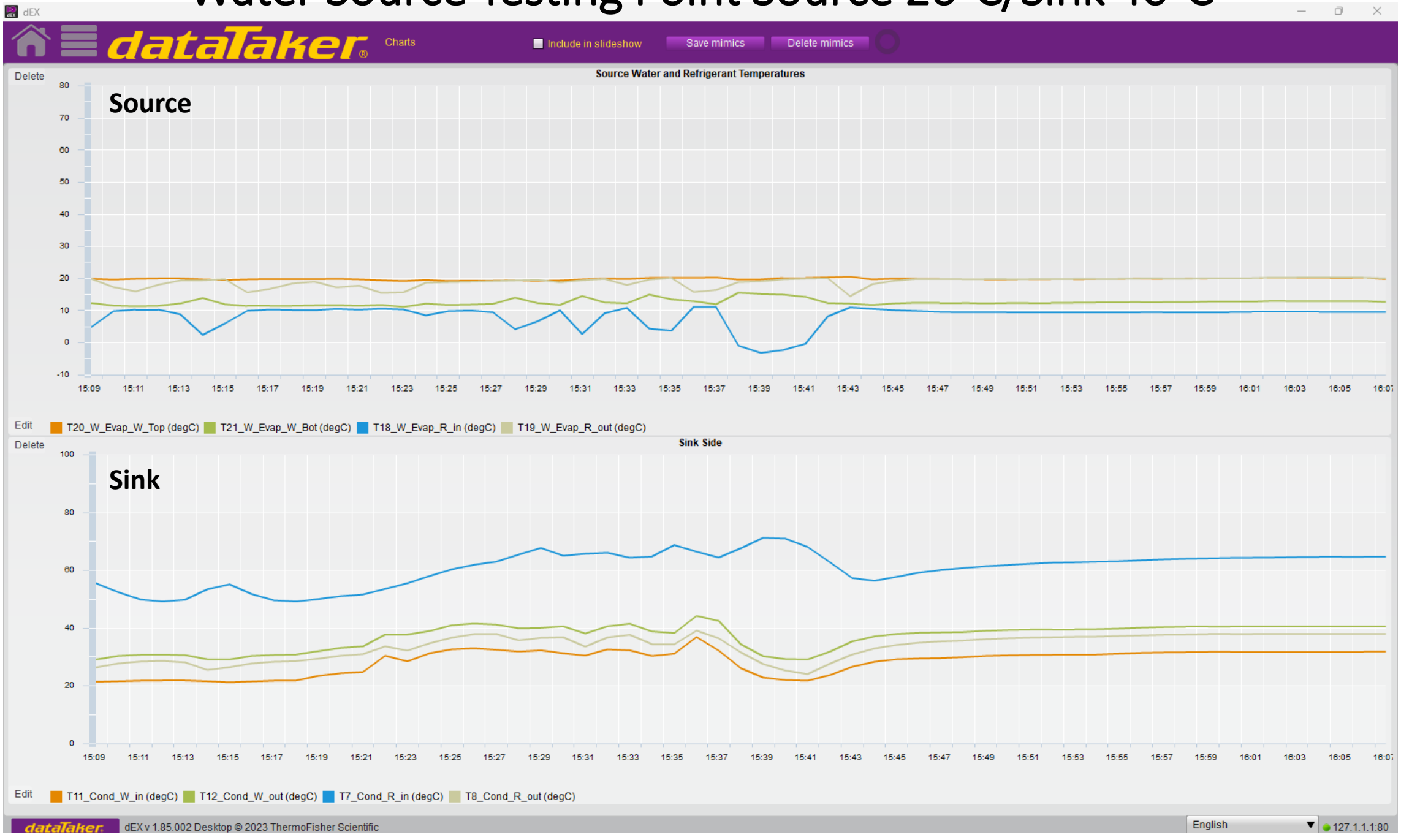


Water Source Testing Point Source 20°C/Sink 40°C



