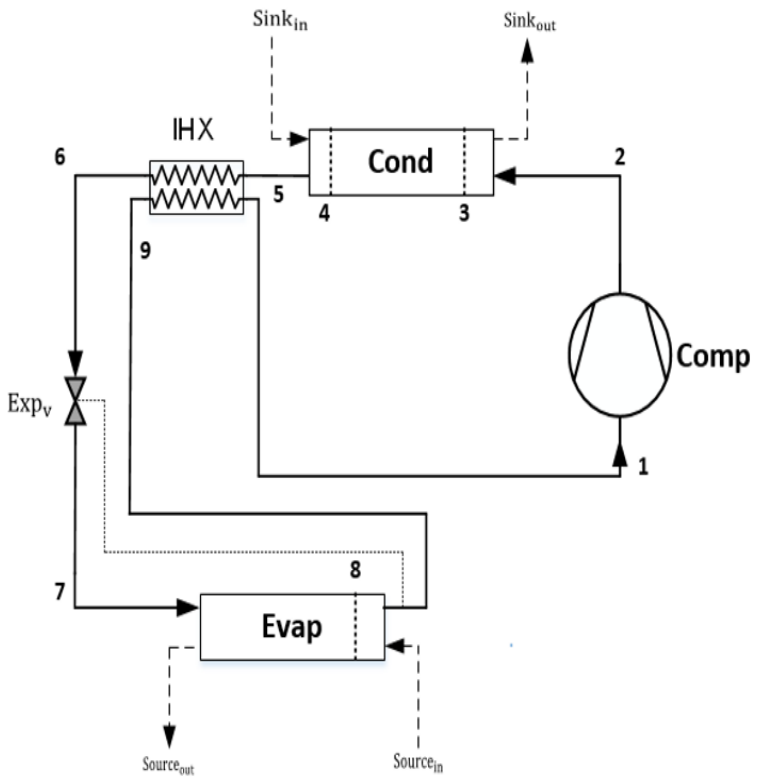
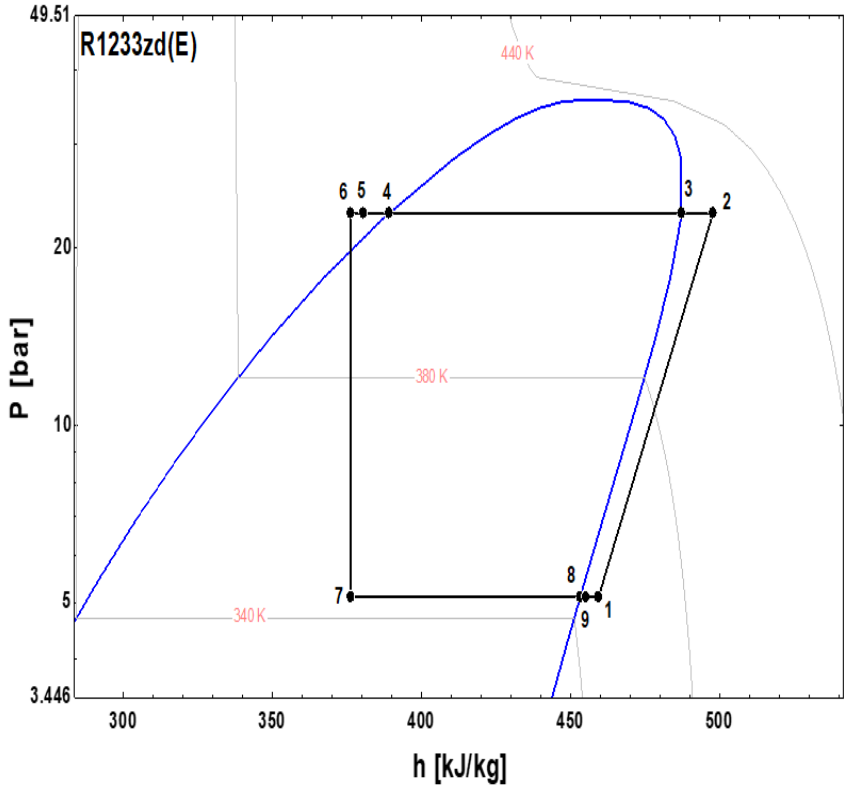
LoT-NET

