

# FUTURE OF REFRIGERANTS

Synthetic or *Natural* ?



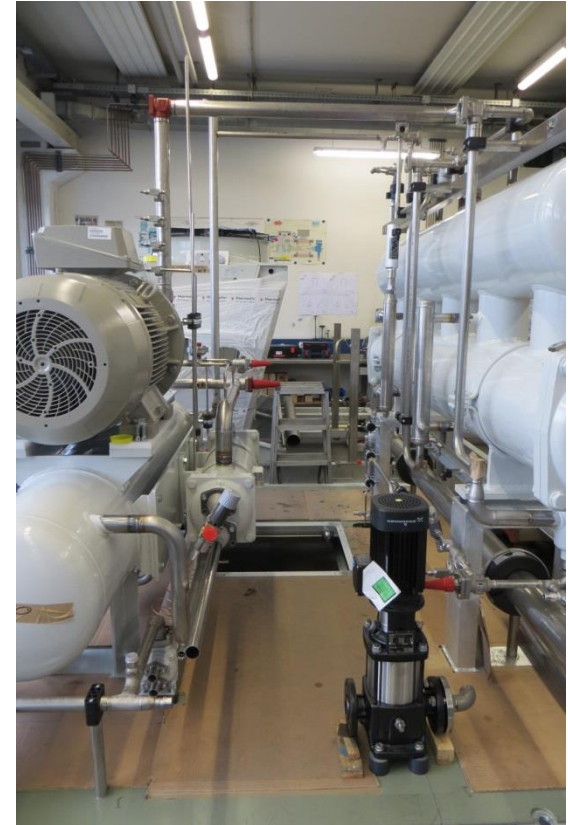
# NOVUS - History

- NOVUS is a Singapore company incorporated in 2005
- NOVUS – 11yrs in Singapore and 39 years in India
- Focus on high quality – power saving Refrigeration and chilling equipment



# FISCHER KÄLTE-KLIMA – GERMANY

- NOVUS works with Fischer Germany for Large and Special Refrigeration systems , since nearly 15 years
- FISCHER is in the business of Refrigeration for nearly 100 Years
- FISCHER has provided a lot of input in preparation of this presentation



# Global Warming

- I AM GONNA KEEP IT SIMPLE
- Global Warming is basically the phenomenon by which the temperature on earth are seen to be rising above the temperatures that were normally recorded in the last 100yrs
- Most scientists agree that the cause of Global warming is due to Greenhouse gasses such as CO<sub>2</sub>, Nitrous Oxide , CFCs and other Synthetic refrigerants

# Kigali and Singapore



Commentary: Challenges ahead in phasing down use of HFCs

By GJ

By ML



27 Oct 2016 11:46AM


Already, companies in the pharmaceutical and food & beverage sectors - where cooling comprises a major portion of energy consumption - are switching to ammonia-based systems. These systems also provide significant energy savings as compared to HFC-based systems. Companies have also been able to leverage the numerous energy efficiency improvement initiatives offered by the National Environment Agency (NEA) and Economic Development Board to fund the required initial investments.

## PRESS RELEASE

### SINGAPORE WELCOMES COMMITMENT TO PHASE DOWN THE GLOBAL-WARMING-INDUCING HYDROFLUOROCARBONS

Singapore joined some 170 countries to welcome a landmark agreement to phase down the use of hydrofluorocarbons (HFCs) at the 28<sup>th</sup> Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer (MOP-28). MOP-28 was held from 10-14 October 2016 in Kigali, Rwanda.



channelnewsasia.com







Singapore

## Singapore welcomes global deal to phase out super greenhouse gas

In her statement at the meeting, Senior Minister of State for the Environment and Water Resources Dr Amy Khor encouraged countries to work together to resolve the challenges in phasing down the use of HFCs.