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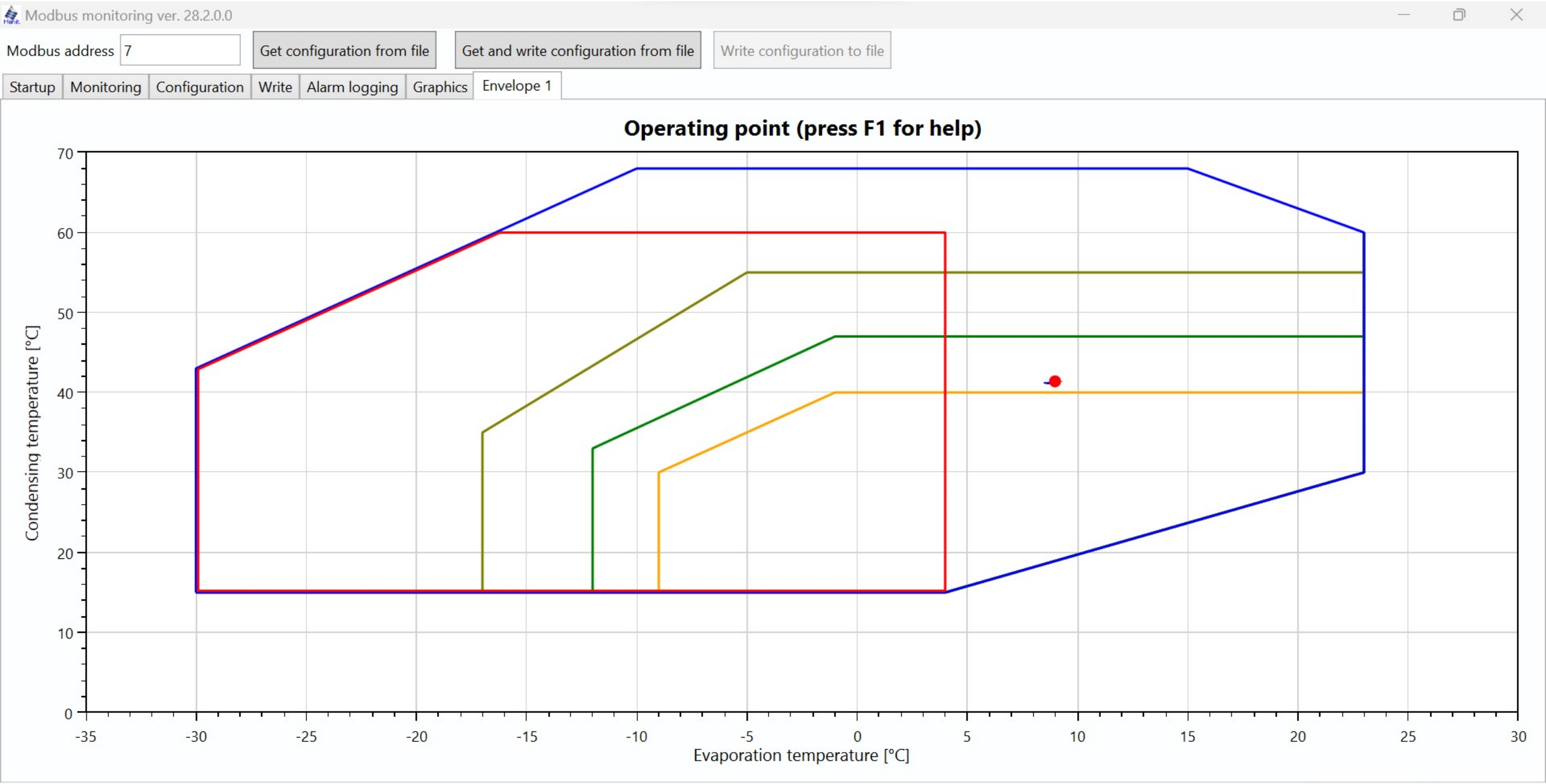
