

# Wirth Research

AR & VR at WR – looking back through time

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# Agenda

Motorsport Heritage

Sustainability Pivot

ARX-02a Front Wheels

Simulator

Ply Match

Emersio

# Wirth Research

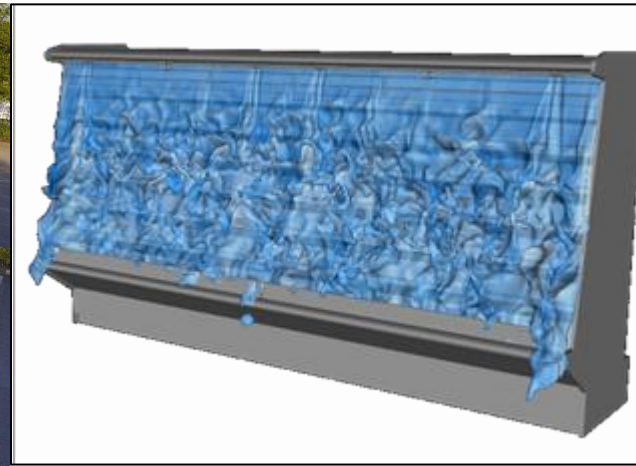
- **HERITAGE** in motorsport – Six-time Indy 500 winners, Three-time Le Mans 24hr winners, Formula 1.
- **TEAM** with decades of experience in CFD & aero/thermodynamics.
- **EXPERTISE** in modelling complex flow phenomena using CFD & WT testing.
- **INNOVATIVE** approach to aerodynamics yields continuous success.
- **PIVOT** from competitions, to products for sustainability.
- **PRODUCTS** EcoBlade, AirDoor, ClimateFlow, AeroKit and much more.
- **WINNERS** of 2 Queens Awards, and 2 CIBSE awards in 2 years (2022-2023), and more.



From Motorsport...



...to improving fuel consumption



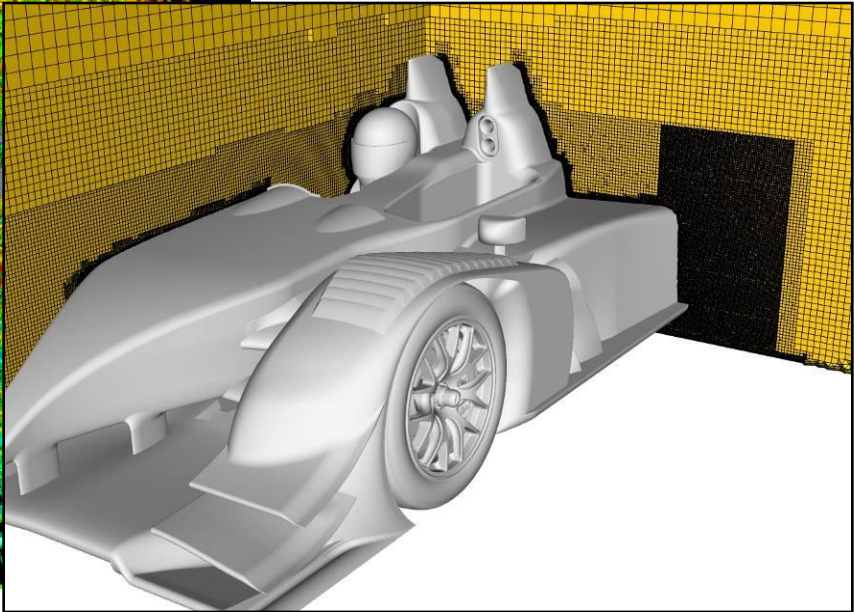
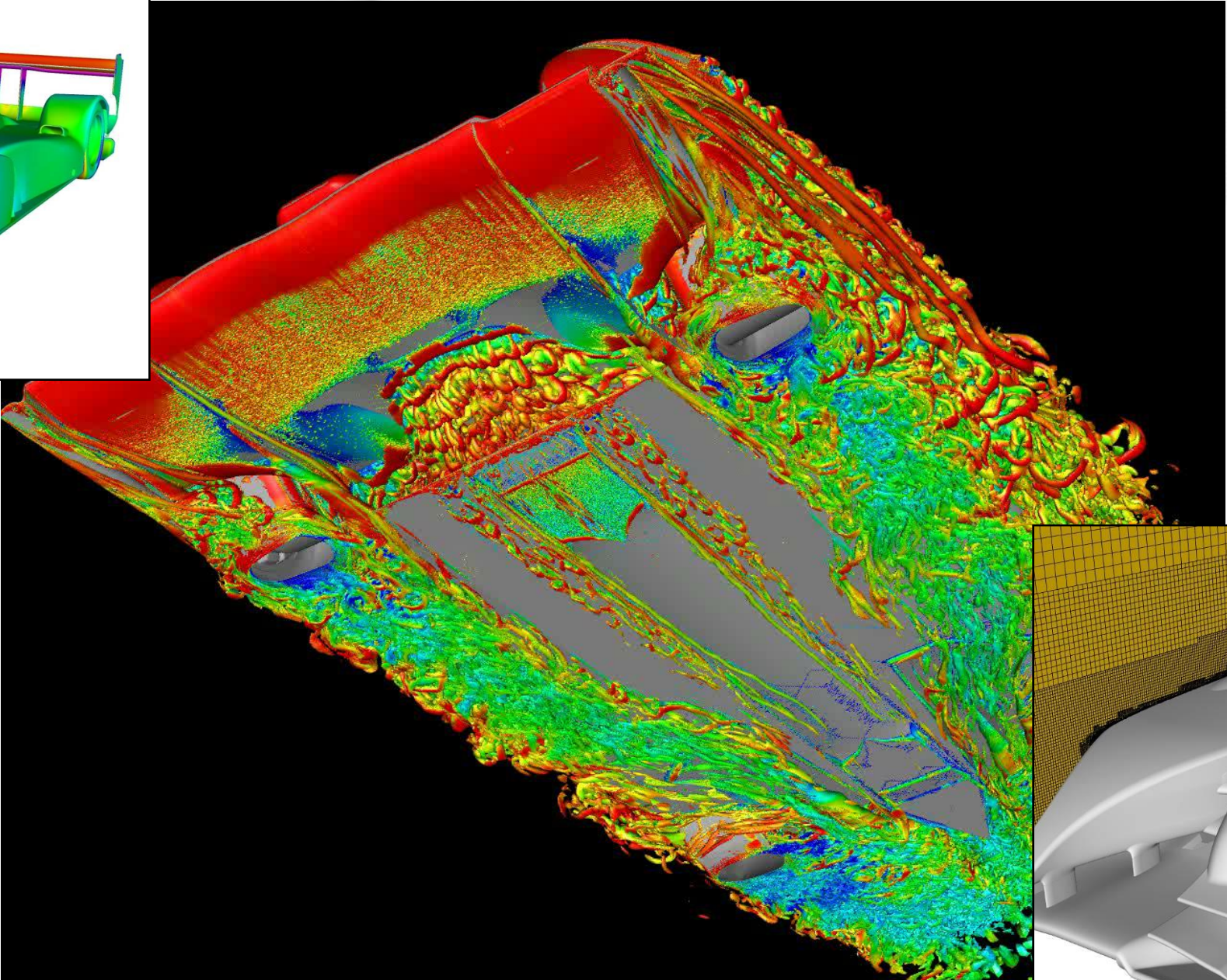
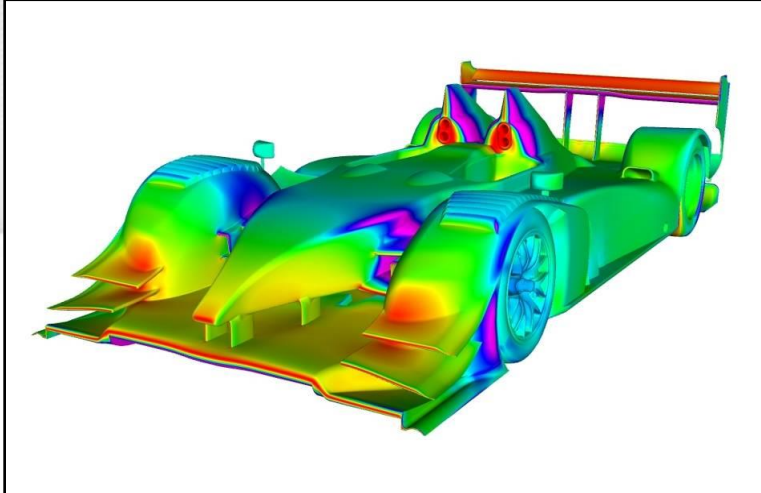
...to developing next generation refrigeration



