



ATMO
sphere

Business Case for
Natural Refrigerants

02/05/17 - Sydney

HUSSMANN®

NZ & AU – CO2 and the journey thus far

“A Greener Future Naturally”

Brian Rees

Technical Director – Hussmann Oceania

2005 – the NZ CO2 journey begins

- 2005 commenced with SubCritical (SC) DX LT and pumped liquid MT (~ 20 supermarkets installed thru to ~2009).



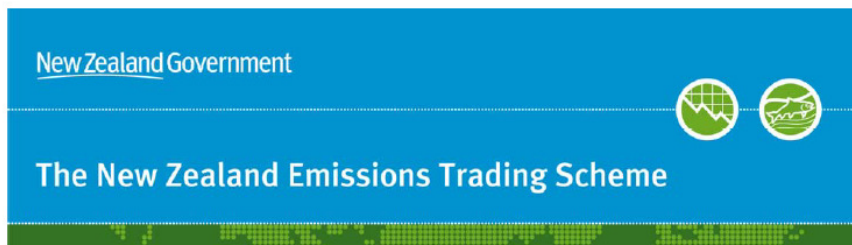
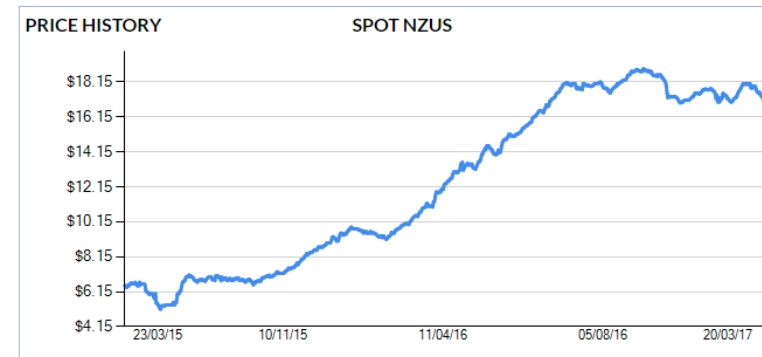
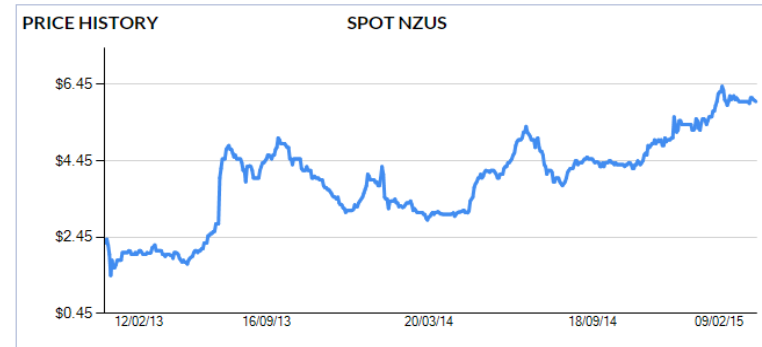
- Due to cost, these evolved to the Hybrid (LT = DX SC CO2, MT = DX R134a). Over 50 supermarkets installed in NZ thru to ~ 2015.



1st Jan. 2013 – NZ ETS commences

Interest in TC CO₂ grows

- Jan. 2013 NZU only cost for 1kg of R404A was ~ \$4
- Jan. 2017 NZU only cost for 1kg of R404A up to ~\$45
- Est. Jan. 2019 NZU only cost for 1kg of R404A likely ~\$68 or higher (?)



Phase out of the one-for-two transitional measure from the New Zealand Emissions Trading Scheme

	2017	2018	2019
non-forestry surrender obligation, allocation or removal activity	2/3 (67%)	5/6 (87%)	100%
	1 unit for every 1.5 whole tonnes of CO ₂ -e emissions	1 unit for every 1.2 whole tonnes of CO ₂ -e emissions	1 unit for every whole tonne of CO ₂ -e emissions

TC CO2 Philosophy – learnings from the SC era

- **Efficient with minimal ‘intervention’** (i.e. simple set-up, remove the ‘fiddle factor’).
- **Robust** – high standstill pressure design (60 bar Suct./80 bar Liq./120 bar high side).
- **Reduced complexity** = increased understanding and buy-in at Service level.
- **Scalable** – from 2HP C/U to large Racks. Internal and external locations.
- **Future proofed.**

