



THE JOURNEY TOWARDS EMISSION FREE TEMPERATURE-CONTROLLED DISTRIBUTION ON ROAD VEHICLES

TOM SOUTHALL –POLICY DIRECTOR

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• 190 COMPANIES REPRESENTED



• 450+ FACILITIES



• >30 MILLION M³ STORAGE



• >30,000 REFRIGERATED VEHICLES



• c.20,000 EMPLOYEES



Leading the UK's Temperature Controlled Logistics Industry



OUR NET ZERO PROJECT



Cold Chain Federation's commitment to support our members to adapt to a low carbon future:

- **Part One:** Shaping the Cold Chain of the Future: The Road to Net Zero (published)
- **Part Two:** Defining a Net Zero Cold Chain (published)
- **Part Three:** The Journey Towards emission free temperature-controlled distribution on road vehicles
- **Part Four:** The Cold Store of the Future (2022)
- **Part Five:** The Cold Chain Ecosystem (2022/23): the connecting elements which will make up the cold chain of the future. eg. blockchain, advanced temperature monitoring etc.

TRANSPORT REFRIGERATION: A CROSS-GOVERNMENT ISSUE



Department
for Environment
Food & Rural Affairs

- AIR QUALITY
- REFRIGERANTS



Department for
Business, Energy
& Industrial Strategy

- NRMM & RED DIESEL
- INNOVATION
- HYDROGEN STRATEGY



Department
for Transport

- TRANSPORT
DECARBONISATION PLAN
- FUTURE OF TRANSPORT



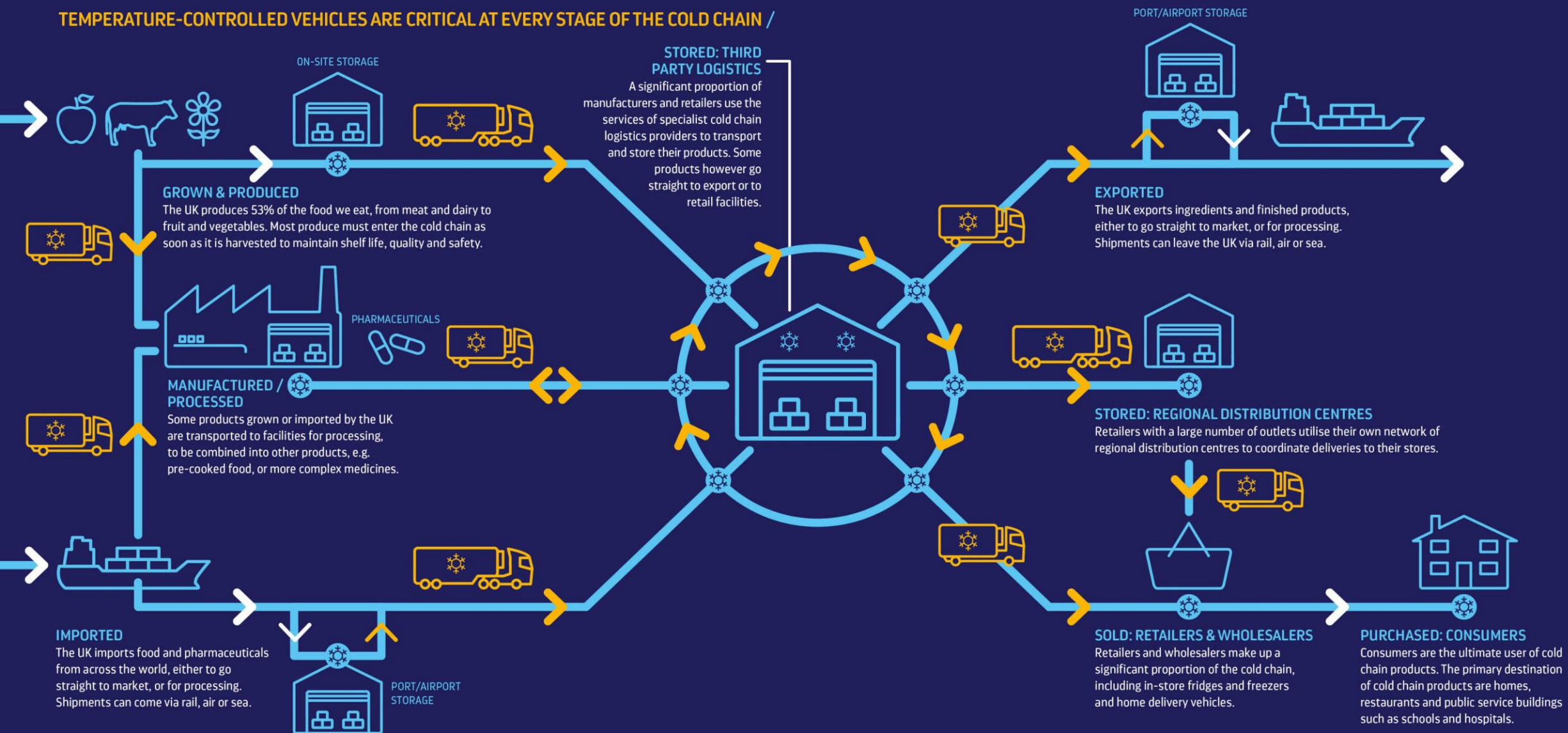
HM Treasury

- TAXATION
& DUTIES

CROSS GOVERNMENT AND DEVOLVED NATIONS:
DECARBONISATION & NET ZERO & COP26

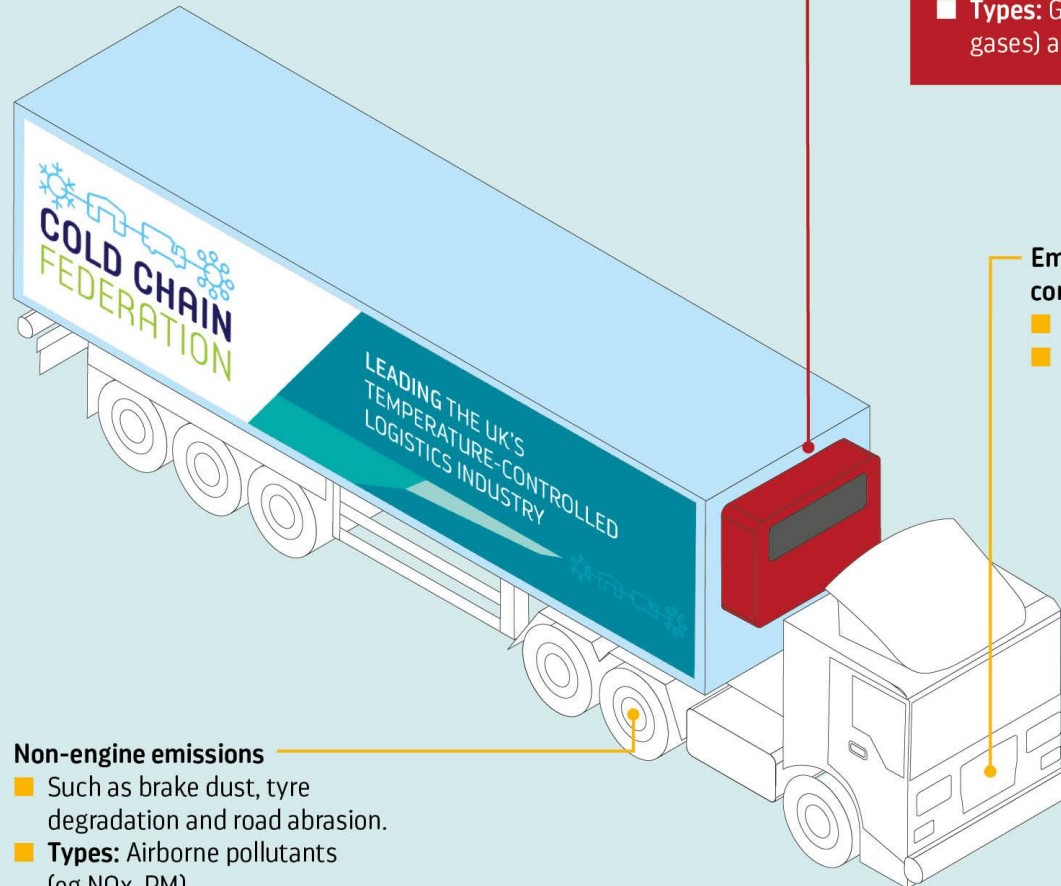
A CROSS-SUPPLY CHAIN ISSUE

TEMPERATURE-CONTROLLED VEHICLES ARE CRITICAL AT EVERY STAGE OF THE COLD CHAIN /



SCOPE: AIR QUALITY & CARBON EMISSIONS FROM TRUs

Types of emissions from a temperature-controlled vehicle



Emissions from a Transport Refrigeration Unit (TRU)