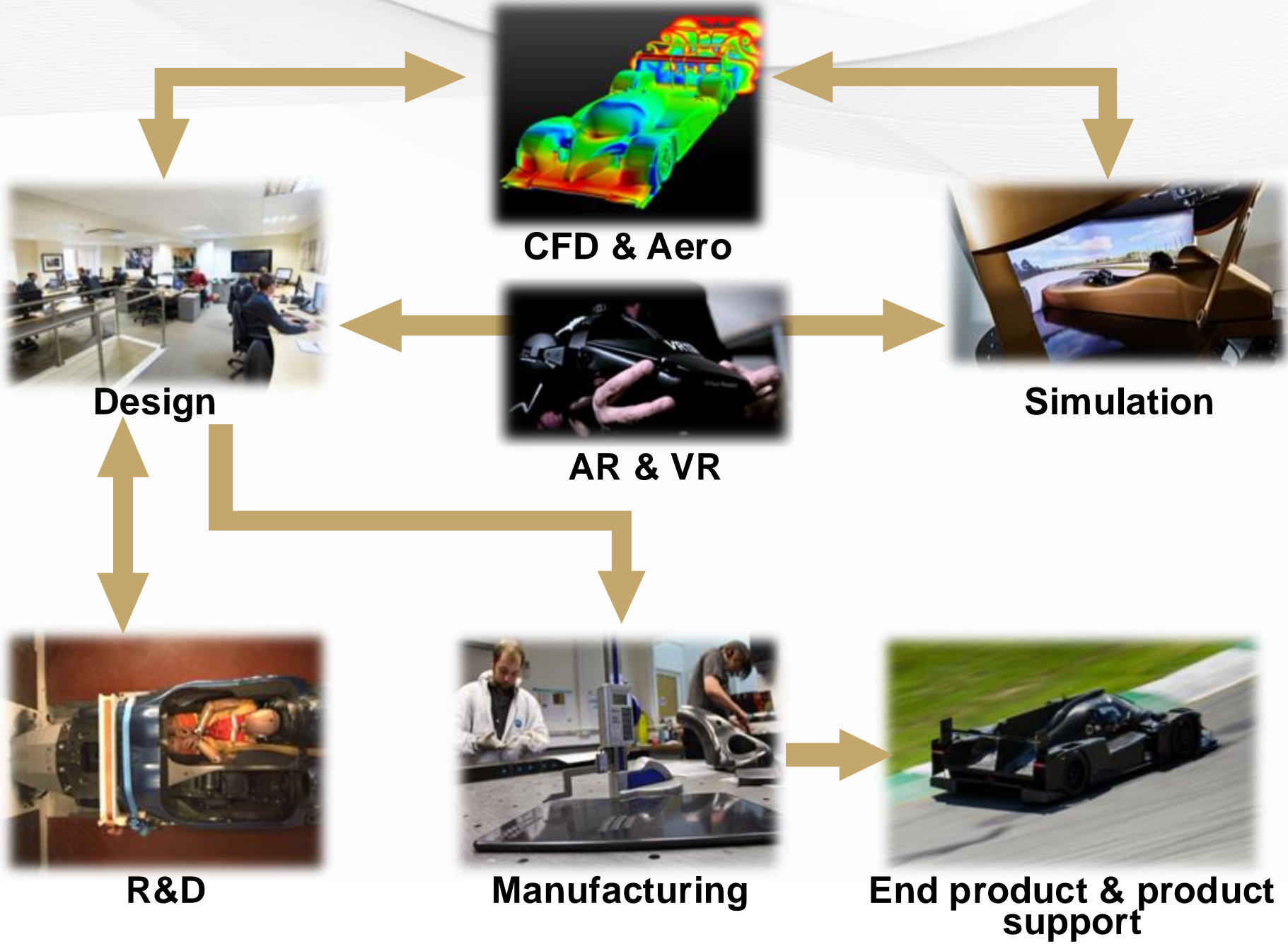
...to reducing store energy consumption



# Motorsport Heritage



# Development in the Digital Domain



# IndyCar & Sportscars Achievements



6 Times Indy 500 Winners with Honda Performance Development (HPD)



LMP2 ARX-01c Le Mans 2010 Champions



LMP1 ARX-03a & LMP2 ARX-03b Le Mans, WEC & ALMS 2012 Champions



2016: 100<sup>th</sup> Indy 500 pole



2016: 100<sup>th</sup> Indy 500 race 1<sup>st</sup> and 2<sup>nd</sup>

- Between 2006 and 2014, sportscars designed and manufactured by Wirth Research have gained:
  - 10 championships
  - 73 wins
  - 74 pole-positions
  - Le Mans, Sebring & Petit Le Mans class victories
  - Multiple American Le Mans Championships
  - 2012 LMP2 World Champions
  - 2013 ALMS LMP1 & LMP2 champions