Advisory Board Meeting October 2023
Work Package 3.1 to 3.4
Ulster University

Low Temperature Heat Recovery and Distribution Network Technologies

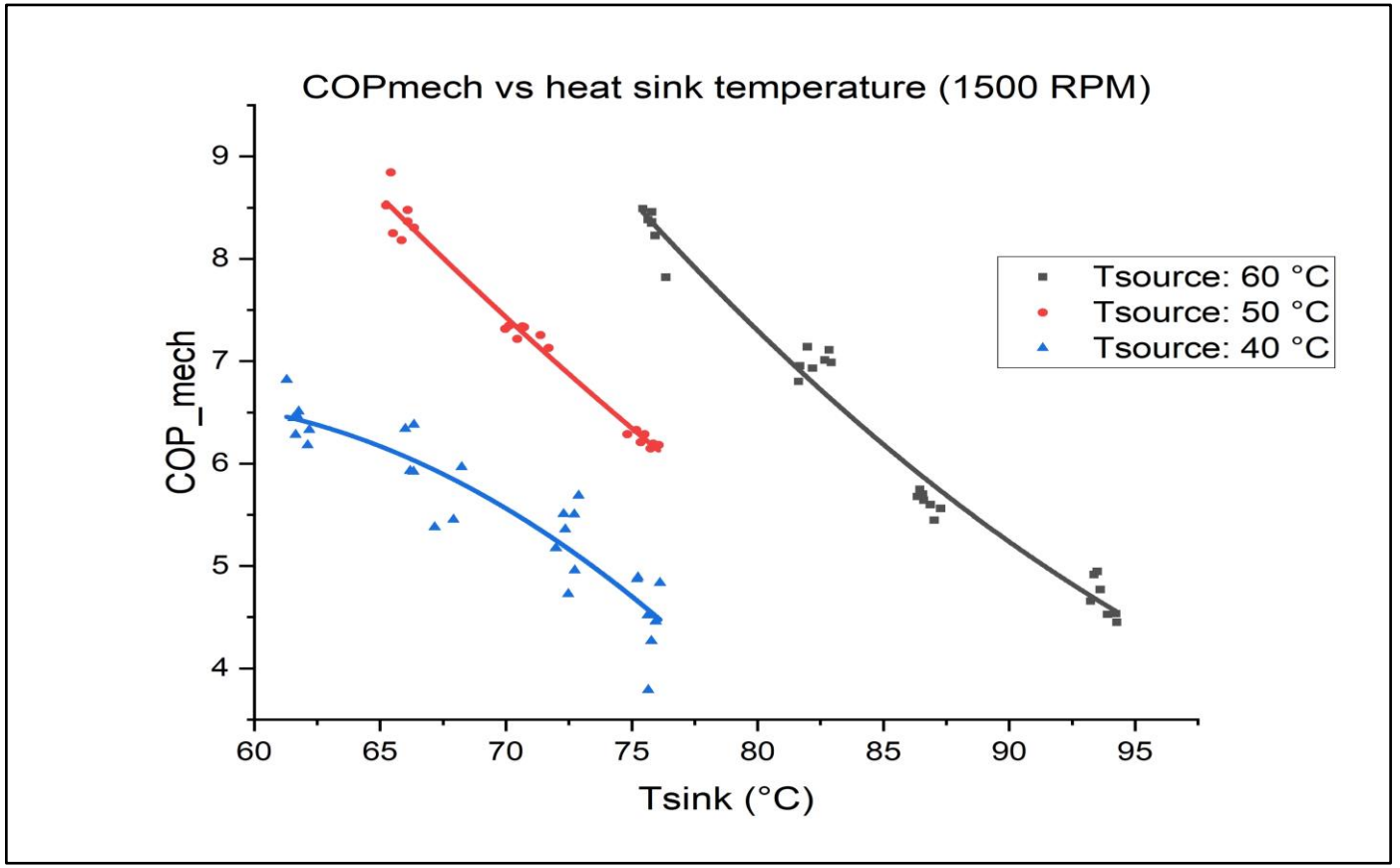
Work Package 3.1 – Low temperature lift, high COP Vapour Compression Heat Pump (combined with WP3.3)



