



ATMO sphere





THE FUTURE OF NATURAL REFRIGERANTS

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SOME FUNDAMENTALS

WHY ARE WE IN BUSINESS?

To Make A Profit?

Certainly – What Is The Step Prior to Making A Profit?

To Create Customers!

Large Corporations (some of whom are our customers) Will Not Go Green Unless It Is Profitable

We in the natural refrigerants business know we can deliver profitable outcomes for our customers. Are we getting that message across?

Considering the current market share of NR solutions, perhaps not

WHAT DELIVERS THE RETURNS ON THE INVESTMENTS IN NATURAL REFRIGERANT BASED SOLUTIONS?

- Energy Cost Reductions
- Future Proofing

WHY DO SOME CUSTOMERS HAVE A PROBLEM WITH 40-70% DOCUMENTED ENERGY PERFORMANCE IMPROVEMENTS?

- The Claims Are Too Good To Be Believable
- The Claims Are Being Challenged By Providers of Synthetic Refrigerant Based Solutions

THE ISSUE OF AWARENESS

THE MAJORITY OF POTENTIAL CUSTOMERS AND REGULATORS STILL DO NOT APPEAR TO “KNOW THAT THEY DON’T KNOW”

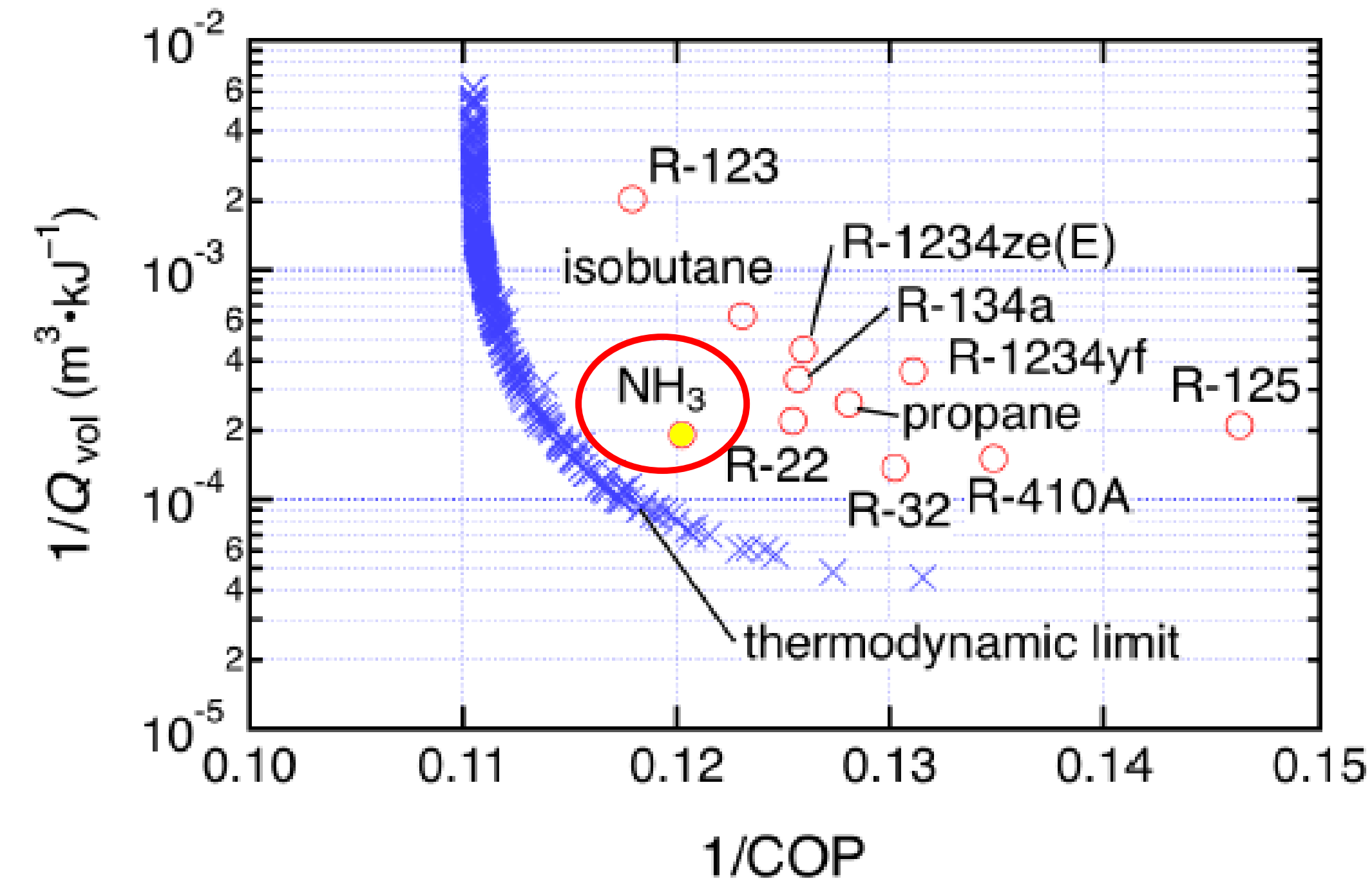
- This Stifles Demand For Natural Refrigerant Services
- This Causes Standards And Code Developments To Fall Behind The Rapid Technological Advances That Are Taking Place
- This Continues The Underestimation Of The Huge Demand For Education and Vocational Training in Flammable Refrigerant Applications