# Sustainability Pivot

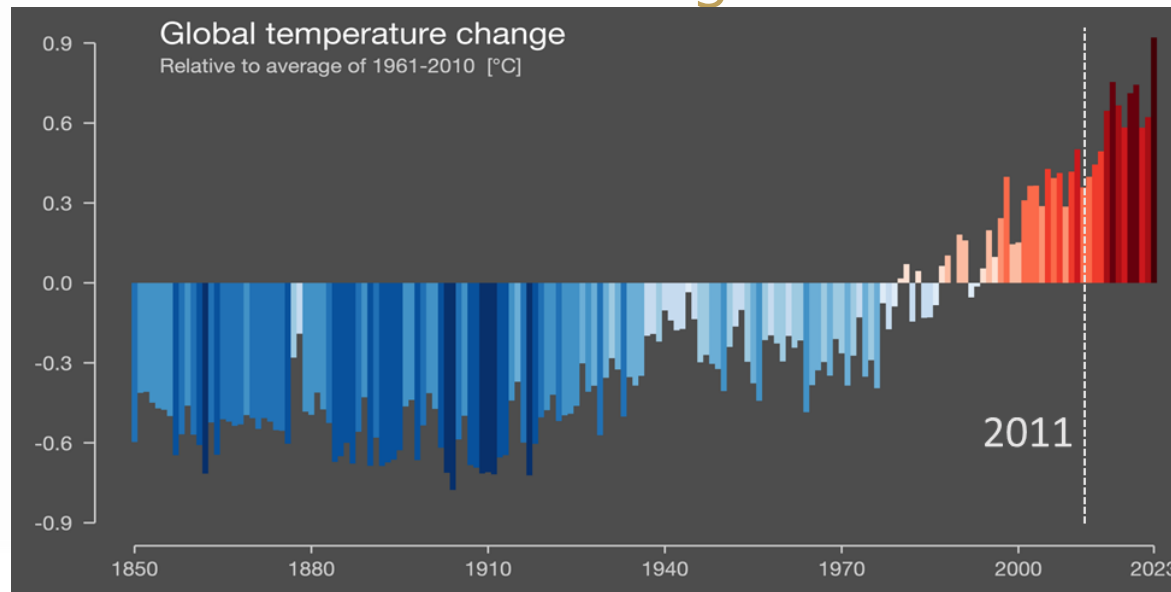
# WR Path to Diversification

After a decade in pinnacle motorsport, Wirth Research made the decision to diversify with the following ambition.

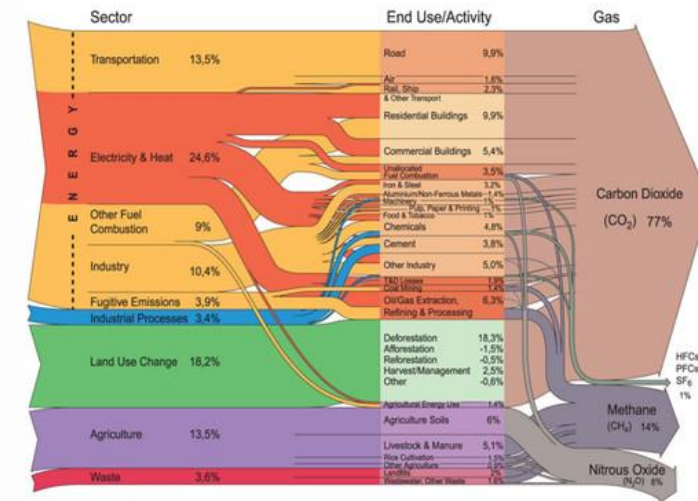
**Use our skills and expertise, optimised in motorsport, to develop efficiency and sustainability improvements for other industries.**

Rather than making a car go faster for a fixed amount of fuel/energy, how can we make other systems perform well for less energy?

Road Transport and Commercial Buildings ranked high on global green house gas emissions contributors....



World Greenhouse gas emissions by sector



All data is for 2000. All calculations are based on CO<sub>2</sub> equivalents, using 100-year global warming potentials from the IPCC (1996), based on a total global estimate of 41 755 MTCO<sub>2</sub> equivalent. Land use change includes both emissions and absorptions. Dotted lines represent flows of less than 0.1% percent of total GHG emissions.

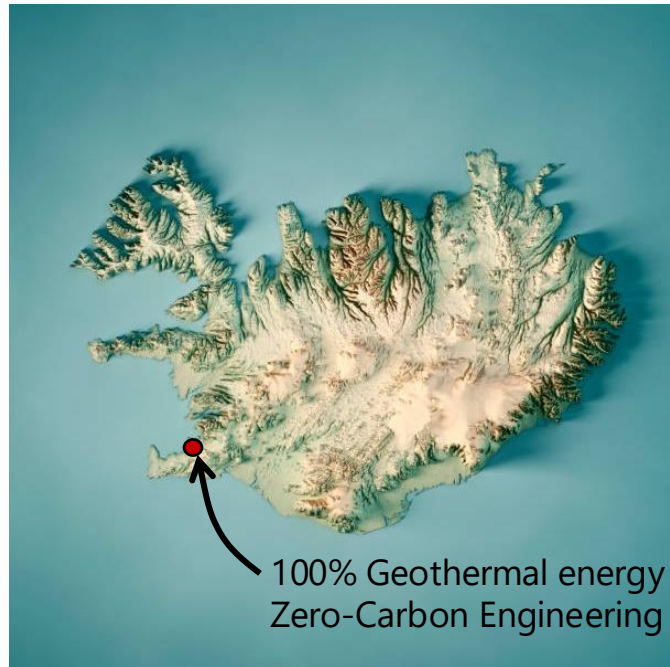
Source: World Resources Institute, Climate Analysis Indicator Tool (CAIT), Navigating the Numbers: Greenhouse Gas Data and International Climate Policy, December 2005; Intergovernmental Panel on Climate Change, 1996 (data for 2000).





# Zero Carbon

- IT and HPC refresh long overdue
- Verne Global - Flexible, optimised services and the best customer support.
- Moved offices to a newly developed Eco Business Centre, reducing our workplace carbon output to net zero.
  - kWh consumption down by 70%
  - CO2 emissions down 99%
  - Operating costs down enormously



(<https://www.perchcoworking.co.uk/eco-business-centre/building/>)



