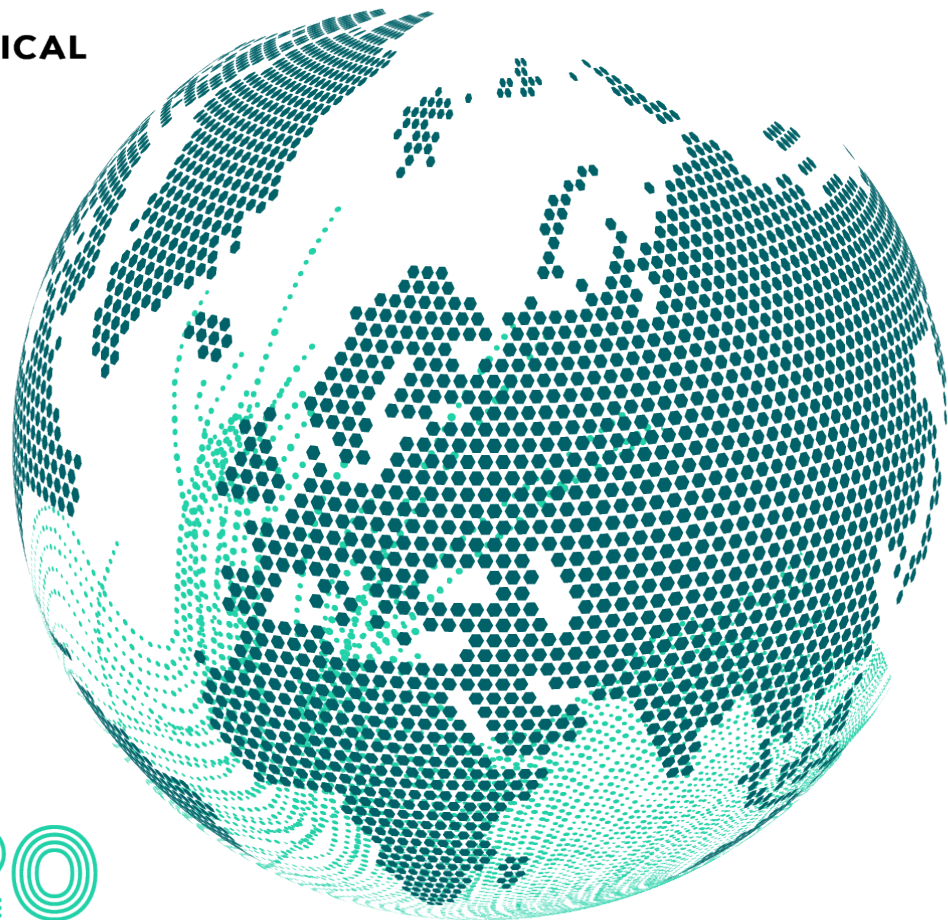




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ONLINE

23-24/06/2020



Future **necessity** of NatRefs in H V A C



Menno van der Hoff



#GoNatRefs

We have only ONE Earth

With a worldwide PROBLEM !

