

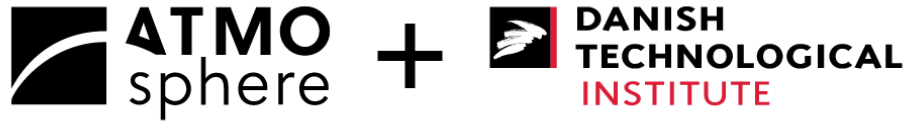


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**ONLINE**

23-24/06/2020



# Future opportunities for natural refrigerants in HVAC

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#GoNatRefs

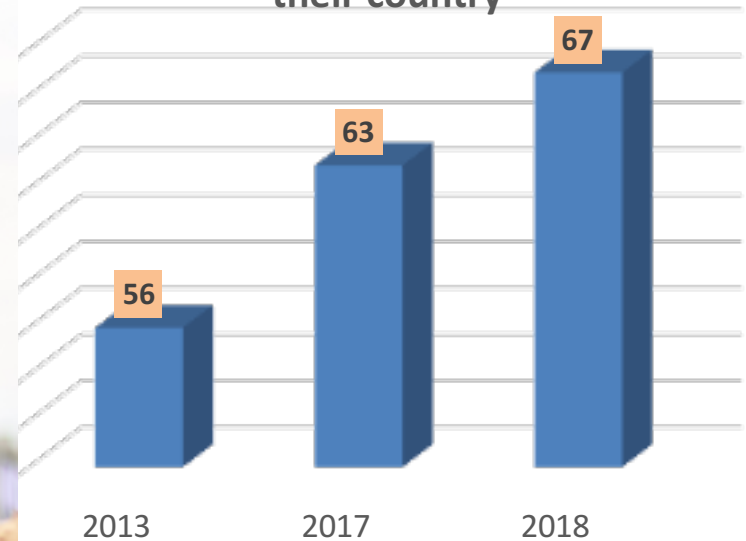
- 1. Why should we care about climate change?**
- 2. How will climate change affect my business?**
- 3. The little known mitigation opportunity offered by action on refrigerants**
- 4. Huge opportunities within the AC market**
- 5. Making heat pumps sustainable**
- 6. Where next for HVAC?**



# People care about climate change



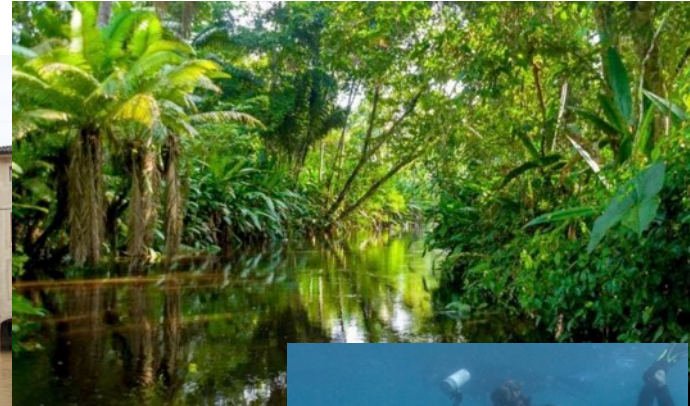
% of global population which see climate change as a major threat to their country





- Droughts, heatwaves and forest fires will increase in intensity and severity
- Biodiversity loss

- Sea level rise and flooding will threaten coastal cities including Shanghai, Miami, Rio de Janeiro



- At 2°C all coral reefs will be lost
- Unprecedented climate migration



# How will Climate Change affect my company?

## Challenges

- Providing cooling for all without warming the planet
- Higher operating temps?
- Pressure on the grid. Need for energy efficiency
- Cooling to be larger part of carbon footprint
- Reputational and financial risk of ignoring climate change

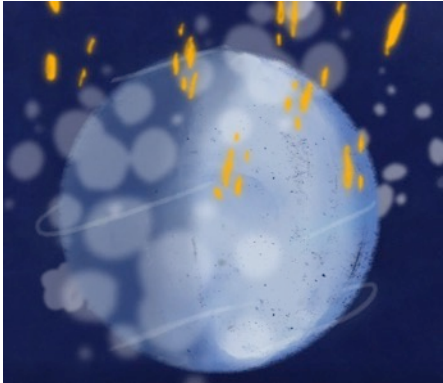
## Opportunities

- As the world heats we need to keep cool
- Can we move away from vapour compression?
- Huge potential for innovation