# Zero Carbon goals

Wirth Research's Computer servers run on 100% geothermal & hydro energy

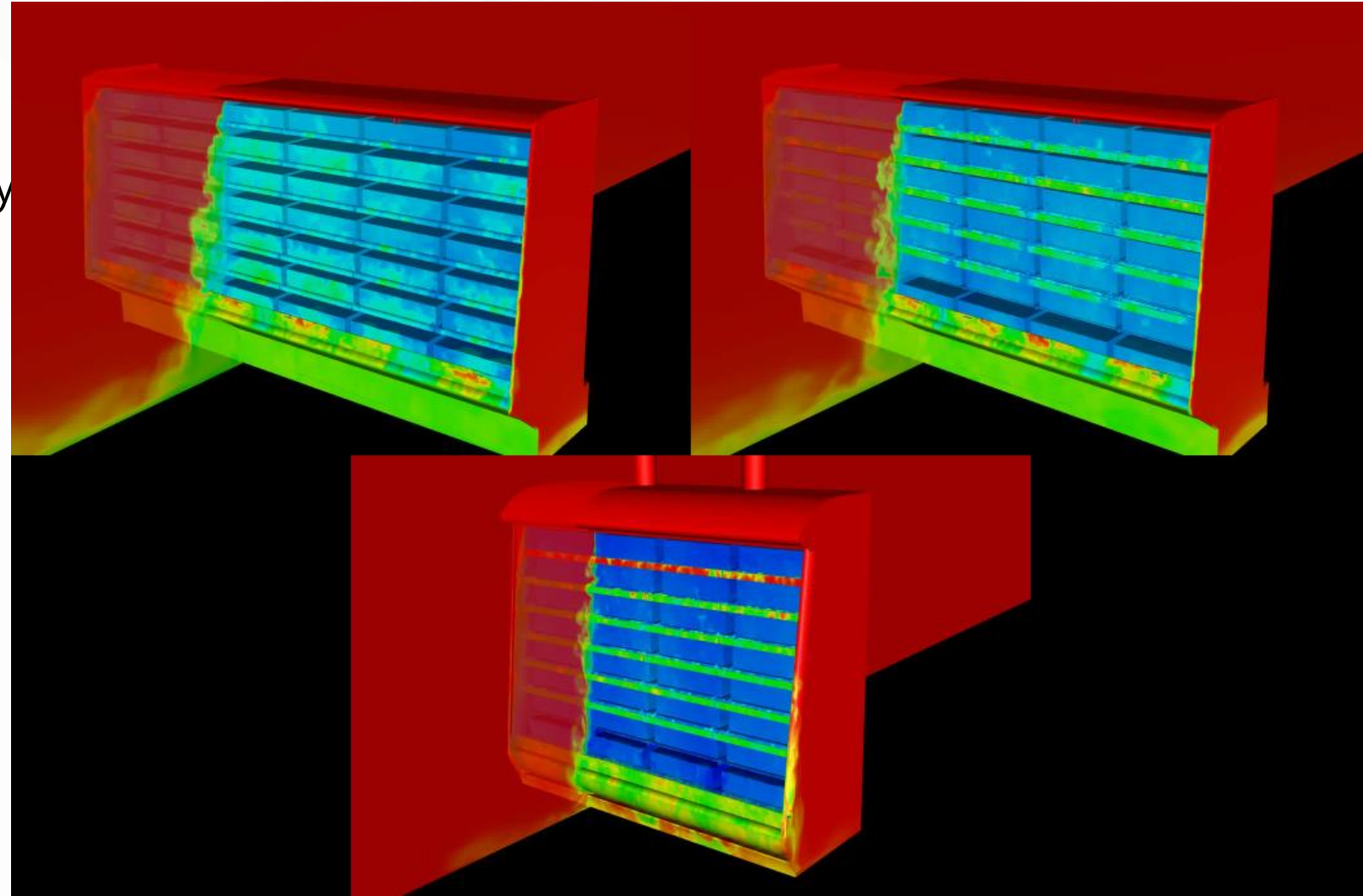
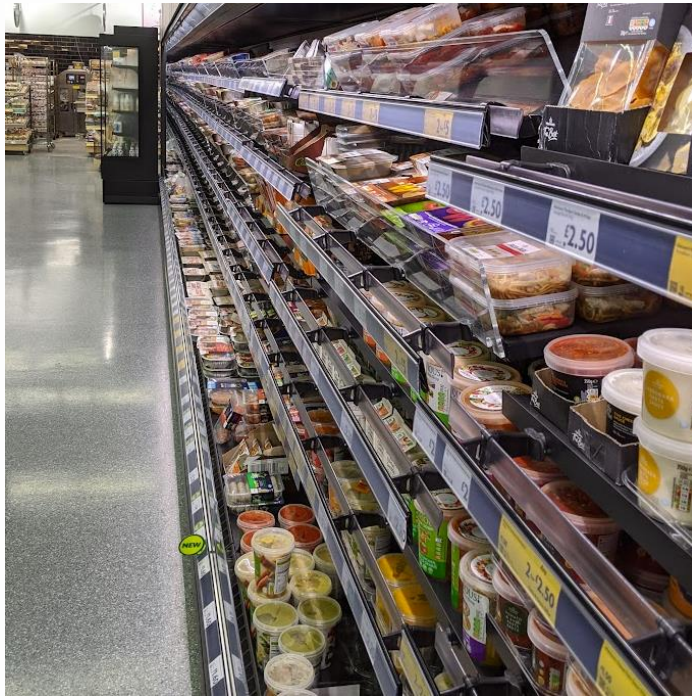


# 2014 – 2016 Refrigerated Cabinets

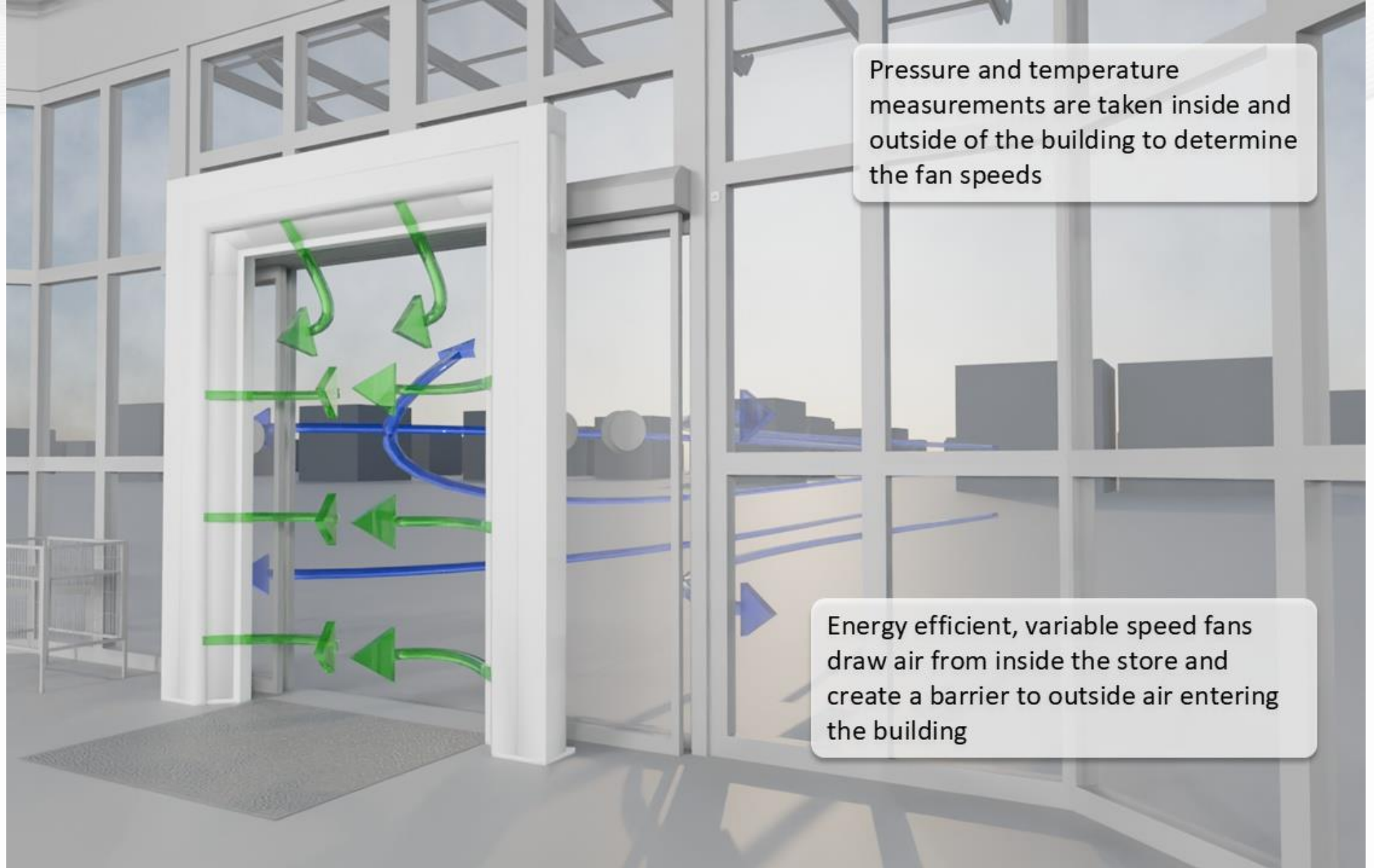
## Supermarket Refrigeration

2014 EcoBlade concept developed from LES inspired lightbulb moment – 20-25% energy saving

2016 “True Chill” cabinet developed – 45% energy saving



# 2020 – 2023 AirDoor



Pressure and temperature measurements are taken inside and outside of the building to determine the fan speeds

Energy efficient, variable speed fans draw air from inside the store and create a barrier to outside air entering the building

Multiple award winning in 2023.