- Engine and refrigerant.
- **Types:** Greenhouse gases (eg CO₂, refrigerant gases) and airborne pollutants (eg NO_x, PM).

Emissions from the vehicle's main combustion engine

- Engine and refrigerant.
- **Types:** Greenhouse gases (eg CO₂, refrigerant gases) and airborne pollutants (eg NO_x, PM).

Non-engine emissions

- Such as brake dust, tyre degradation and road abrasion.
- **Types:** Airborne pollutants (eg NO_x, PM).

Other indirect emissions relating to temperature-controlled distribution

- Such as equipment manufacturing, resource extraction, driver-related emissions and scrappage etc.
- **Types:** Greenhouse gases (eg CO₂, refrigerant gases) and airborne pollutants (eg NO_x, PM).



EMISSIONS FROM TRUs

- Difficult to determine - operation of TRUs is extremely variable
- BEIS conversion factors suggests a refrigerated HGV emits 16% more CO₂ emissions than a non-refrigeration. 9% in 'Auxiliary TRU in the Greater London Area' TFL- 2018
- CO₂ emissions are 50% refrigerant leakage and 50% power source (Stellingwerf et al. (2018))
- Studies (eg. Zemo & TFL) have shown TRUs responsible for significant NO_x and PM



SHAPING THE COLD CHAIN OF THE FUTURE:
THE ROAD TO NET ZERO

**PART TWO – DEFINING A
NET ZERO COLD CHAIN**



- More work is required to fully understand the size and scale of carbon and air quality emissions from transport refrigeration units
- But the cold chain must reduce and eliminate diesel as a power source to remove all forms of emissions

AIM & PRODUCTION

➤ DfT Commitment in Transport Decarbonisation Plan:

“We will build on the initial work of Zemo Partnership and others in identifying zero emission solutions for transport refrigeration units and auxiliary power units, producing an action plan for their identifying the technologies available, barriers to introduction, and opportunities”

➤ Product of 2 years of consultation across the cold chain

- CCF member companies (operators)
- TRU manufacturers
- Trailer manufacturers
- Industry experts
- Refrigeration engineers
- Refrigerant manufacturers