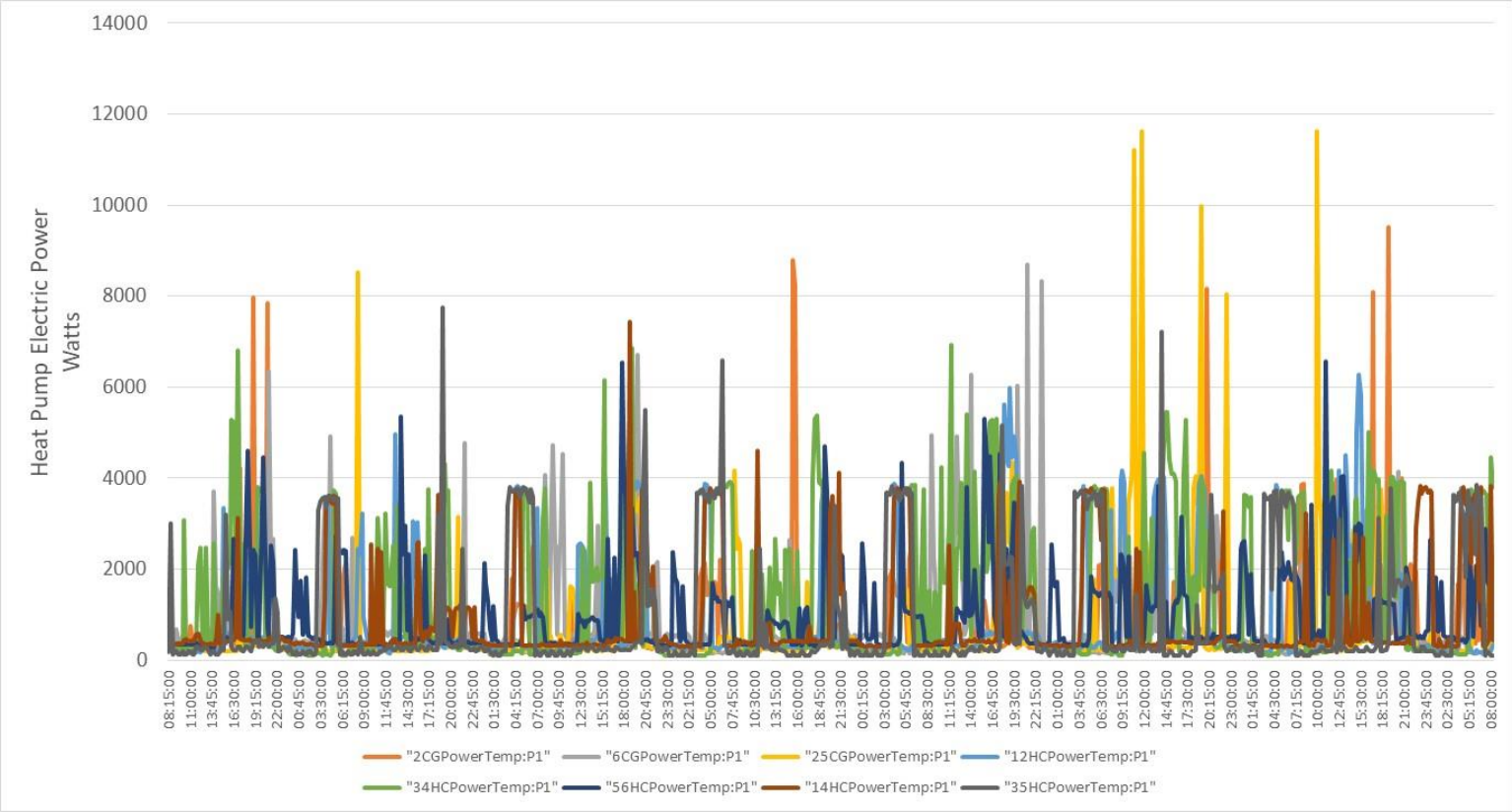


LoT-NET

Work Package 3.1 – Low temperature lift, High COP Vapour Compression Heat Pump – Refrigerants



Work Package 3.2 – Vapour Compression Heat Pump for Demand Side Management (Combined with CCB)