CIBSE Building Performance – Product/Innovation of the year – Thermal

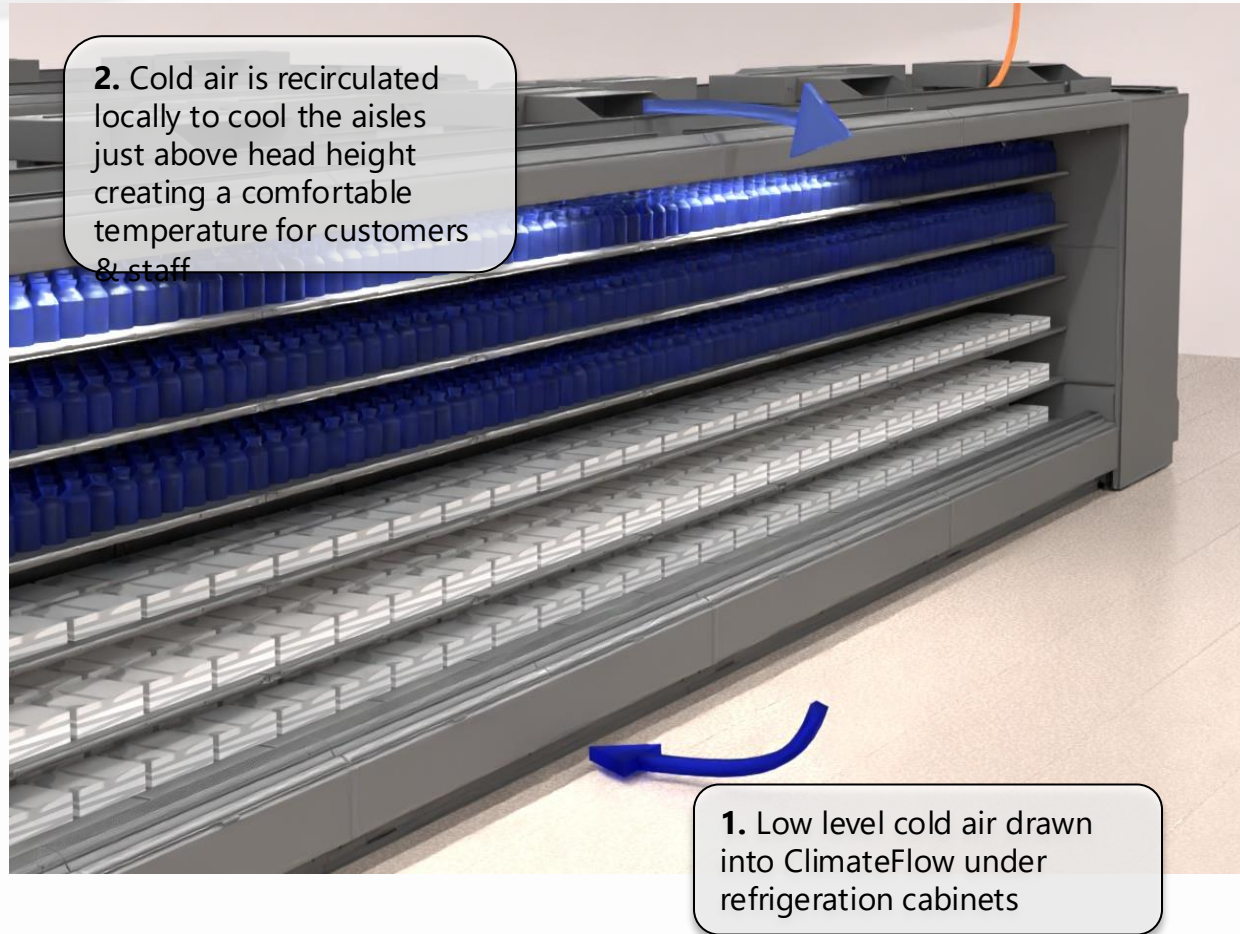
H&V News Awards – 2x awards

Thames Valley Tech Awards

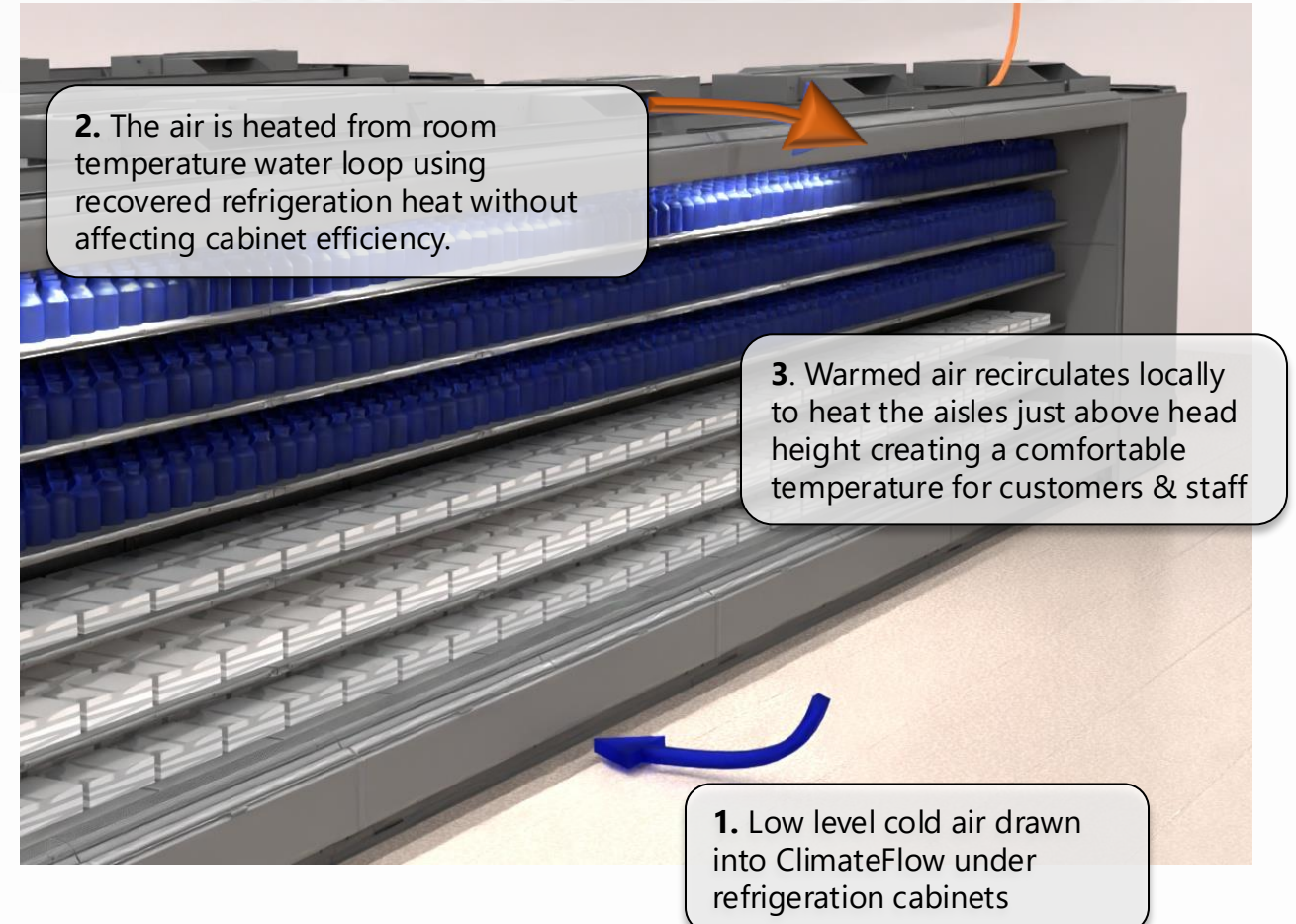


# 2023 – 2024 ClimateFlow

## Cooling Mode



## Heating Mode



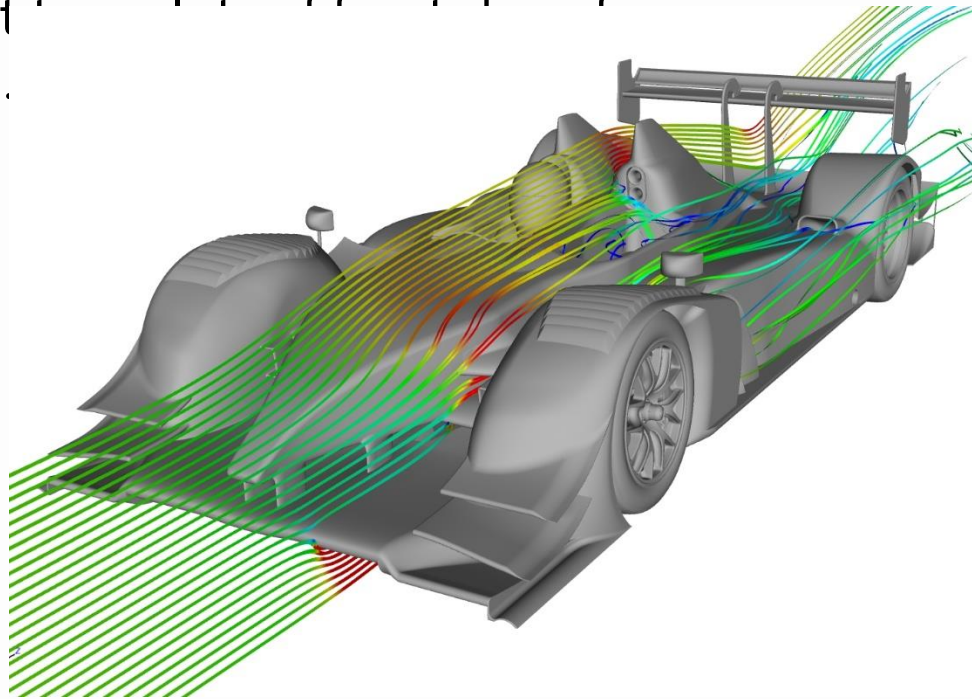


ARX-02a

# 2008 ARX-02a

## LMP1 Challenger vs Audi and Peugeot

Challenge established "Diesel" LMP1 cars.  
Much lower torque, lower rear weight...  
Let's maximise front grip and dominate the corners.  
Test scenarios in simulator...  
Big front steering.