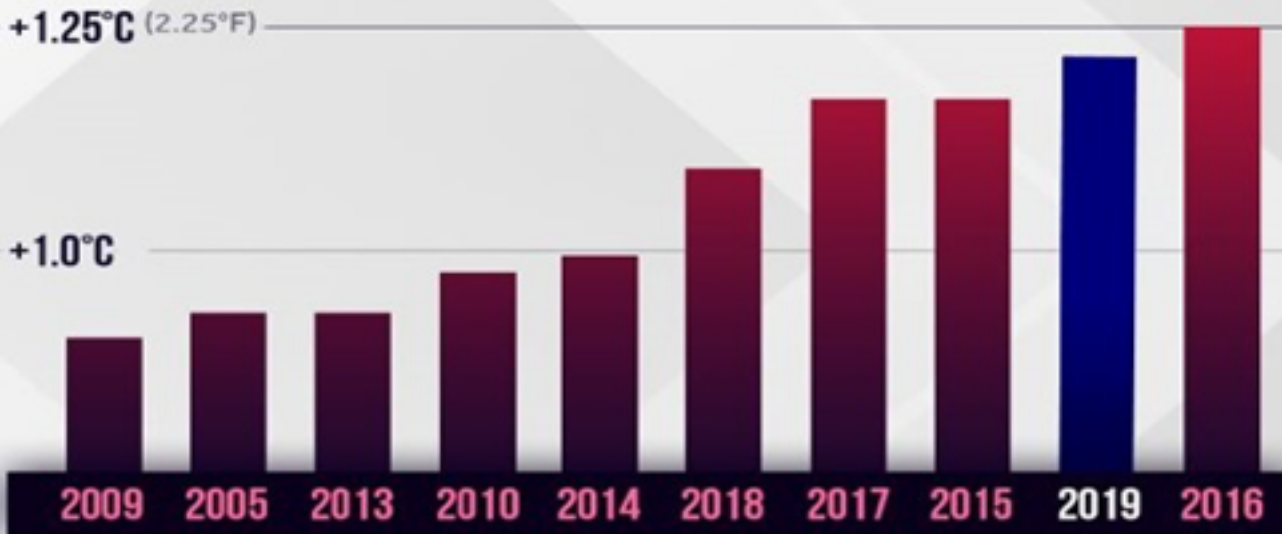
e





All in **OUR** life !

10 HOTTEST YEARS ON RECORD GLOBALLY



Source: NASA GISS & NOAA NCEI global temperature anomalies (°C) averaged and adjusted to early industrial baseline (1881-1910). Data as of 1/15/2020.

CLIMATE  CENTRAL

We have learned why...

It's called:

**The CO₂
disease**

CO₂





Sure, you all know the largest source of CO₂ emission?

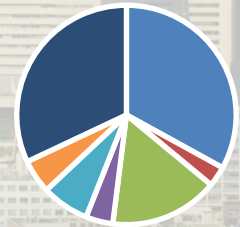
NO.1 in CO₂ ?

H V A C for Buildings !!!

They use Oil, Gas @ Coal ... 33% of total CO₂ emission

In addition, HVAC sector is another 7.8% , **TOTAL > 40 %**

CO₂ Emission



- Buildings
- Miscell.
- Agriculture
- F Gases
- Industry
- Waste
- Transport

Start with low hanging fruit!

Reduce CO₂ emissions for HVAC in buildings

EU low-carbon Energy roadmap 2050: 100% emission reduction by 2050

- “Meeting the Paris goal of keeping climate change well below 2° C – and aiming for no more than 1.5° C – **requires bold action**, including reaching climate neutrality this century”
- Carbon neutrality to become a target for 2050
- Commissions work will include “in-depth analysis of the economic, social and environmental transformations needed to inform the political debate in the context of the development of the mid-century strategies,”
- Public consultation ongoing
- Only 2 scenarios inline with max. 1.5° C warming



