

CO₂ as a Refrigerant: An Environmentally Friendly and Cost-Effective Solution for NZ businesses

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A look at one of the first water cooled 2-stage transcritical CO₂ refrigeration systems in New Zealand.



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Old Plant

Contained over 1 million kg of CO₂ equivalent in GWP

Comparison of refrigerants

Refrigeration	Type ¹	ODP ²	GWP ³
R-744 (CO ₂)	Natural	0	1
R-134A	HFC	0	1,430
R-410A	HFC	0	2,088
R-407C	HFC	0	1,774
R-404A	HFC	0	3,922
R-22	HCFC	0.055	1,810
R-12	CFC	1	10,900
R-717 (Ammonia)	Natural	0	0

¹ Natural = Naturally occurring; HFC = hydrofluorocarbon;
HCFC = hydrochlorofluorocarbons; CFC = chlorofluorocarbon

² ODP = Ozone depletion potential, 0 to 1 scale with R-12 = 1

³ GWP = Global warming potential, scale based on CO₂ = 1



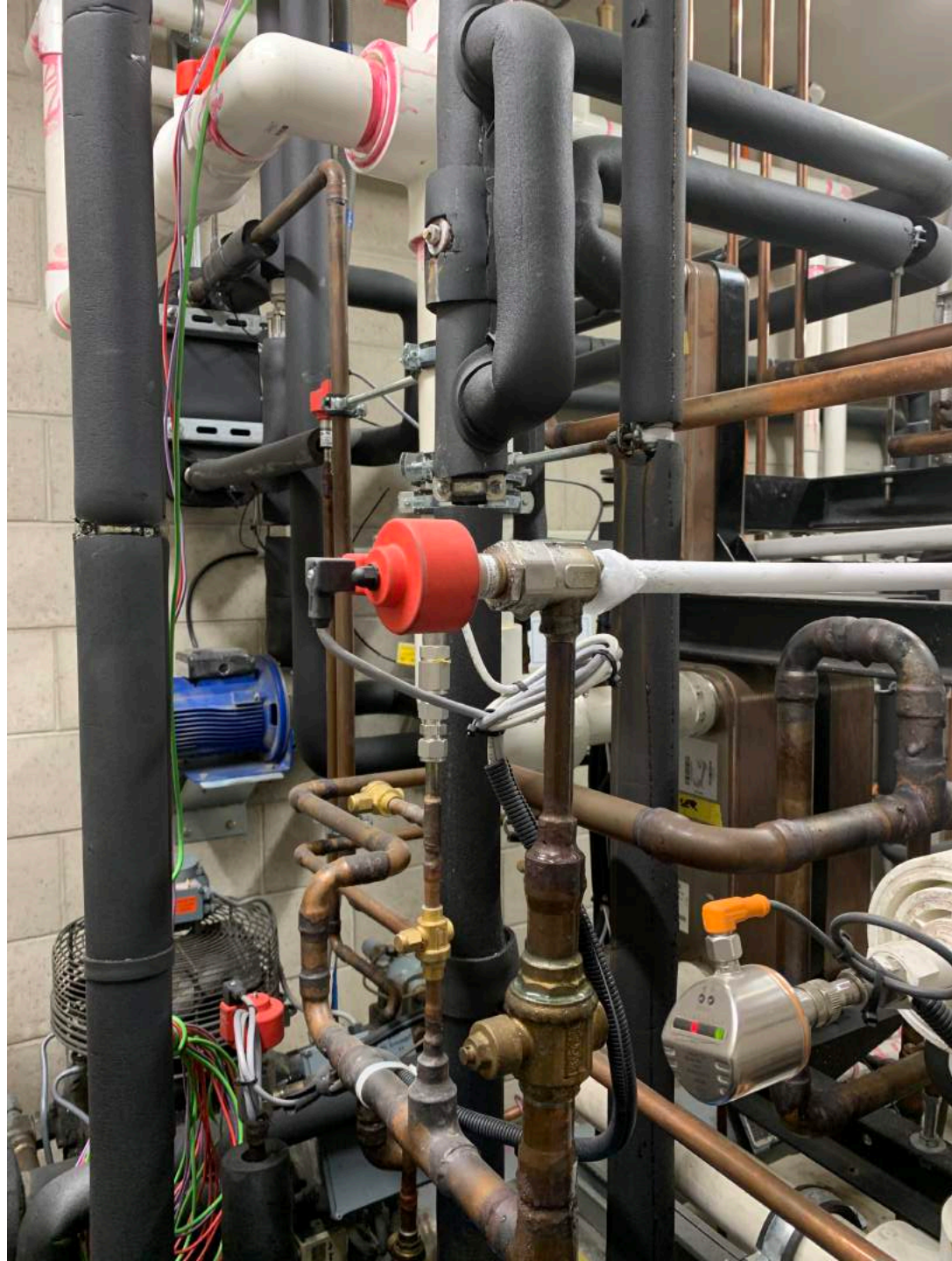
New Plant

Contains only 60 kg of CO₂



Heat Reclaim

Provides 60 hot showers worth of hot water per week

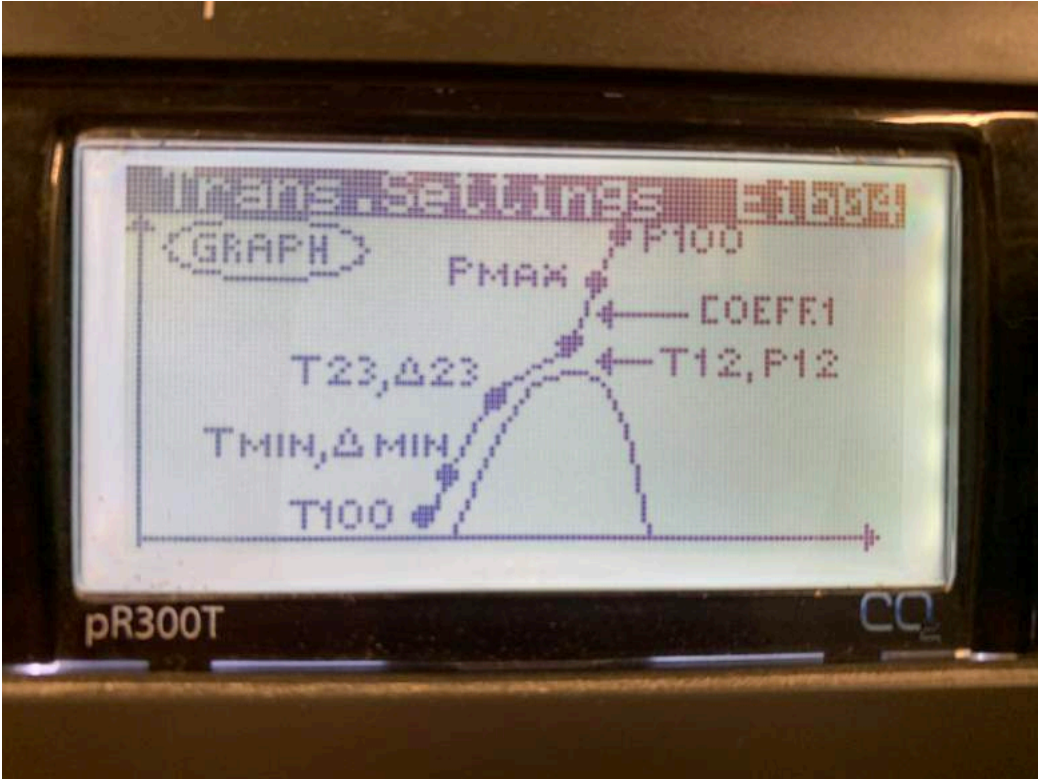
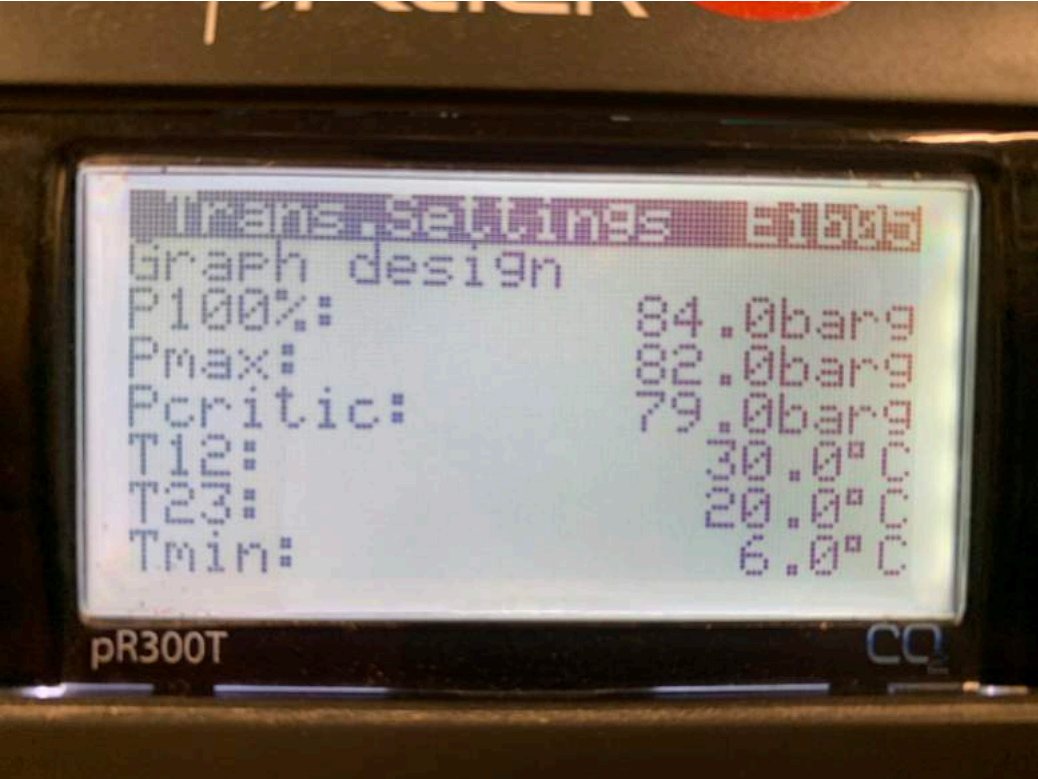