# Simulator



# 2006 – 2016 Driver in the Loop Simulator

## Evolution of WR DIL Simulators

Sim 1- Five flat panel screens, hexapod moving platform, flexible driver seat package

2006 – Sim1 for LMP2 program, basic car model, pacejka tyres

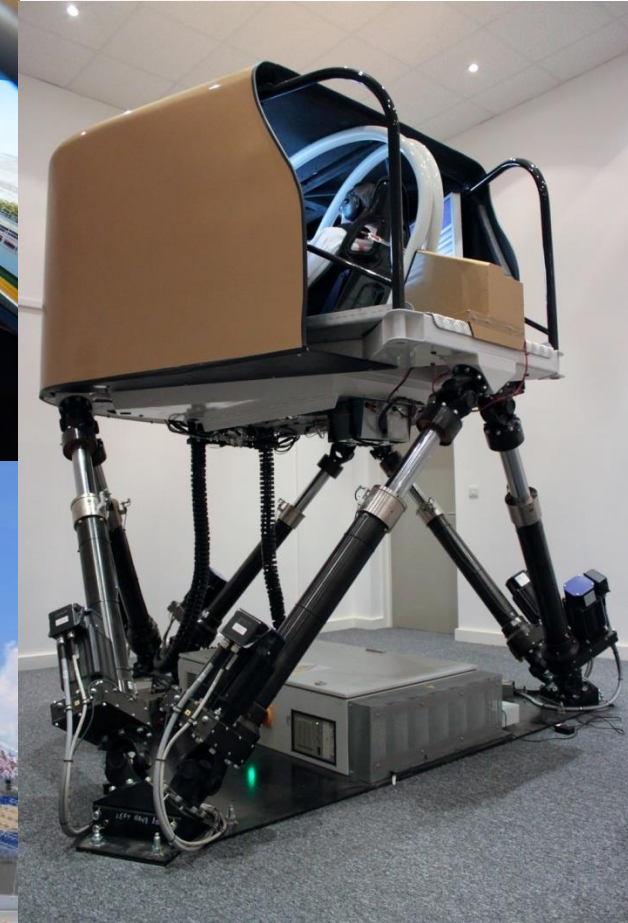
2008 – LMP1 program, upgraded physics model, Michelin TaMe tyre. Pivotal in developing rear tyres all round approach

2009 – Virgin F1, WR developed MuRiTyre to model Pirelli tyres

2012 – IR12 Indycar. WR Simulink physics model. Key to developing Indy500 set-up and win.

2014 – HPD Indycar Aerokit, WR Dymola model. Target setting for new road courses and super speedways.

2016 – VW Sweden WRX Polo, tech demonstrator.