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# Why we need to act now on refrigerants

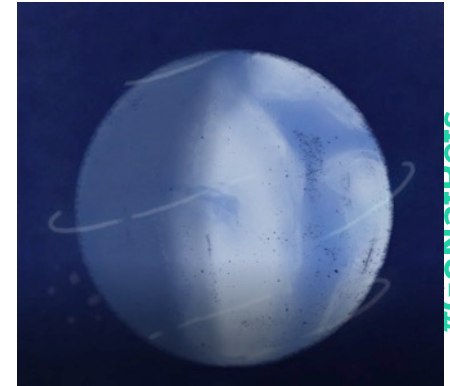


- Commitments under Paris Agreement => 3.2°C warming
- 1.5°C is considered a 'safe' amount of warming
- To achieve this we need to cut emissions to 25gigatons (Gt) CO<sub>2</sub>e year by 2030
- 2019 Global GHG emissions = apx 44 GtCO<sub>2</sub> eq

*Project Drawdown analysis of climate mitigation opportunities*

	2020-2050 savings Gt CO <sub>2</sub> eq
Addressing refrigerants	101-108
Onshore wind turbines	42-148

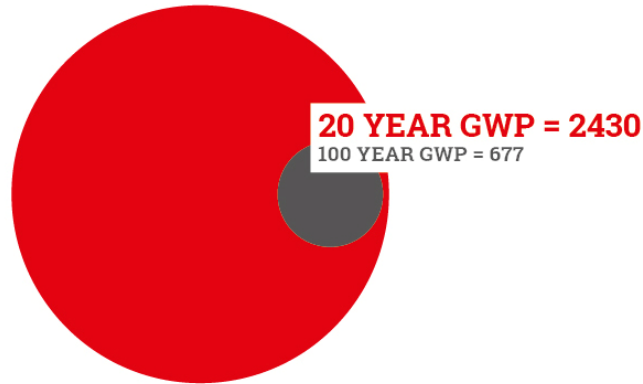
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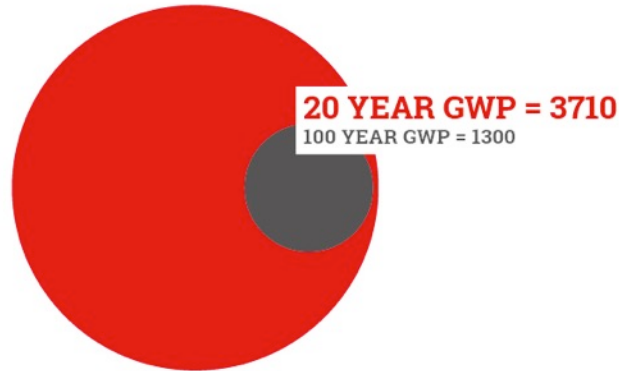
# HFC Near term climate impact

- Average lifetime of most HFCs is less than 20 years but Global Warming Potentials (GWP) are measured on a 100 year timescale
- Near term warming impacts much higher than commonly understood

