

Initial assessment of categories & duty cycles provides four main commercial/off-highway vehicle classifications:

Duty Cycle and classifications are a function of application rather than vehicle or product
However, typical applications and characteristics are listed below:

Light duty vehicle,
up to and including
3.5t GVW

Up to ~120 kW

Typical
Engine
Disp.

1.5 – 3 litres



Light duty
delivery



Skid Steer
Loaders/Excavators



Fork lifts &
Telehandlers

Medium duty vehicle,
From 3.5 – 26t GVW
Rigid & drawbar

From ~ 90-200 kW

4 – 7 litres



Medium duty
truck



Backhoe Loaders



Compact Wheel
Loaders

Bus/Coach – Heavy
Duty engine but
lighter duty cycle

From ~ 180+ kW

4 – 12 litres



Bus



Mobile Cranes



Tractors – Utility
& 4WD

Heavy duty vehicle,
From ~ 26 – 44t GVW
Rigid & drawbar

From ~ 180+ kW

7 – 16 litres



Heavy duty truck



Crawler
Excavators

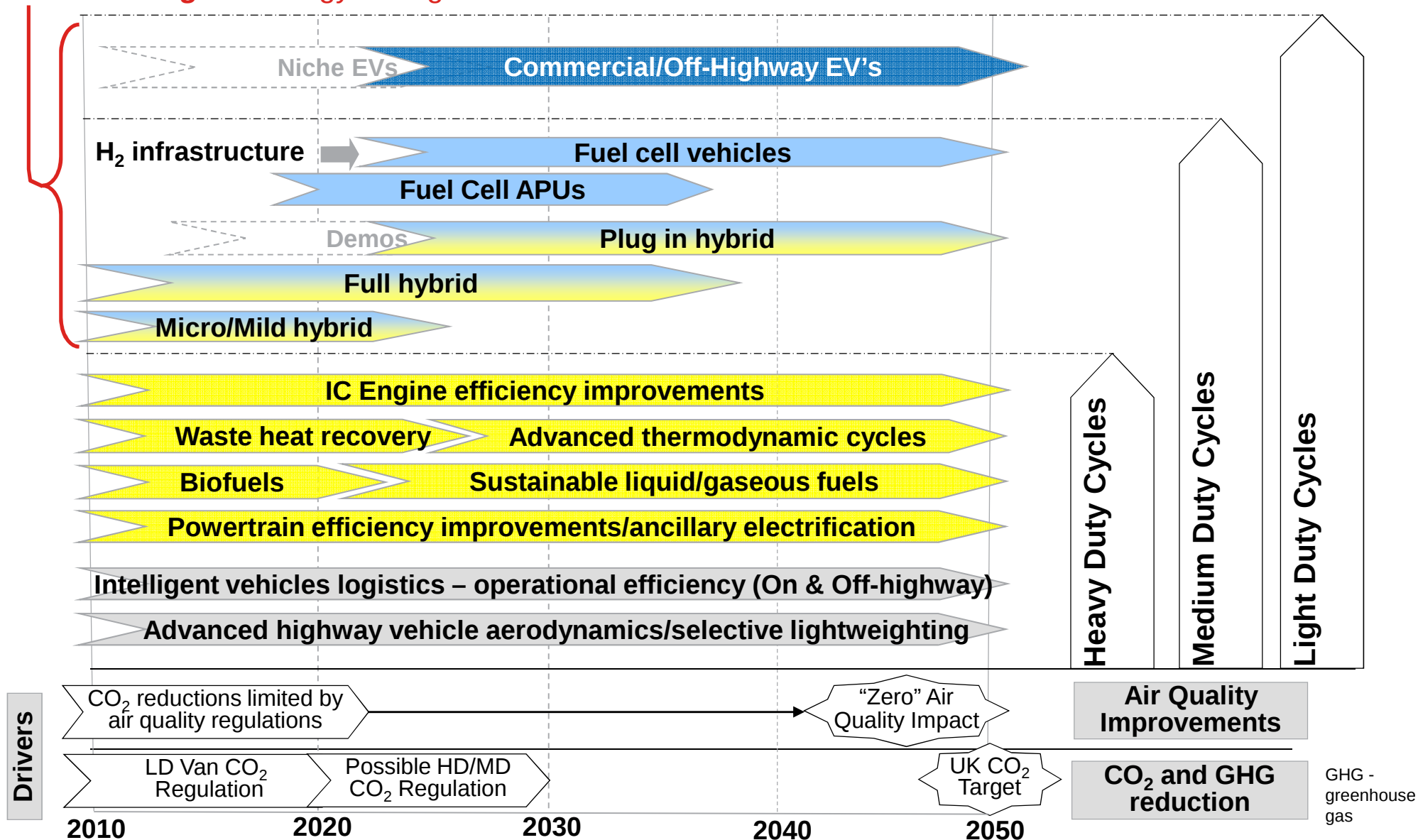


Wheel / Track
Bulldozers

Sample Off-Highway Applications

Low carbon Commercial Vehicle & Off-highway roadmap has parallel technology streams depending on duty cycle

Breakthrough in energy storage



Commercial Vehicle & Off-Highway share a similar future roadmap - CO₂ reductions require efficient combustion engines, low carbon liquid fuels & intelligent logistics



Key Points related to the low carbon Commercial & Off-Highway Vehicle roadmap

- Whilst there are many common technologies shared between on and off-highway vehicles with similar technical and commercial barriers, the relevance to specific products will be based on many other factors such as:
 - Specific duty cycle & overall power requirements
 - Re-fuelling & range requirements – particularly for higher power & heavy duty cycles
 - Total cost of ownership
- Reducing CO₂ emissions for long haul vehicles & high power products in the foreseeable future will be dependent on improvements in conventional powertrains & transmissions
 - A key requirement will be affordable & sustainable low carbon liquid fuels
- The shift to alternative powertrains and transmissions such as electrification will be limited to light duty products and short range/endurance products but will benefit from technologies developed for the passenger car market
- Centrally re-fuelled vehicles and products may offer opportunities for the introduction of low carbon fuels or electrification where this can be cost effective
- There are clear opportunities & benefits available from an integrated approach and the introduction of “Intelligent Logistics” for both on-highway & off-highway vehicles