# 2006 – 2016 Driver in the Loop Simulator

## Evolution of WR DIL Simulators

Seamless UHD 3d Graphics

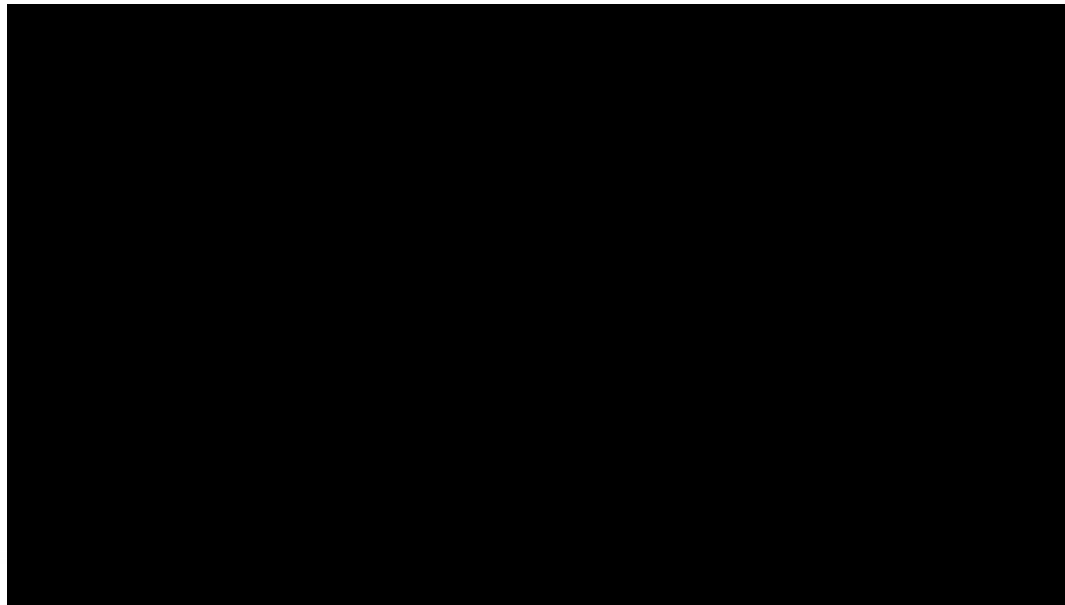
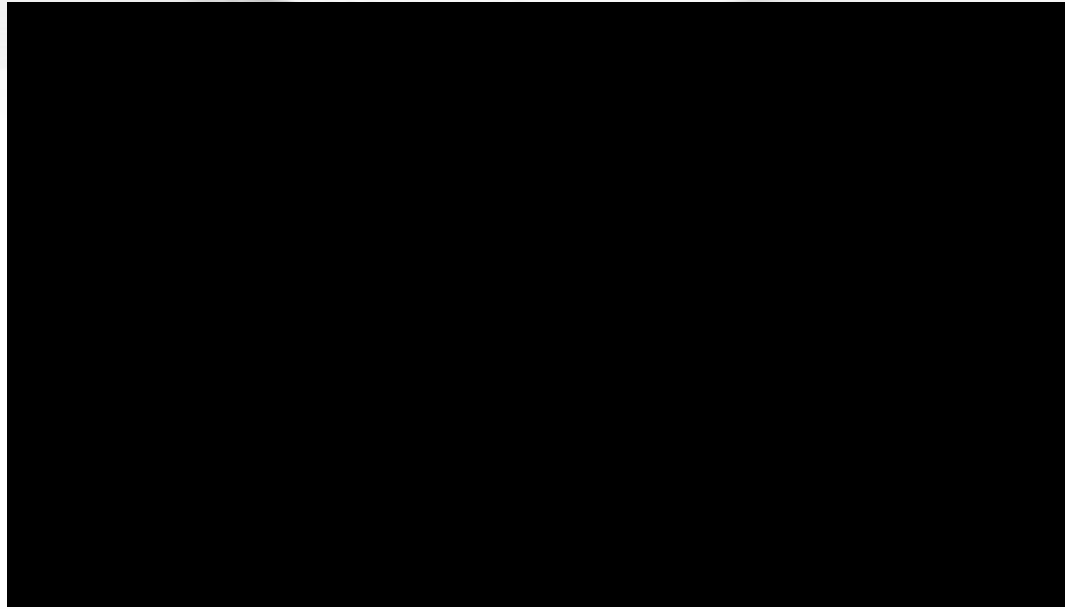
Accurate monocoque driver package

WR car physics model in Dymola

Seatbelt tensioners

Accurate brake pedal stiffness

Steering feedback





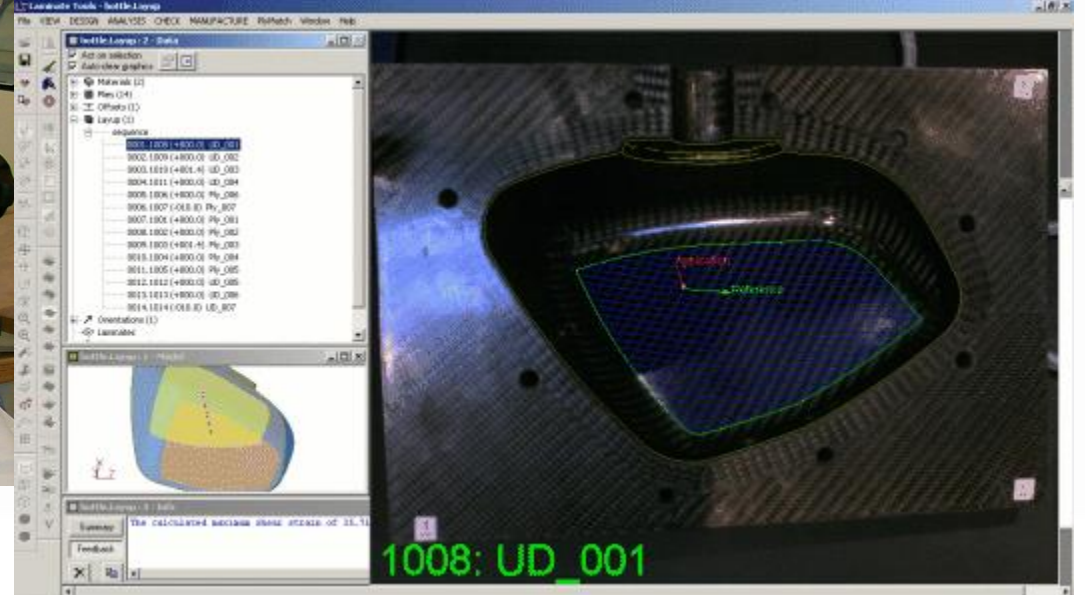
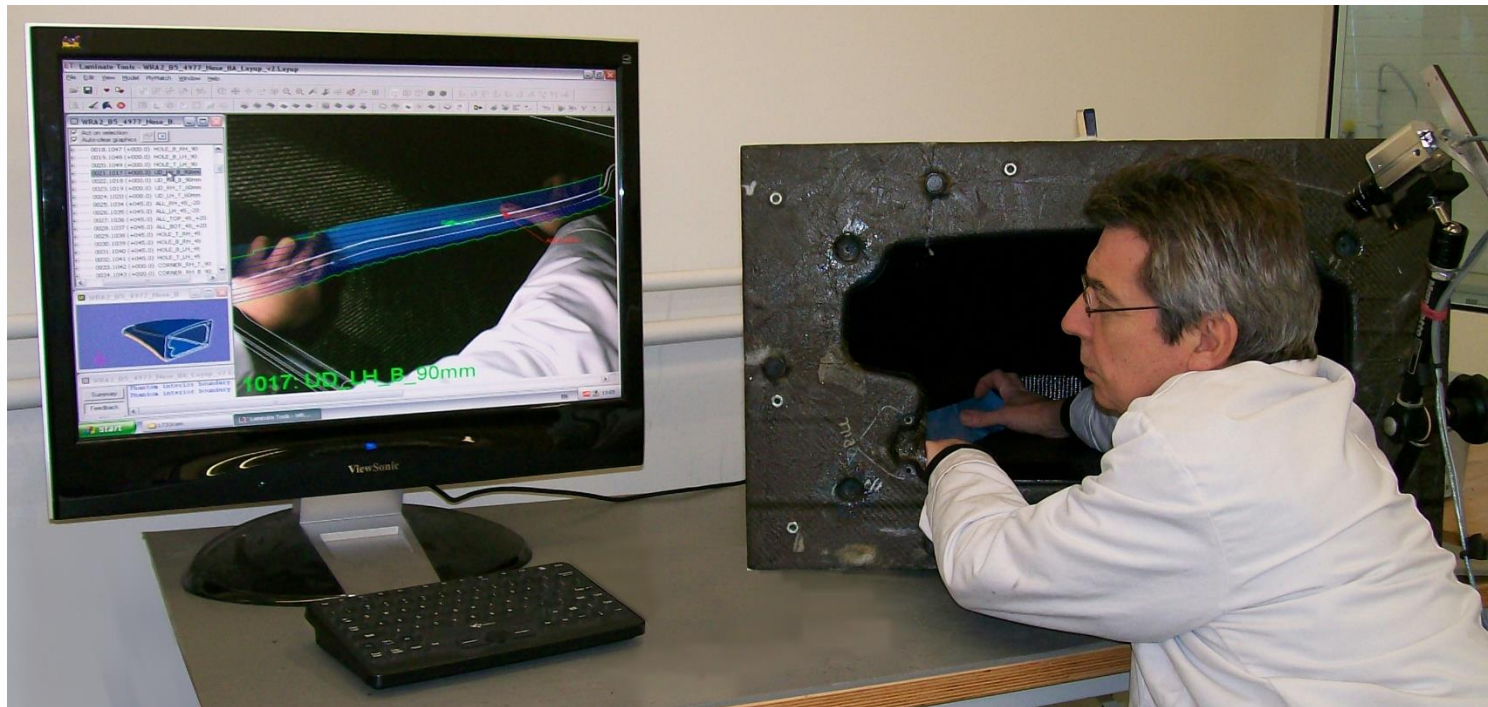
# PlyMatch