Switchboard



Theory







PRODUCT OF NEW ZEALAND

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RAINBOW
NEW ZEALAND SOUTHERN SCALLOPS

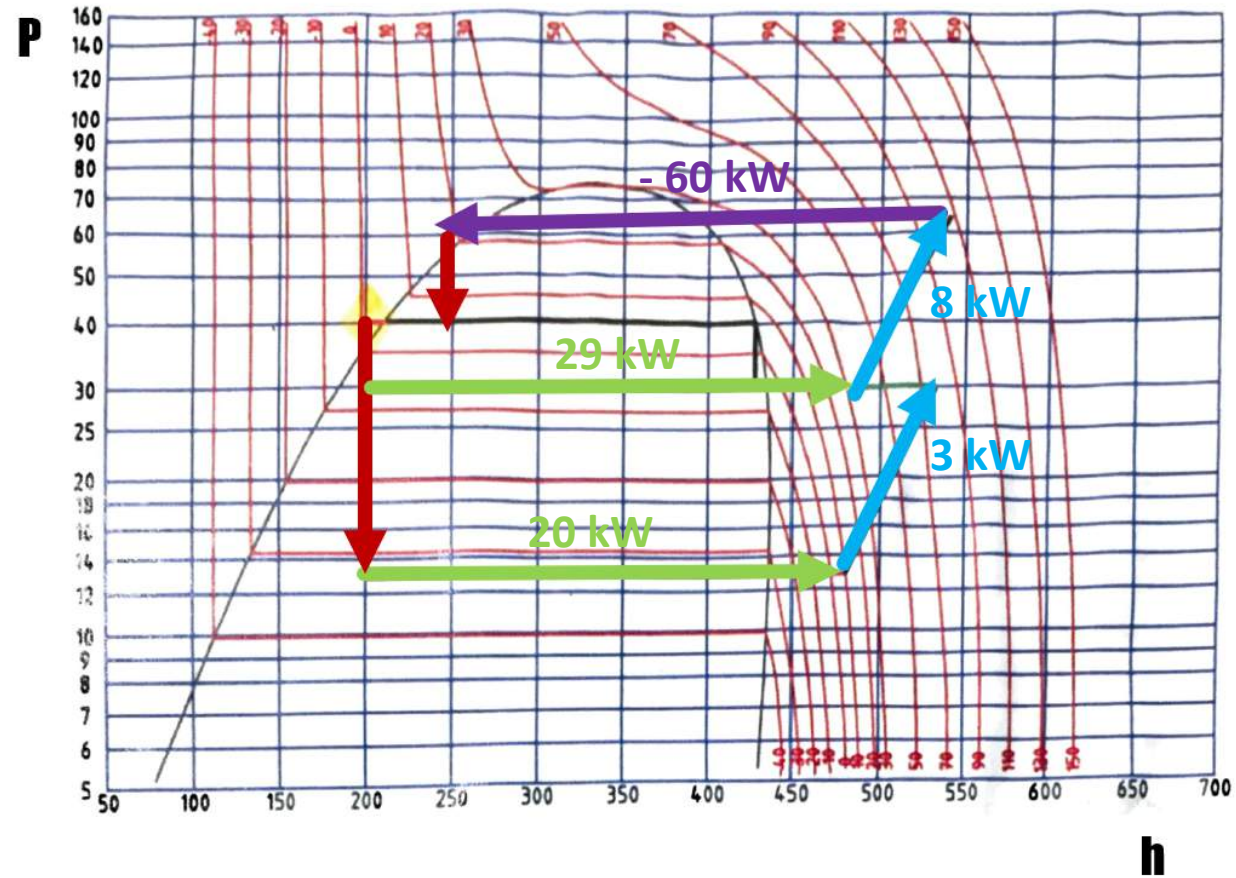