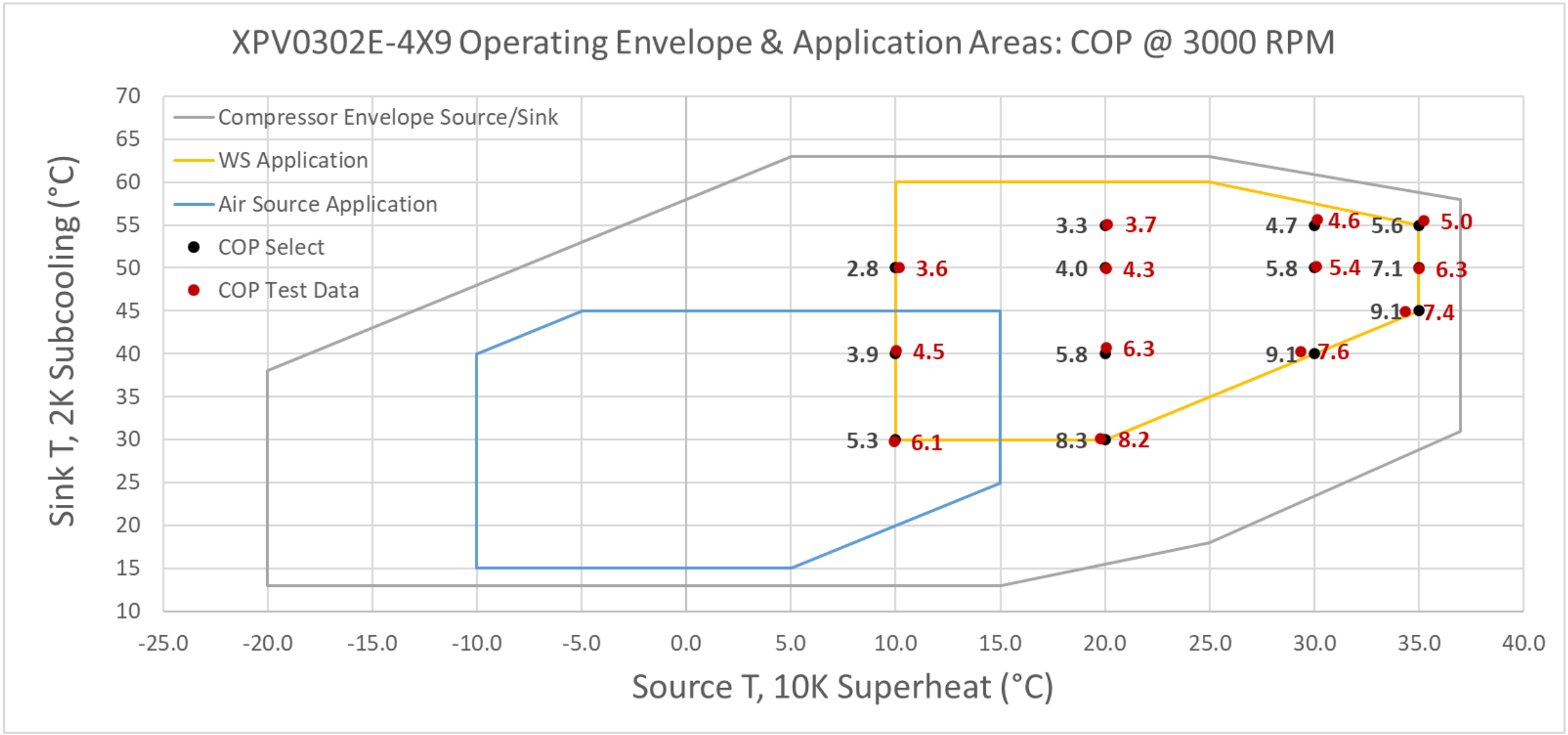


How do Select COPs compare with test data?