# 2007-2015 Laser Guided Laminating

## Carbon Composite AR

Laser and video ply positioning systems

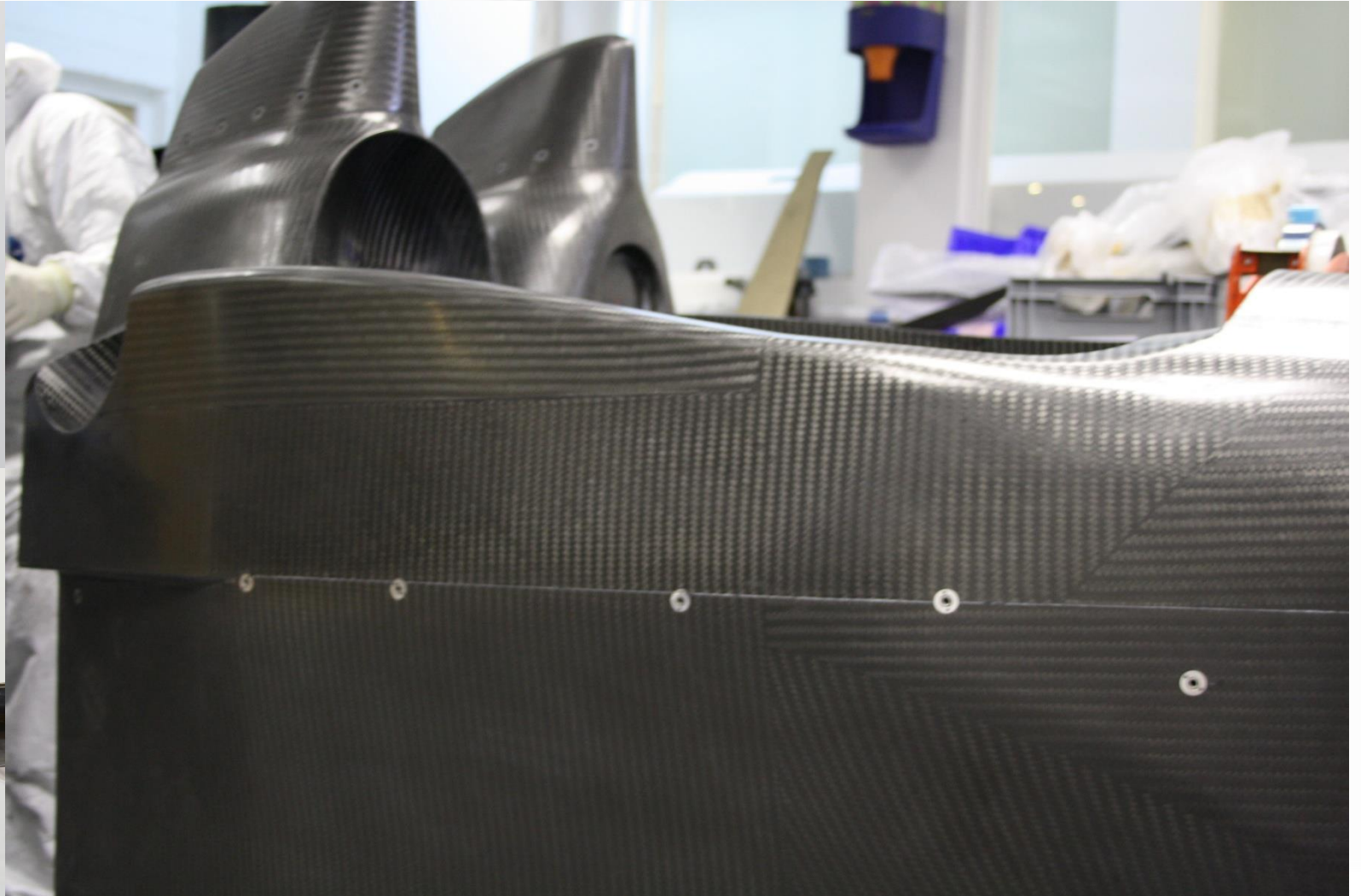
Allows benefit of optimising composite lay-ups



# 2007-2015 Laser Guided Laminating

Carbon Composite AR

Lightweight & strong components



# 2007-2015 Laser Guided Laminating

Carbon Composite AR





# Emersio

# 2011 – 2013 Emersio

## Ipad-2 3d Tracking AR

PTAM Technology – Parallel Tracking and Mapping





# 2011 – 2013 Emersio

## Ipad-2 3d Tracking AR



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Thank you!