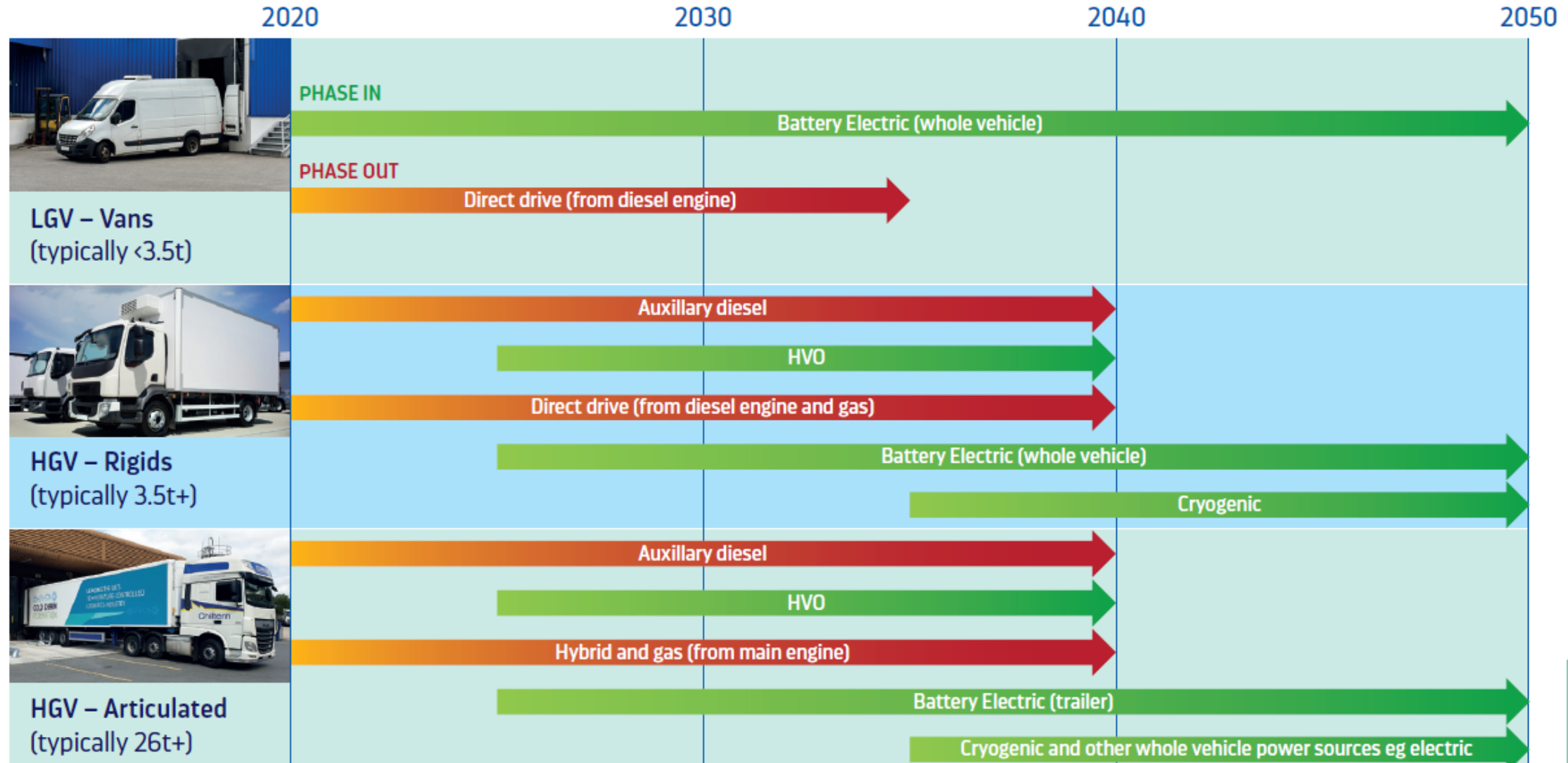
INDUSTRY LED MEASURES TO REDUCE EMISSIONS NOW

- Transparency and data reporting
- Undertaking regular and complete maintenance of refrigeration equipment
- Reducing the number of journeys and empty running
- Faster innovation in trailer and TRU design and more efficient operation
- Reshaping the supply chain



Photo: Carrier Refrigeration UK Ltd

TRANSITIONING AWAY FROM DIESEL



OUTLOOK FOR ELIMINATING EMISSIONS FROM TRUs

Short term: by 2030 (transitioning to lower or emission free refrigeration)

Vans and small rigids

- As more vans upgrade to at least Euro VI (or later) standards, those operating 'direct drive' systems will reduce emissions significantly.
- Increasing adoption of electric whole-vehicle solutions to achieve a fully electric refrigerated vehicle.
- Reduction in the GWP of gases used as a refrigerant due to F Gas regulations.

Large rigids and articulated

- Improved efficiency in operation of refrigerated trailers to significantly reduce the overall emissions from auxiliary diesel TRUs.
- Some adoption of lower emitting fuels to reduce emissions, such as HVO and biofuels.
- Increasing adoption of hybrid technology to run systems from Euro VI (or later) engines where possible.
- Some adoption of 'smart battery' powered trailers as this technology becomes more viable.
- Reduction in the GWP of gases used as a refrigerant due to F Gas Regulations.