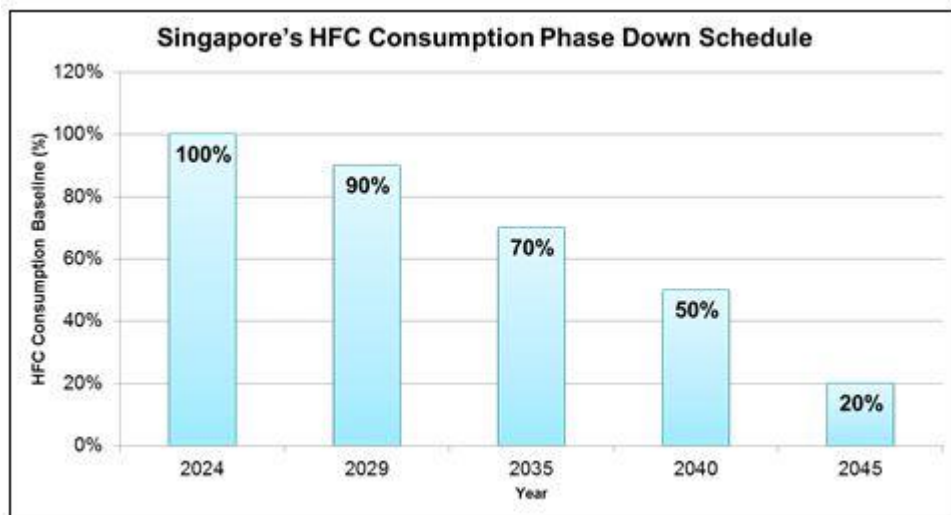
15 Oct 2016 11:20PM

# What does Singapore have to do ?

What does a Singaporean company need to do ?

Singapore belongs to Article 5 Group 1 and the HFCs phase down schedule for this group is illustrated in Fig. 1 below



## POINTS TO NOTE :

1. Start reducing HFC use by 2024
2. The 100% Baseline is defined as the consumption levels in the period from 2020-2022
3. Quota Licenses for import or manufacture of HFCs to be implemented

More information <http://www.nea.gov.sg/>

# This does not impact me !!! 2020 is FAR AWAY

That's what you think !!!  
It comes faster than you can imagine

Germany is ahead of Singapore in the phase out deadline ( Baseline levels is 2015),  
so what has happened there already ?

Germany has already implemented the Quota Licensing system.

And just a simple example :  
A refrigerant that our partner was buying for EUR 8.00 per Kg some months ago ,  
NOW Costs them EUR 56.00 per kg .

So if you have a system using HFC and the licensing quotas come in place , then !! ??



# What are my options ?

## **[A] NATURAL REFRIGERANTS**

Ammonia  
R717

Propane ( Hydrocarbons)  
R290

CO2  
R744

## **[B] HFOs**

R1234yf

R449

R32

R1234ze

# HFO Gasses

1.

This is the new range of Synthetic Gasses developed in recent years.

2.

These gasses meet the environment friendly requirements of ODP and GWP laid down by the Kigali Protocol

3.

The limitations that these gasses have are as follows:

- Expensive Gas
- Still developing and research is continuing
- A more developed range of HFO gasses may come in the future and then the current HFO gas production may be reduced or stopped
- Many car companies have stopped using them because of experiences of explosions
- Also said to issue carcinogenic substances when disposed

## The Telegraph

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### Eco-friendly car refrigerant 'turns into deadly gas it vehicle catches fire'

A new "eco-friendly" car refrigerant expected to become the industry standard turns into a deadly gas if the vehicle housing it catches fire and should be shelved, it has been claimed.



Green MEP Michele Rivasi talks about the potential dangers of a new refrigerant used recently in the cooling system of vehicles at the European Parliament in Strasbourg Photo: GEORGES GOBET/AFP/Getty Images



By Henry Samuel, Paris  
7:34PM GMT 17 Jan 2012

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The coolant for car mobile air conditioning systems, called HFO-1234yf, has been approved for use in the US, Japan and Europe and Toyota and Subaru have started fitting their cars with the substance.

It was chosen as it produces 98 per cent less climate damaging than its

Motoring News

News » World News »  
Europe »  
Environment »  
Henry Samuel »



Telegraph Car

# Natural Refrigerants

Ammonia - R717

Good For Medium Temperature and Low temperature Applications

Limitation : The gas is dangerous is breathed in – can damage the lungs and eyes and in extreme cases cause death.

CO<sub>2</sub> - R744

Good for very low temperatures and Deep freezing applications

Limitation : Very high pressure gas and difficult to use in transcritical modes in Warm climates

Propane ( Hydrocarbons) - R290

Various applications

Limitations : Explosive

# So what should be used ?

1.  
Currently the most wide spread Refrigerants in Europe is Ammonia and CO2 for Commercial and Industrial Applications .
2.  
Propane is used for systems with very small charge , less than 0.5kgs of refrigerant in the system – example Domestic Refrigerators – NOT suited for larger Systems ( see photo of explosion )
3.  
Europe bets on Natural Refrigerants
4.  
Experts in Europe think that the final solution is Natural Refrigerants. Some believe that the Best HFO solution has yet to come , and some others think that HFO may be phased out in a decade – But Natural Refrigerants will remain forever