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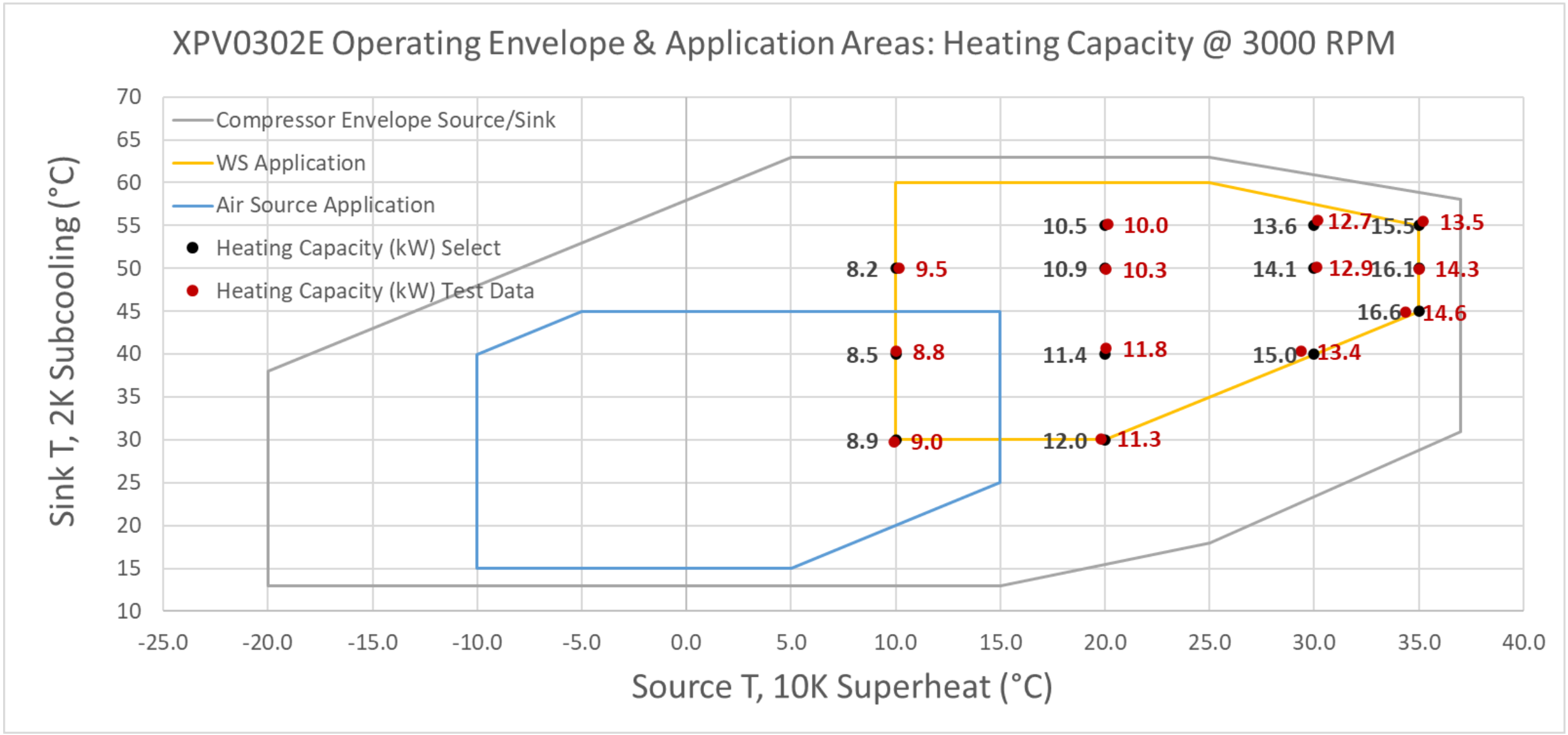
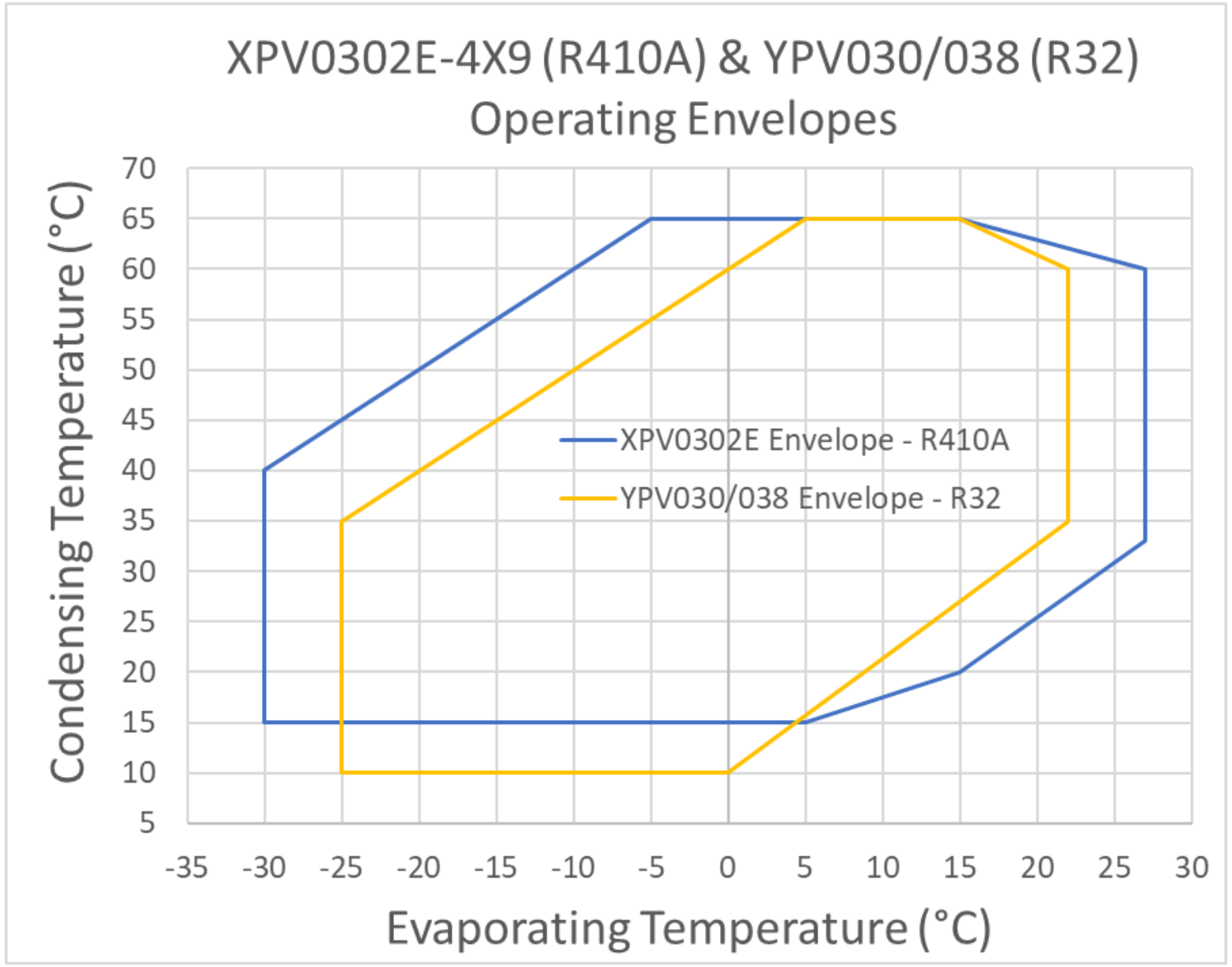


Future Work

- Process data for different speeds and data for air source evaporator
- Compressor replacement required
- Consider different refrigerants (R410A phase out) and modifications required – potentially R32

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Thank You.
Questions?