Long term: by 2040 (move to emission free refrigeration)

Vans and small rigids

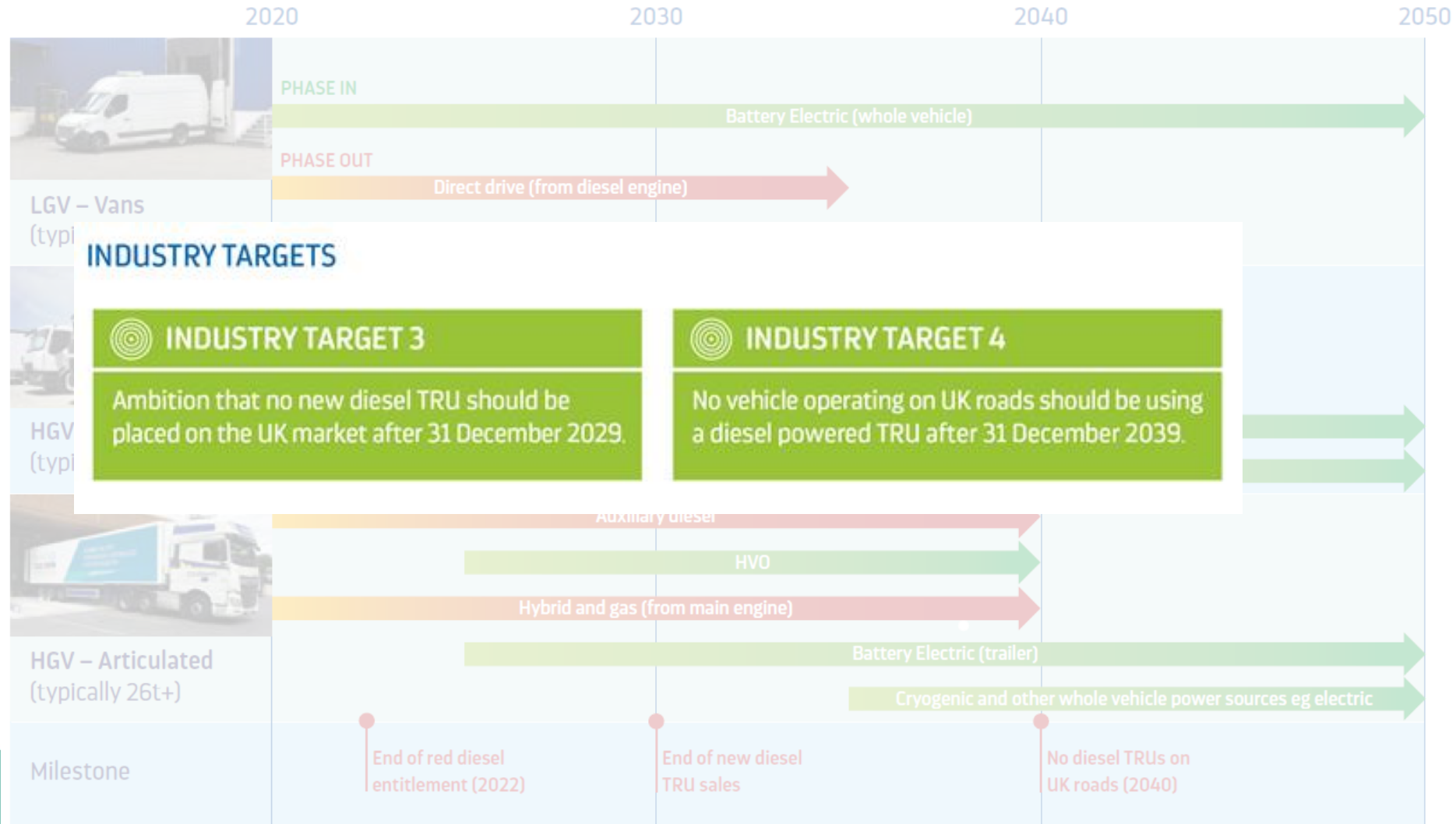
- All vehicles will run their refrigeration systems from the main engine of the vehicle, which is likely to be electric by 2040.
- Emission free, or ultra-low refrigerants replacing high GWP gases.