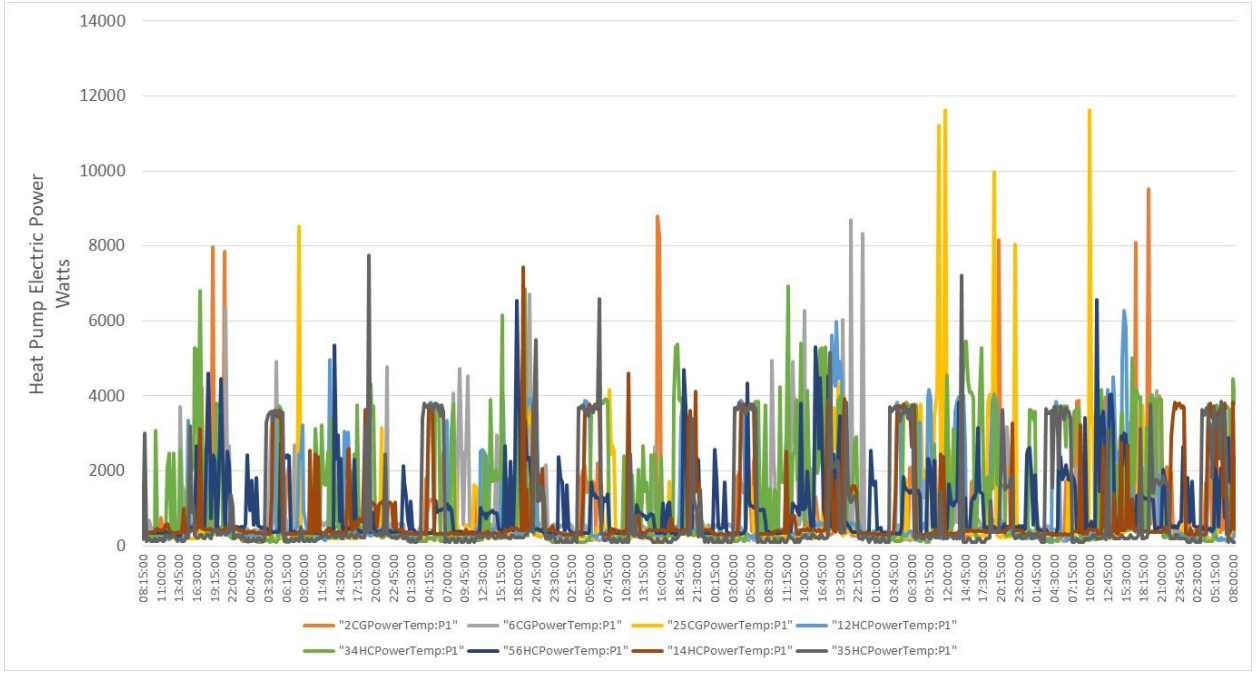
HEAT PUMP ONLY

Vaillant Heat Pump as Part of Sunamp Installation

Sunamp Heating Battery Installation

LoT-NET

Work Package 3.2 – Vapour Compression Heat Pump for Demand Side Management (Combined with CCB)