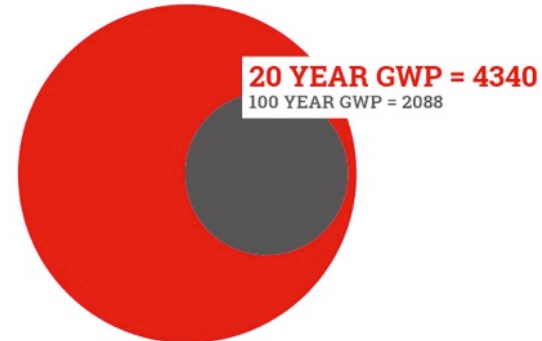
**HFC-32**



**HFC-134a**



**HFC-410A**



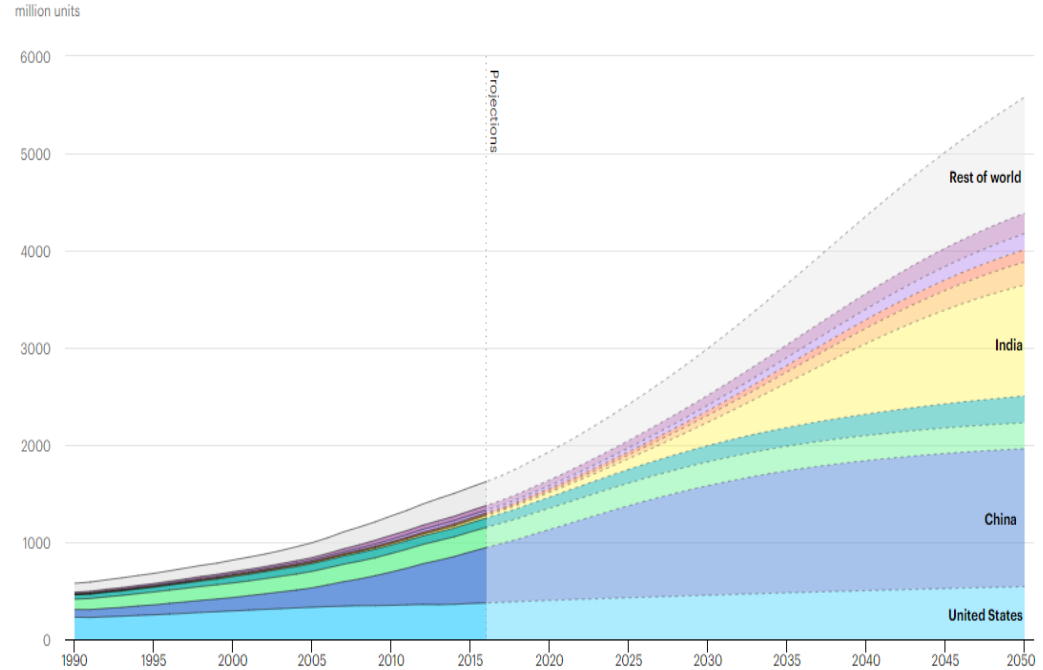




# Rapid growth in AC market

Global stock of air conditioners  
X3 by 2050 5.6 billion units.

10 new units being sold **every**  
**second** for the next 30 years.



## Industry is Lagging



Carbon Disclosure Project Research on 18 of the largest companies in the cooling sector showed:

- Major firms that dominate the sector are failing to innovate or make the latest technology widely available.
- R&D investment is low (2.2% of sales income, compared to Goods average of 3.5%)
- 5% of innovations are transformative
- Significant energy efficiency gap of up to 50% between best available technology and those offered on the market
- There is a significant revenue opportunity for companies

# Progressive standards can bring climate savings for residential cooling

**Product standard IEC 60335-2-40 is being revised.**

- A3 flammable refrigerants charge size currently limited to 150g
- Considering increasing allowable charge, up to 988g per circuit

**EIA Commissioned Oko Recherche study on impact of updating standards in single split AC**

<b>No ambition</b>	<b>0% of new equipment manufactured 2050 is Hydrocarbons (HC)</b>
<b>low ambition</b>	50 % of new equipment manufactured 2050 is HC
<b>mid ambition</b>	90 % of new equipment manufactured 2050 is HC
<b>high ambition</b>	2025 ban on use of HFC