Large rigids and articulated

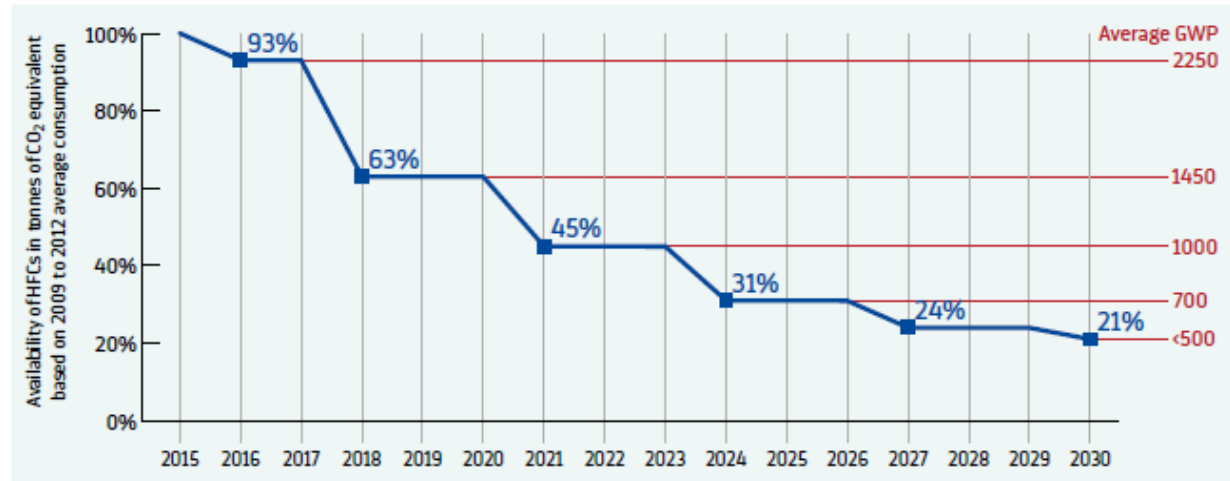
- No auxiliary diesel TRUs for large rigids, which will be able to be electrically powered by the main engine when in motion and by plug-in electric when stationary (or from batteries).
- Widespread adoption of smart battery technology to achieve mostly diesel free emissions from refrigerated trailers.
- Alternative technology such as nitrogen fully scoped and beginning to be adopted if viable.
- Emission free, or ultra-low refrigerants replacing high GWP gases.
- Decarbonisation of HGV engines could result in wider adoption of a single vehicle (truck and trailer) power source for both motion and refrigeration.



WHAT CAN BE ACHIEVED? END OF DIESEL TRUs



WHAT CAN BE ACHIEVED? PHASE OUT OF HIGH GWP REFRIGERANTS



SHORT TERM (to 2030) – Transition to lower GWP refrigerants as per requirements of F-Gas Regulations and The Kigali Amendment of the Montreal Protocol. Better leakage detection, record keeping and action on leakage will also reduce emissions.

LONG TERM (by 2050) – Move to ultra-low and emissions free refrigerants as they are developed.

INDUSTRY TARGETS

INDUSTRY TARGET 1

No transport refrigeration units (TRUs) to be sold into the UK market containing refrigerants with a GWP of more than 300 by 2025.

INDUSTRY TARGET 2

No transport refrigeration units (TRUs) should use refrigerants with a GWP of more than 300 by 2035 (in line with the Kigali agreement).



BUT.....BARRIERS TO PROGRESS

- Infrastructure
- Maintenance, reliability and operator confidence
- Affordability and case for investment



Photo: Siemens



Photo: Fenland Refrigeration

COLLABORATION TO OVERCOME THE BARRIERS...

MANUFACTURERS

OPERATORS

GOVERNMENT

COLD CHAIN FEDERATION



OPERATORS SHOULD...

- MORE EFFICIENT USE OF EXISTING EQUIPMENT
- TRIAL DEVELOPING TECHNOLOGY
- PREPARE THEIR OPERATIONS FOR THE FUTURE

MANUFACTURERS (TRU & TRAILER) SHOULD...

- QUICKEN THE PACE OF REDUCING HIGH GWP REFRIGERANTS
- INCREASE PACE OF INNOVATION AND DESIGN AIMED AT REDUCING EMISSIONS IN CURRENT FLEET, WHILST DEVELOPING TECHNOLOGY OF THE FUTURE
- PUSH THE LIMIT OF TRAILER DESIGN TO INCREASE EFFICIENCY AND GENERATE POWER FROM RENEWABLE SOURCES



COLD CHAIN FEDERATION WILL...