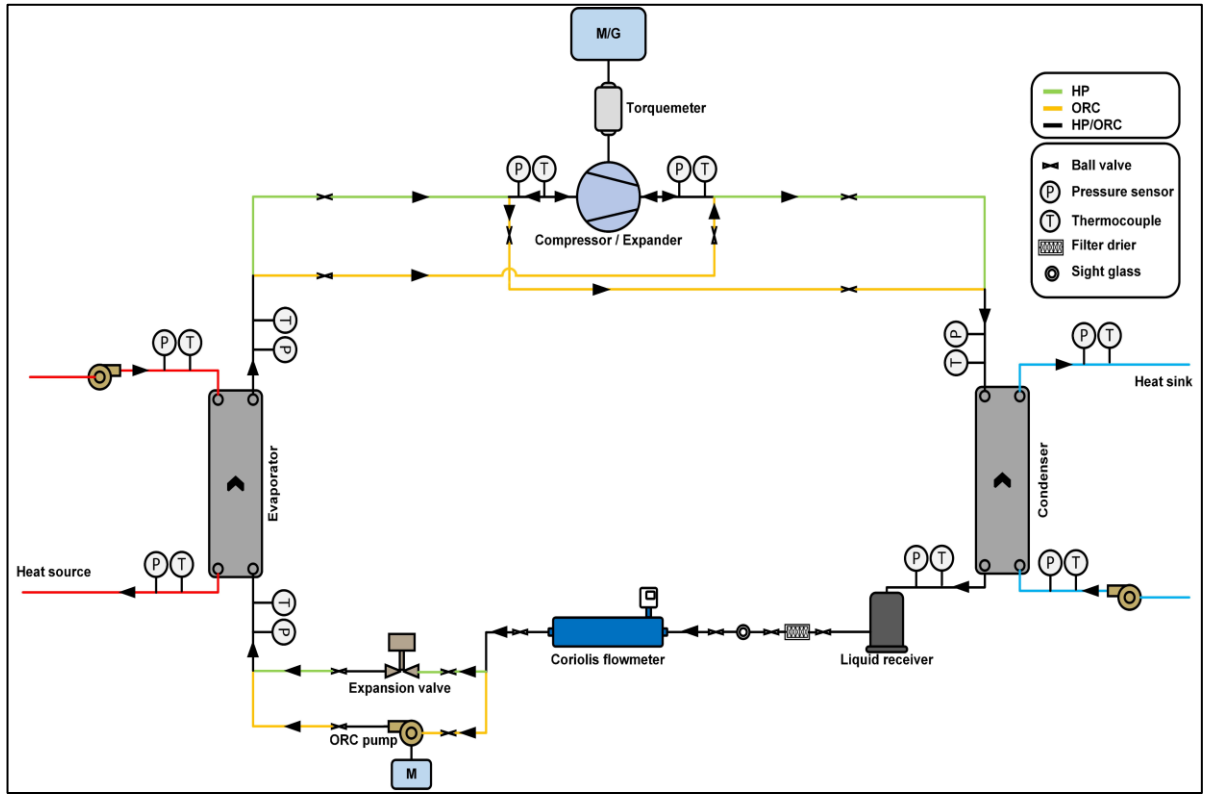


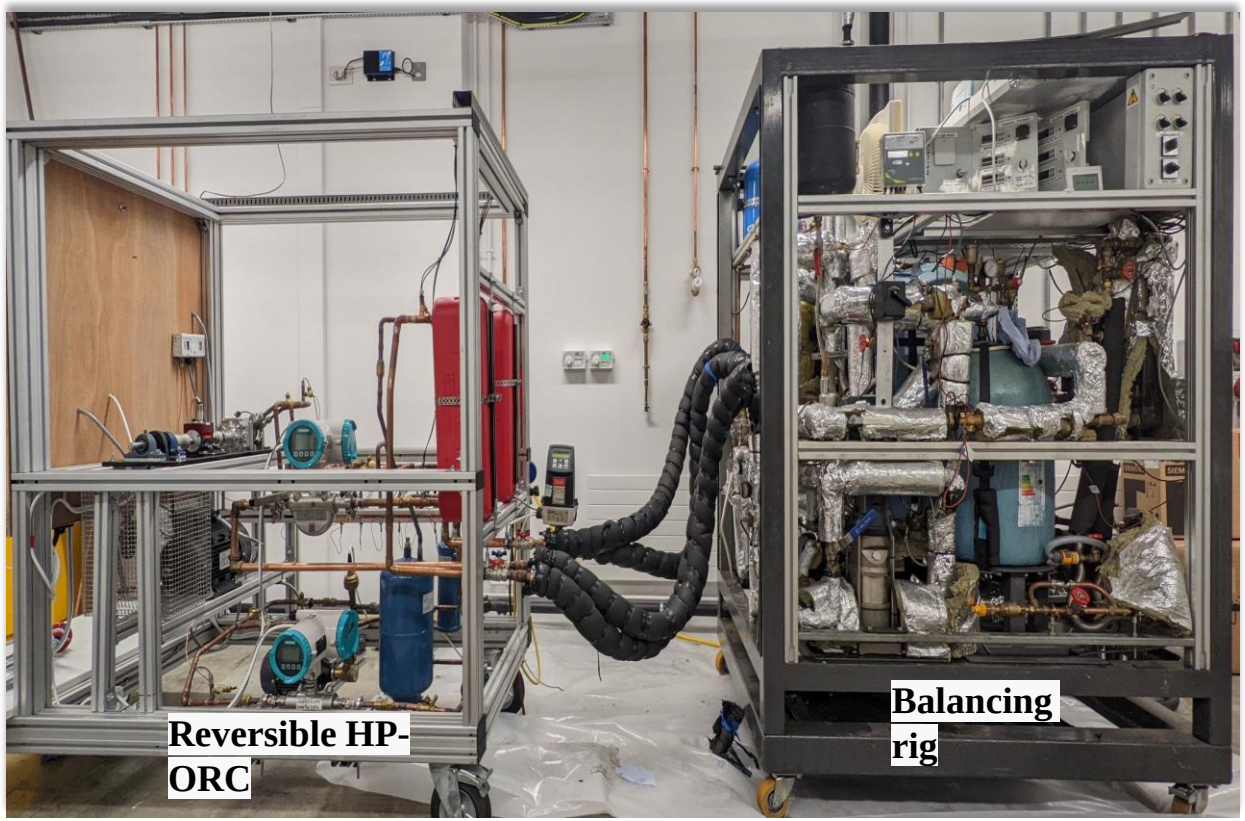
Scenario	Description	ADMD Per Home (kW) Diversified	ADMD Per Home (kW)
0	Gas Fired Heating With A Conventional House	0.75	2.0
1a	30% Deployment Of HP	0.80	2.0
1b	60% Deployment Of HP	1	2.5
1c	Full Deployment Of HP	1	2.5
2a	30% Deployment Of Total Electrification In Smart Grid Scenario	1	2.5
2b	60% Deployment Of Total Electrification In Smart Grid Scenario	1.5	3.0
2c	Full Deployment Of Total Electrification In Smart Grid Scenario	2	5.0
3a + 2c	Full Deployment Of Total Electrification In Smart Grid Scenario + 30% Deployment Of EV's At On Peak Fast Charge	3	7.0
3b + 2c	Full Deployment Of Total Electrification In Smart Grid Scenario + 60% Deployment Of EV's At On Peak Fast Charge	3.5	9.0
3c + 2c	Full Deployment Of Total Electrification In Smart Grid Scenario + Full Deployment Of EV's At On Peak Fast Charge	4.5	11.5