Stop fossil fuel

CO₂ emission

Solar & Wind

Zero CO₂



Task
for the



Heat Pump
without HFC's



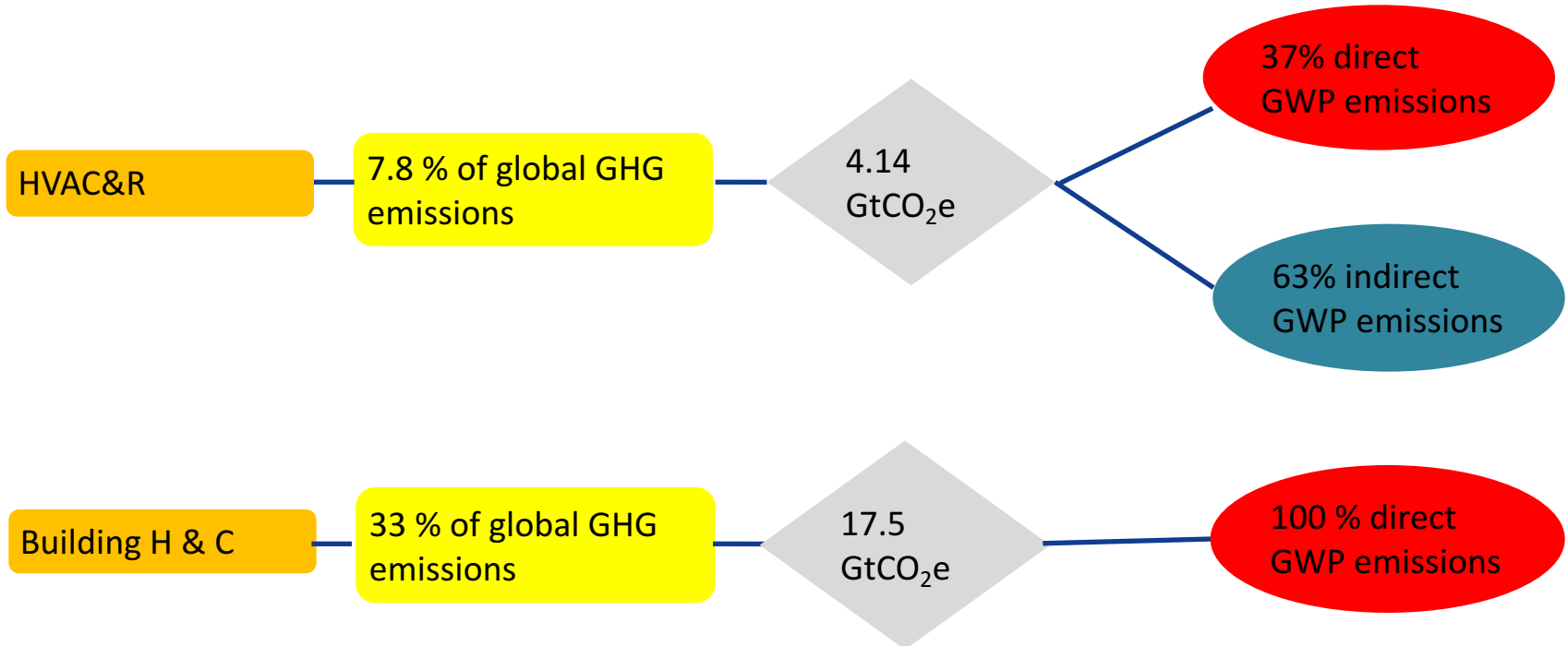
Where we are going

Long term perspective

- **Europe has approx. 115 - 120 million buildings**
 - 90 million single family residential
 - 15 million multi-family residential
 - 10 – 15 million commercial and office buildings
- **If heat pump reach a market penetration of 75% of all boilers...**
 - More than 86 million HP need to be manufactured and installed by 2050
 - 2.9 million every year (2.5 times today's annual sales)

ALL WITH F-gas?

The impact of Buildings and HVAC&R on climate change

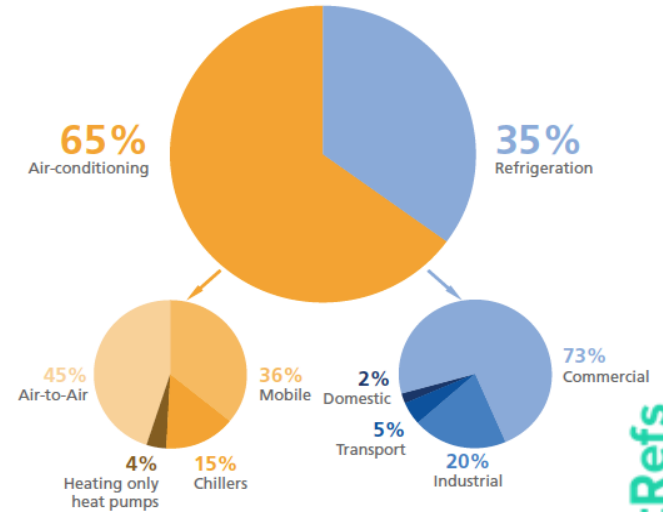


COOLING DEMAND IS TO GROW ! So how then reduce CO₂eq?