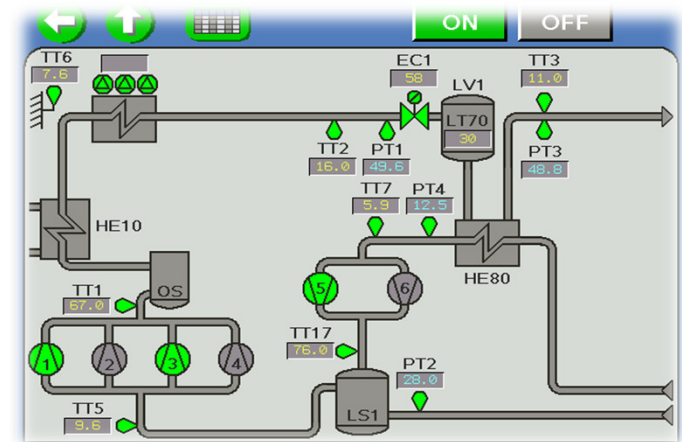


**GREEN
& COOL**
Green Refrigeration Systems



TC CO2 – NZ experience (Rack Systems)

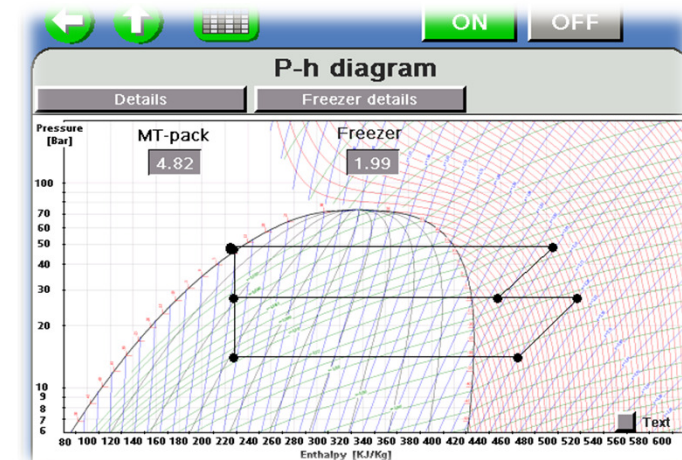
- Our 1st TC CO2 system installed and operating since June 2013.
- Focus on simple/reliable/easy-to-understand.
- We now have x24 large TC CO2 rack systems operating, another x6 being installed at present, and ongoing repeat orders.
- Simple touch-screen interface, with graphing plus view only interface to CPC, Danfoss, etc.



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Press enter for a list of actions.

F3: CIRCUITS F4: SENSORS F5: SETUP



- By the end of 2017, estimate is ~40 NZ supermarkets will be operating TC CO2 systems.
 - In context, NZ has approx. 440 mid-large supermarkets (excluding small regional stores < 500m²)
 - ~ 10% TC CO2 in ~ 4 years
 - Plus ~ 16% SC CO2

Learnings:-

- Walk before you run
- Plan, Do, Check, Act.
- Training is ongoing, now predominantly via practical on-site training and mentoring.
- New NZ supermarkets now all but exclusively TC CO2, plus many store refurbishments are also adopting TC CO2.
- TC CO2 industry knowledge now mature in NZ, this coupled with external forces (ETS, etc.), a temperate climate, and customer's future-proofing, will see increased interest in TC CO2 in other market sectors.

Australia:-

- The current lack of an ETS has slowed TC CO2 uptake, though the Kigali Amendment and recent Australian Government announced phasedown of HFC's will no doubt have many ownership cost conscious refrigeration personnel and end-users looking much more closely at refrigerant & system options.
- Australia's hot summer climate presents challenges for TC CO2 in regards optimising efficiency, though parallel compression and liquid sub-cooling and other near-future enhancements will all but eliminate the 'Transcritical Equator'.
- Hussmann have partnered with Green & Cool and Panasonic to ensure a full suite of best-in-class equipment for each application will soon be available in Australia as well as NZ.

NP

+

NR

=

NE

Natural Power

+

Natural Refrigerants

=

Natural Earth



**Thank You
& Questions ?**



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