$$MD = N \times DF \times ADMD$$

LoT-NET

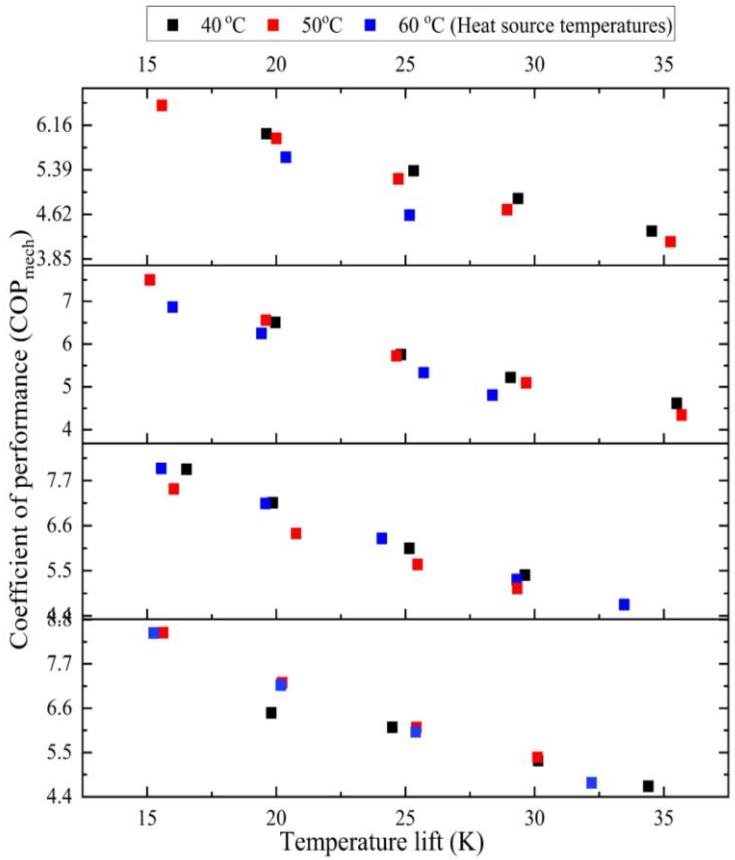
Work Package 3.4 – Combined Vapour Compression Heat Pump/Organic Rankine Cycle for Heat or Electricity