- LEAD AND MONITOR PROGRESS ON EMISSIONS
- CONSULT ON THE INTRODUCTION OF SCHEME TO PROMOTE BEST PRACTICE IN T/C DISTRIBUTION
- PRODUCE A BEST PRACTICE GUIDE FOR BUSINESSES AND OPERATORS TO MAXIMISE EFFICIENT OPERATION OF TRUs
- PROVIDE THE FORUM FOR DISCUSSION, PROBLEM SOLVING AND TECHNOLOGY SHOWCASING

GOVERNMENT

- REGULATION
- STRATEGY & INFRASTRUCTURE
- DIRECT SUPPORT FOR BUSINESSES

SO WHAT CAN BE ACHIEVED?

THE OPPORTUNITY

- Emission free transport refrigeration by 2040.
- A good news story for UK decarbonisation
- Decarbonising a small, but visible element of transport infrastructure ahead of HGVs and other NRMM
- Tackling carbon emissions and air quality objectives
- Minimal need for further regulation/policy aimed at TRUs
- Showcasing collaboration between Government, manufacturers and operators



SHAPING THE COLD CHAIN OF THE FUTURE:
THE ROAD TO NET ZERO

**PART THREE – THE JOURNEY TO EMISSION
FREE TEMPERATURE-CONTROLLED
REFRIGERATION ON ROAD VEHICLES**



NEXT STEPS

- Keep up engagement with Government on recommendations following COP26 and publication of Net Zero Strategy.
- CCF actions: Produce a best practice guide for businesses and operators to maximise efficient operation of TRUs
- Continue to be the central resource for discussion, showcasing innovation and monitoring progress
- <https://www.coldchainfederation.org.uk/cold-chain-net-zero-project/>

INDUSTRY TARGETS

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INDUSTRY TARGET 3

Ambition that no new diesel TRU should be placed on the UK market after 31 December 2029.

INDUSTRY TARGET 4

No vehicle operating on UK roads should be using a diesel powered TRU after 31 December 2039.

HOW THIS WILL BE ACHIEVED – INDUSTRY LED ACTION, SUPPORTED BY EFFECTIVE GOVERNMENT REGULATION AND INVESTMENT

OPERATORS SHOULD:

- Continue to reduce air quality and GHG emissions from TRUs through more efficient usage of existing equipment whilst trialling and adopting lower emitting, or emission-free alternatives to diesel and high GWP refrigerants as they come to market and are financially viable.

TRU MANUFACTURERS SHOULD:

- Continue to reduce the use of high GWP refrigerants in line with F Gas Regulations and seek to increase the pace of innovation in design aimed at reducing air quality and GHG emissions.

TRAILER AND REFRIGERATED VAN MANUFACTURERS SHOULD:

- Continue to push the limit of trailer design to maximise thermal efficiency and continue to seek innovative solutions to generate emission free power from the trailer's roof, axles and brakes.

THE COLD CHAIN FEDERATION WILL:

- Consult on the introduction of industry-led scheme to promote best practice in efficient temperature-controlled distribution.
- Produce a best practice guide for businesses and operators to maximise the efficient operation of TRUs and reducing associated emissions.
- Continue to support efforts to quantify emissions from temperature-controlled distribution (as detailed in our 'Defining a Net Zero Cold Chain' document) and to track progress of this plan through regular reviews. The first review will be completed no later than December 2025.

GOVERNMENT MUST:

- Provide confidence and a clear deployment strategy for the technologies which will be backed to become widespread in the future to give operators confidence in major investments in developing technology eg electric, hydrogen, biofuels etc.
- Provide a clear investment strategy to facilitate the improvement of electric charging for vehicles and temperature-controlled trailers at depots and at rest points along the road network which must include subsidies or grants to overcome the significant costs for operators of installation of equipment.
- Support the targets set out by this plan with effective regulation and policy to achieve successful implementation of this plan as set out in Part 5.
- Support the investment in trials, or adoption of lower emission technologies through Green Funds, extension of super tax credits, Grants or other tax allowances and ensure that research funding is allocated to realistic solutions.
- Ensure the requirements of temperature-controlled operators are taken into account when developing the freight system of the future as outlined in the Transport Decarbonisation Plan.