THE ANSWER?

Marketing! Natural Refrigerant Based Solutions Will Sell Themselves If The Value Propositions Are Understood By Customers and Regulators

IS THIS A QUESTION OF “NATURALS” VERSUS “SYNTHETICS”?

NO. IT IS A QUESTION OF ENERGY AND INDIRECT EMISSIONS



Using evolutionary algorithms, most important thermodynamic parameters and their optimum values were determined as illustrated on the “Pareto Front” (vapour compression A/C cycle)

Source: Hitting the Bounds of chemistry: Limits and Trade-offs for low GWP Refrigerants, M.O. McLinden et al, ICR 2015, Yokohama

Pareto front (x) and selected current refrigerants (o) for simple vapour compression cycle

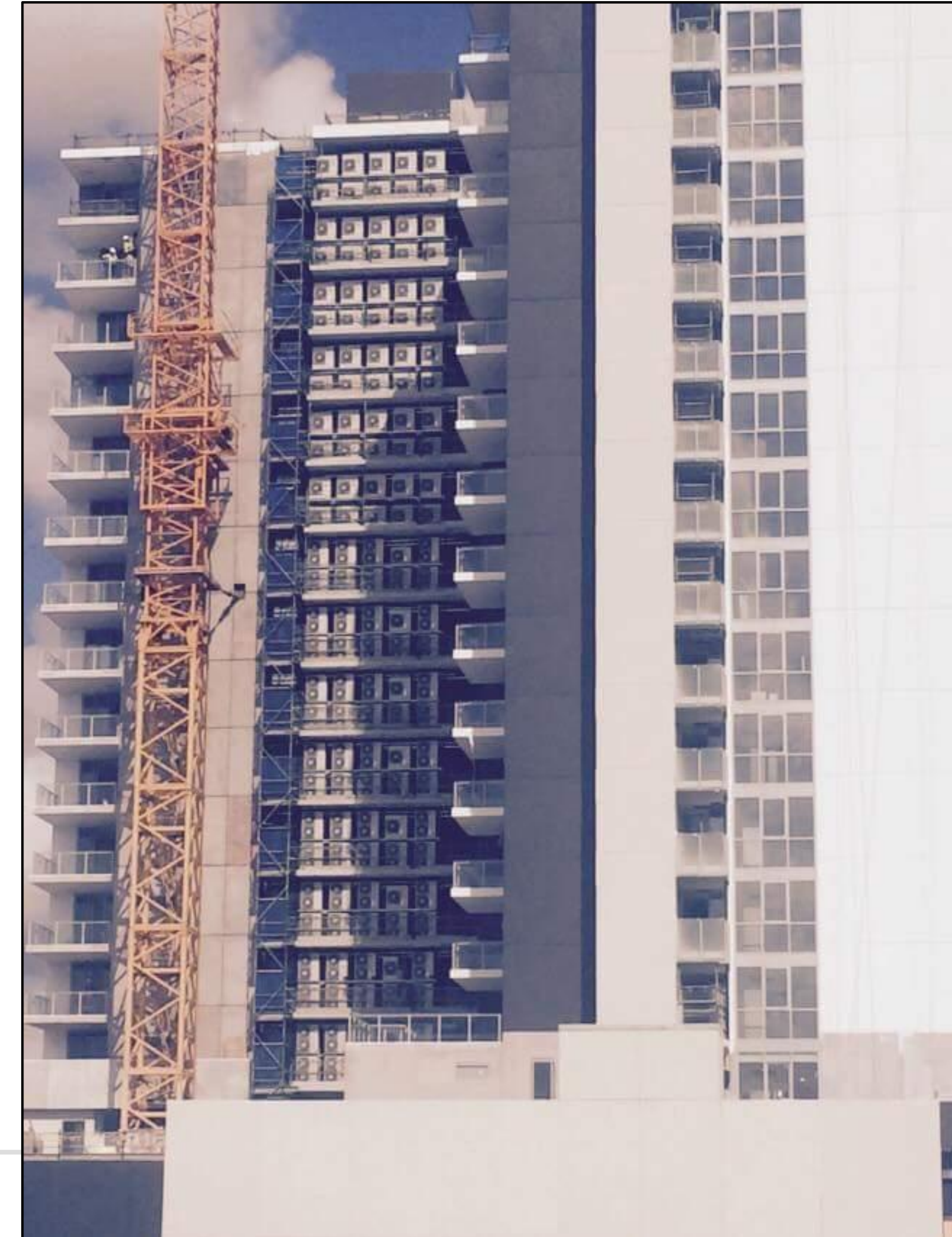
CARBON NEUTRALITY BY 2050. THAT'S THE OBJECTIVE

HOW DO WE GET THERE?

BY FOCUSING ON ENERGY PERFORMANCE

IS THIS GOOD DESIGN AND DOES IT MINIMIZE
INDIRECT EMISSIONS FROM THAT BUILDING?

If A Credible Mandatory Energy Performance Model
In This Case Would Have Indicated That
Multiplexing Increases Indirect Emissions Above
That Of A Central CHW Plant Employing An NH_3
Based Water Chiller Then The Regulator Should
Not Have Let This Design Happen