RAINBOW
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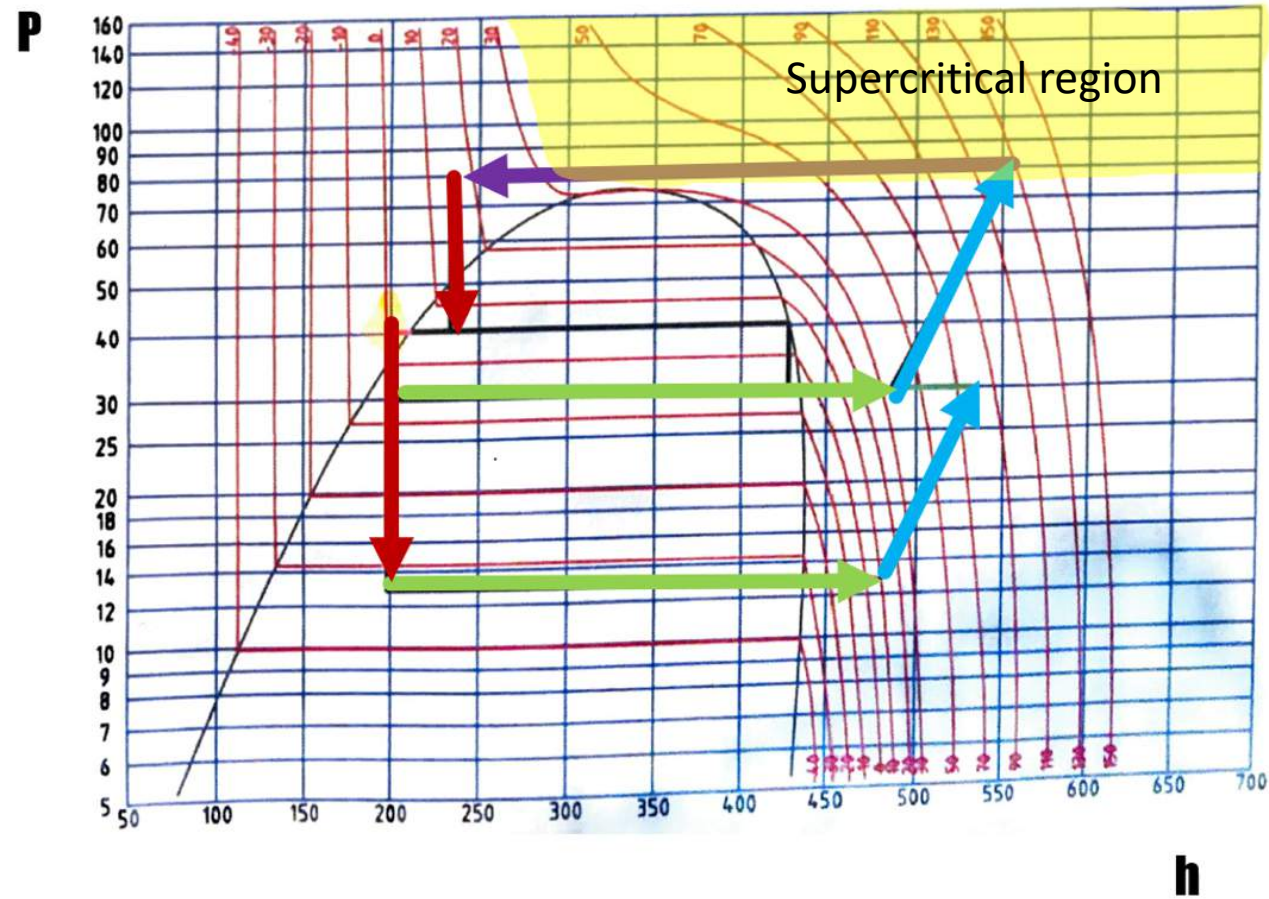
RAINBOW
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Subcritical operation