Globally, need for AC increases 3x by 2050! <= rising temperatures + growing middle class.
 UNEP estimates stock will be over \$1.5billion by 2030, 20% of household energy

 The “Blue” refrigeration sector is reducing GWP values, charge, goes to natural refrigerants or ‘near to zero’ GWP gas. With bans, incentives, and trends in the world.



 The “Orange” HVAC sector is strongly on R22, R407C, R410A, R32. Splits and VRF are largest in size and booming sales. No plans for a ‘near to zero’ GWP alternative in sight!

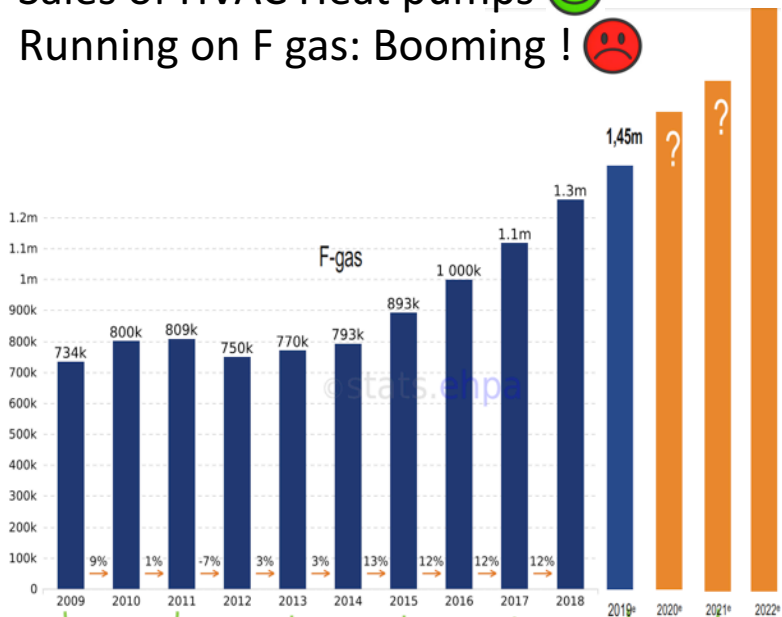



Source UNEP % in CO₂eq

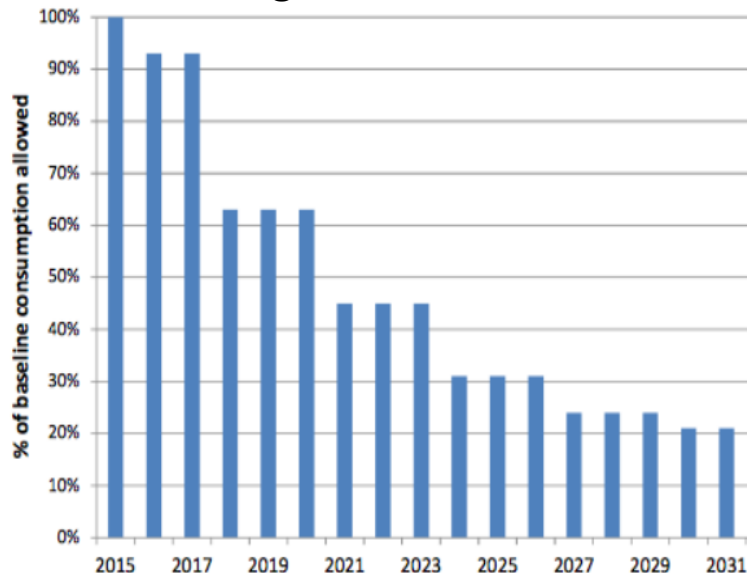
End Users will find out, stop accepting this and change their public policy !

The F-gas contradiction !

Sales of HVAC Heat pumps 
 Running on F gas: Booming ! 