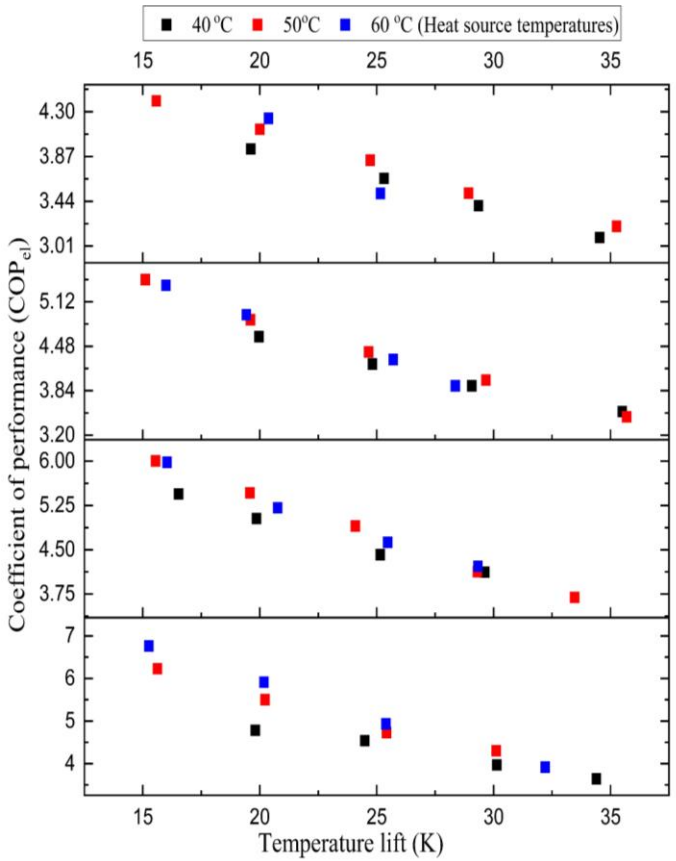


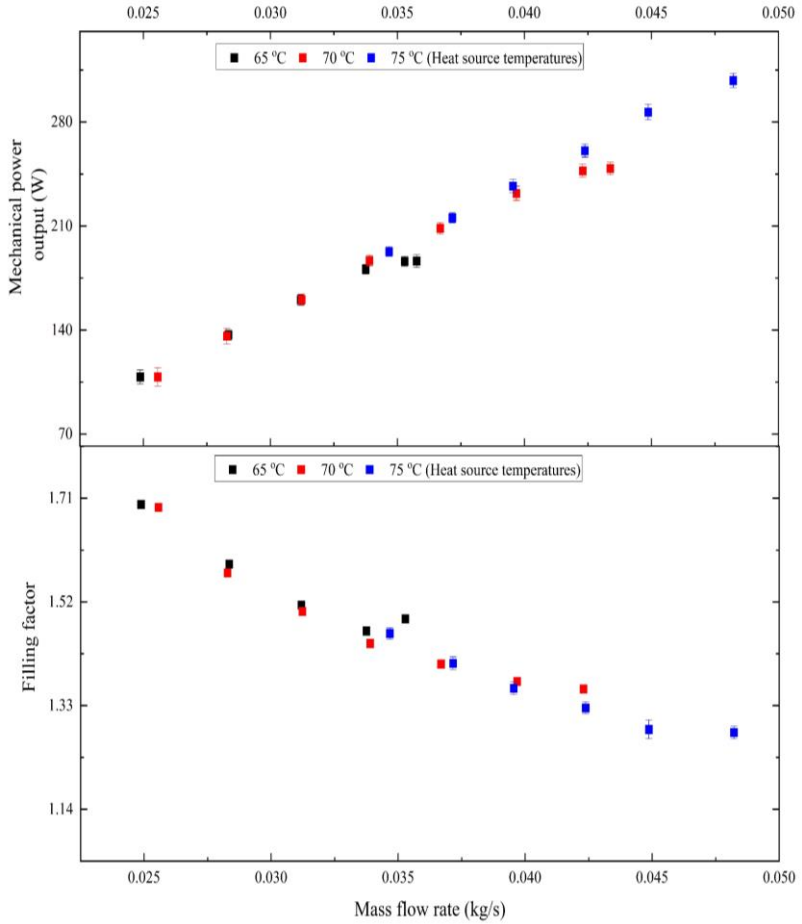


LoT-NET

Work Package 3.4 – Combined Vapour Compression Heat Pump/Organic Rankine Cycle

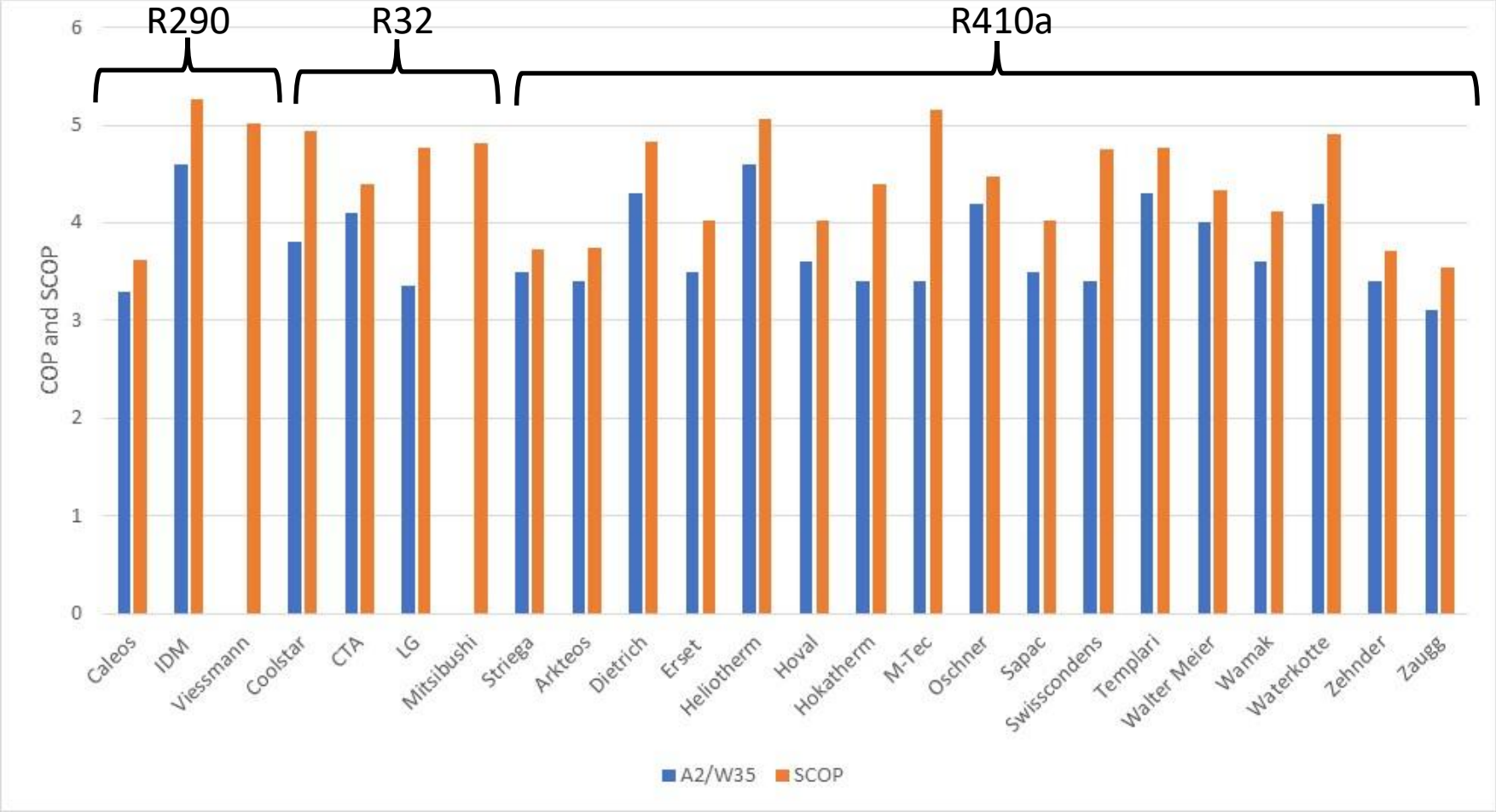






LoT-NET

Work Package 3.1 to 3.4 – Summary and Future Challenges



LoT-NET

Work Package 3.1 to 3.4 – Summary and Future Challenges

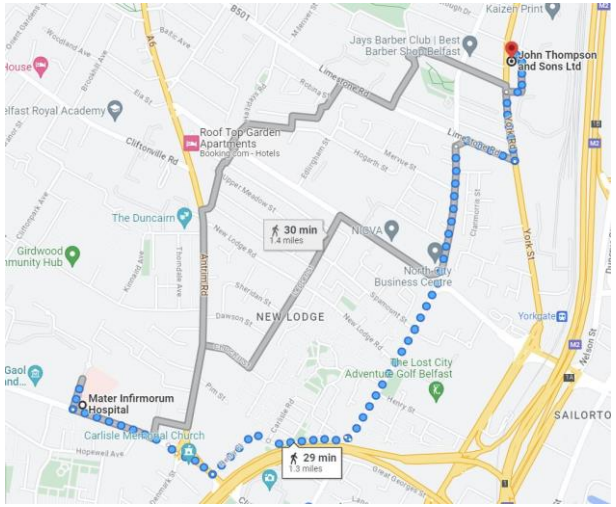
- The introduction of a full ban from 2027 on monobloc heat pumps and air conditioning systems with a capacity of under 12kW that use f-gas refrigerant that has a GWP of above 150. This ban will be extended to a complete phase-out of f-gas products in these applications from 2032
- A ban will also be introduced for split air conditioning systems and heat pumps using f-gases from 2035. This will also see earlier deadlines introduced for certain split systems that use refrigerant with higher levels of GWP