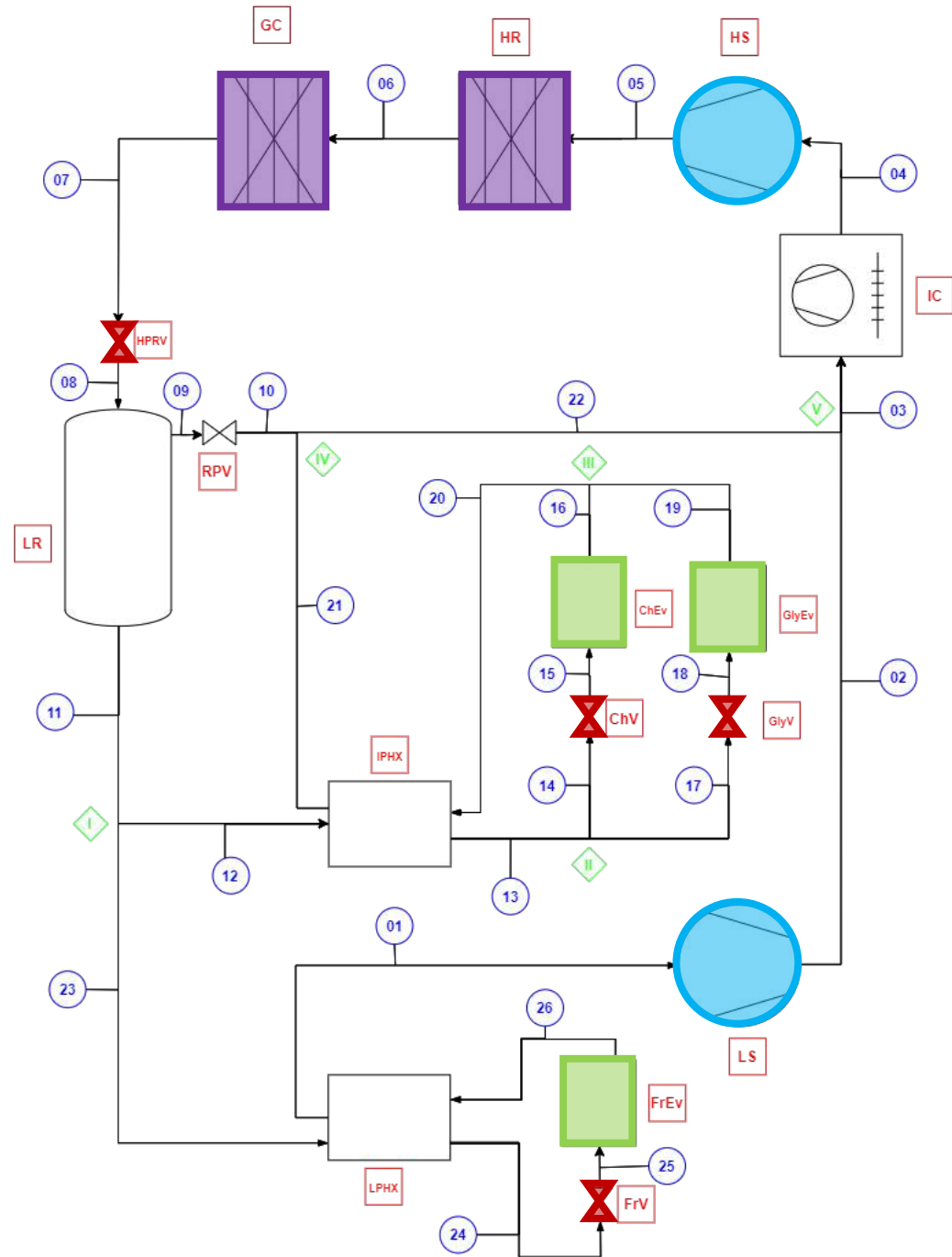
Transcritical operation



Flowchart

Key

- ChEv Chiller evaporator
- ChV Chiller expansion valve
- FrEv Freezer evaporator
- FrV Freezer expansion valve
- GC Gas cooler
- GlyEv Glycol evaporator
- GlyV Glycol expansion valve
- HPRV High pressure expansion valve
- HR Heat recovery heat exchanger
- HS High stage compressor
- IC Intercooler
- IPHX Intermediate pressure heat exchanger
- LPHX Low pressure heat exchanger
- LR Liquid receiver
- LS Low stage compressor
- RPV Intermediate pressure expansion valve





Live Data