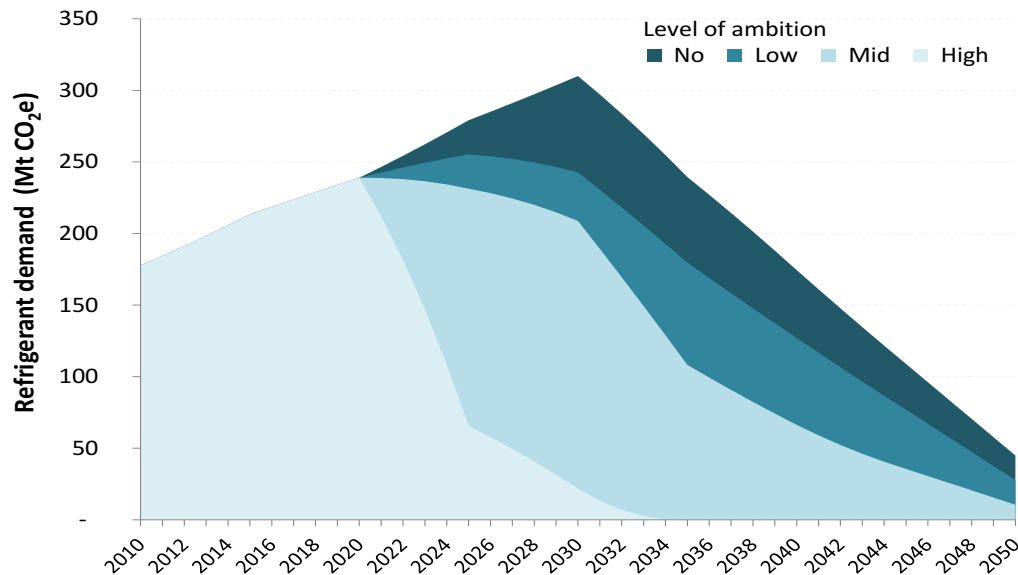
**Öko-Recherche**  
Büro für Umweltforschung und -beratung GmbH



# A chance for change in developing countries

Gt CO<sub>2</sub>e saved compared to BAU

	2021-2030	2021-2050
Low ambition	0.3	1.2
Med ambition	0.5	2.4
High ambition	1.9	5.2



*For context: EU 2018 GHG annual emissions apx 4.2 Gt CO<sub>2</sub>e*

# F-Gas Regulation Review: Time to make up for a lost decade?

- EU Green Deal and increasing 2030 climate ambition puts HFCs back in the spotlight
- F-gas review Legislative proposals expected 2022
- Last time round Impact Assessment (2012) concluded HFCs could have been banned in split systems and rooftop chillers from 2020, but they weren't.
- EU 2025 Ban on HFCs in single split AC could reduce HFC demand by 2.5 Million tonnes CO2 eq annually by 2030
- Equates to annual emissions from over 500,000 cars



# Heat pumps: How to make decarbonisation sustainable?

- HFC heat pumps promoted as Renewable Heat source
- EU Market growth 12-18% annually
- Incompatible with HFC phase-down
- Natural refrigerants are proven alternatives.
- [www.cooltechnologies.org](http://www.cooltechnologies.org)
- Need clear regulatory signals to avoid HFC phase in



**COOLTECHNOLOGIES**

Sustainable Cooling Database

Very low GWP HFC blends, eg: R-454C (GWP 148) often contain large amounts of R-1234yf  
 R-1234yf degrades to 5X more TFA than HFC-134a  
 TFA:

- is a persistent toxic pollutant
- accumulates in the hydrosphere.
- affects germination and plant growth... and could potentially impact food supply chains

High rate of TFA from a number of HFOs, especially R-1234yf *“may be of considerable environmental relevance in view of the expected future HFO production expansion”* according to the Montreal Protocol



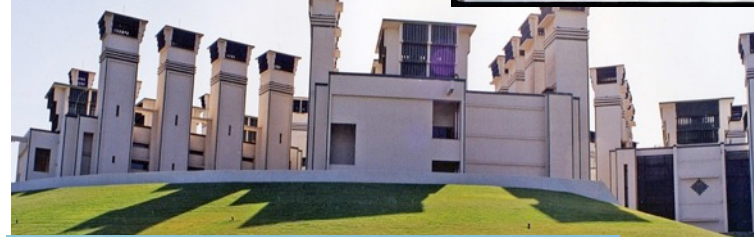
# Where next for HVAC?

Even without HFCs, vapour compression still uses energy.

Start thinking outside of the box:

Alternatives to vapour compression:

- City planning
- Building design
- Cool roofs
- Passive cooling
- Behaviour change
- Thermal storage





# Key opportunities

- Adopt technology using natural or no refrigerants
- Support progressive changes to standards
- Action in developing countries is key
- EU must show leadership, ban HFCs in small split AC from 2025
- Growth in heat pumps must be sustainable
- Don't be a dinosaur...time to innovate... Energy-free cooling for all?





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Thank you  
for listening!



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