- Exemptions on some of these proposals will apply in cases with certain equipment must be used in line with safety requirements that could restrict certain products with some level of flammability for some applications

Work Package 3.1 to 3.4 – Summary and Future Challenges

High Temperature Heat pumps work!
Domestic heat pumps work!
We need new (old) working fluids (natural)!
We will us the turbine as an expander for that extra COP (at what scale?).

And Lot-NET is attracting attention

Europe's Largest Animal Feed Mill



A Belfast Acute Hospital

170 m^3/hour at 65^oC and returning at 40^oC
47kg/s * 4.18 * 25K = 4937 kW
Over a 24h period = 118433 kWh

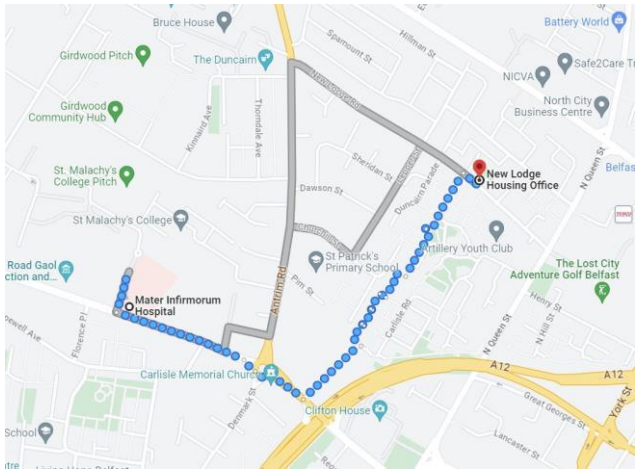
7258087 kWh of Gas

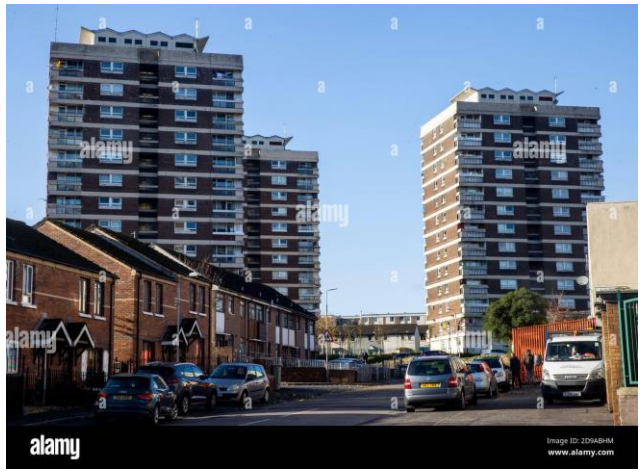
LoT-NET

And Lot-NET is attracting attention and Phase 2

Europe's Largest Animal Feed Mill

170 m^3/hour at 65^{o}C and returning at 40^{o}C
47kg/s * 4.18 * 25K = 4937 kW
Over a 24h period = 118433 kWh





A Belfast Acute Hospital

7258087 kWh of Gas
20,000 kWh/day average

LoT-NET