Availability of F gas for future 
 Shortage is to come for sure



FACT: 99 % of all HVAC units operate with F Gas refrigerants

It is no rocket science this is likely running into a **PROBLEM!**

PROFESSIONAL end users have adopted natural refrigerant policy



Mercedes-Benz



AJINOMOTO



DANONE



PEPSICO



i'm lovin' it



GREENPEACE



PEPSICO



ASDA



coop



M&S

EST. 1884



SONAE



METRO

MIGROS



GROUPE Casino

ICA

KESKO

Sainsbury's

REWE

Waitrose



colruyt
prix · qualité



Overwaita
Food Group



pepsi

Walmart

weis

Wegmans



Professional Users DID find out, stopped use of F - gas , and changed their policy !

#GoNatRefs



HVAC: Do we want this?





Nat Refs Alternatives are plenty out there



China: share 85%, 100 million units / year

20 RAC lines ready for R290: *potential* 6 mio units/yr

Major players: Midea, Gree, Haier, TCL

Midea - received Blue Angel certification from German government

NEW PRODUCTION OF R290 ACs > MIDEA

Midea products

- Currently two sizes developed
- Both reversible
- Other products developed
- Safety systems under development



Model	Indoor unit (mm)	Outdoor unit (mm)	Cooling capacity	EER	Heating capacity	COP	R290 charge
KFR-26GW/N7-Y-Y(C4)	850 × 275 × 160	780 × 540 × 250	2.6 kW	3.4	2.8 kW	3.6	290 g
KFR-35GW/N7-Y-Y(C4)	900 × 285 × 160	780 × 540 × 250	3.5 kW	3.4	3.7 kW	3.6	350 g

NEW PRODUCTION OF R290 ACs > GREE

- Gree products
- Several models developed
- Split, window, portable
- Reversible and cooling only
- Products have safety system integrated to reduce leak amount
- Lower price than equivalent R22, R410A models



Capacity (kW)	EER (W/W)	Charge (kg)	Max noise ID/OD (dB)	Dimensions (mm)
2.7	3.55	265	38/52	Indoor 830 × 284 × 205 Outdoor 760 × 257 × 541
3.5	3.52	330	41/52	



India: Split AC represents 80% of total AC units

± 300,000 R290 units installed

inverter R290 top efficiency Leader: Godrej

Model Name	R290-12K	R290-18K
Operating Mode	Cooling	Cooling
Cooling Capacity	3400 W	4900 W
Rated Power Input	914 W	1318 W
Rated Input Current	4 A	6 A
EER	3.72	3.72
Refrigerant	R 290	R 290
Refrigerant Charge	0.290 kg	0.340 kg



PORTABLE AC : Europe is moving towards R290 in 2020

- EU F-Gas bans HFCs with GWP > 150 in portable AC as of 2020
- Delonghi, Midea, TCL, Blaupunkt, Kaysun, Gree, Olimpia Splendid



SPLIT HC MARKET = reluctant Active world policy support, update of safety regulations, update of EN standards industry commitment and training are underway to unlock R290 RAC

In recent years

Number of brands on #GoNatRefs has exploded

Over 100 Brands are now available worldwide

ATMO
sphere



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HERA NEW



23-24/06/2020 - Online

#GoNatRefs



Product availability is solved !



ALSO plenty CO₂ and NH₃ CHILLERS / H P today available

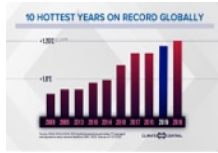


Are you still waiting for the final trigger to explode sales of NatRefs H V A C ?

Today's LESSONS for Consultants & HVAC END USERS :

1. F-gas free solutions is the only way forward. There is plenty of choice today
2. The growth of F-gas driven heat pumps is in conflict to the future HFC availability.
3. NatRefs are final and definitive solution for our generations to come !
4. World's global warming problem is driven by HVAC for buildings
5. NatRefs and Heat Pumps is the lowest hanging fruit way to carbon neutral.

Remember this story. Make it your story too...



Pass it on! We need each other. Our future is ours.



Thank you

Menno van der Hoff





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Thank you
for listening!