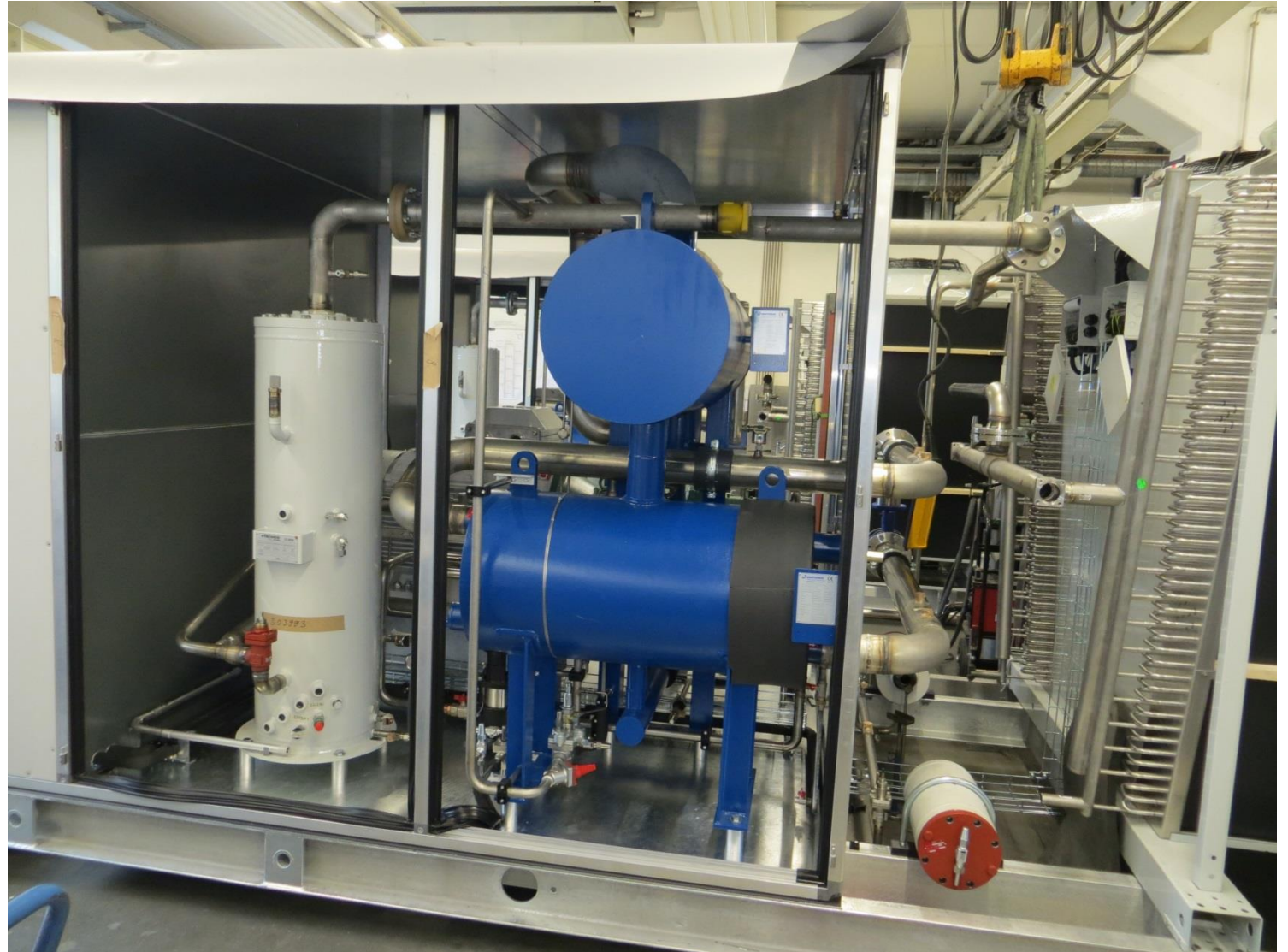




# NOVUS – FISCHER Ammonia Chiller

FISCHER builds complete Chillers and refrigeration Systems running on Natural Refrigerants

Built to order , for complex applications





# NOVUS – BITZER AVP Ammonia Packs

Ammonia Packs can Be used for various Applications

BITZER AVP produces the packs taking care of All the complexities, making it easy for new contractors to build ammonia Chillers or Refrigeration Systems





# NOVUS – Products



Industrial Chiller



Dehumidifier



Dessicant Air Dryer

Industrial Refrigeration System using NH<sub>3</sub> / CO<sub>2</sub>



Compressed Air Dryer

Compressed Air Filter





## NOVUS – Partners



The ultimate filtration & drying technology