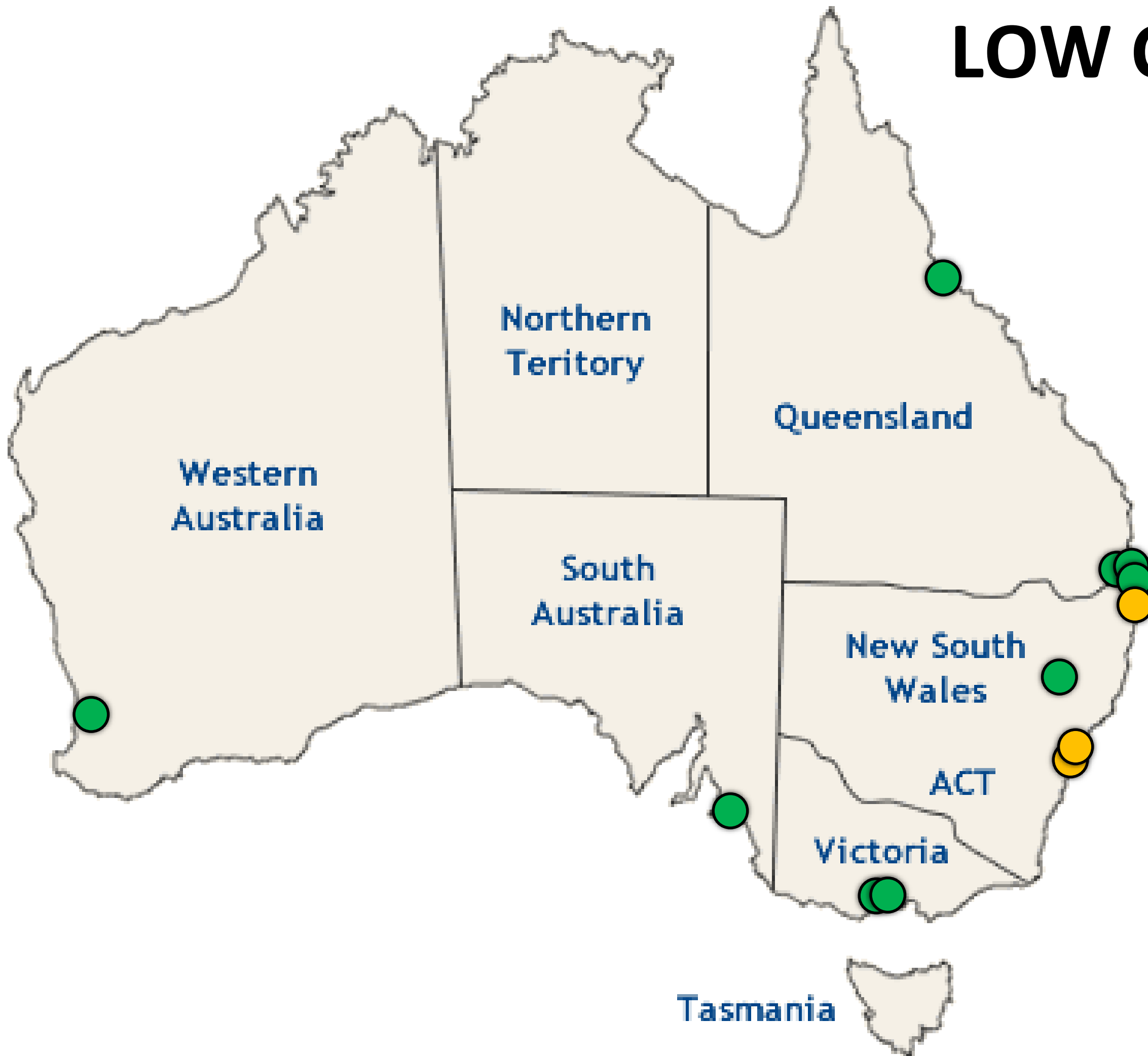


ACCELERATION OF CHANGE

- Energy Performance Benchmarking – Australia Could Adopt the International Energy Conservation Code (IECC)
- Australia May Introduce A Mandatory Energy Performance Modelling Tool For All HVACR Applications Combined With Training In Its Use
- The Australian Government Could Ban HFC's In All New HVACR Systems with A Charge Exceeding 5 kg By 2025 – Announcement Now
- The Australian Government Could Ban Split Air Conditioning Systems In All Building Enclosures with More Than Six Air Conditioned Spaces
- Introduction of New Mandatory Competency Levels For Practitioners That Are A Function Of: 1) Refrigerant Flammability, 2) Refrigerant Toxicity, 3) Refrigerant Inventory and 4) Refrigerant Pressure

PROGRESS OF CHANGE SO FAR

LOW CHARGE NH₃



- Completed
- Under construction

ONCE YOU GO AMMONIA YOU NEVER GO BACK



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Thank you very much!

