An introduction to sustainable fuels

Silverstone Technology Cluster

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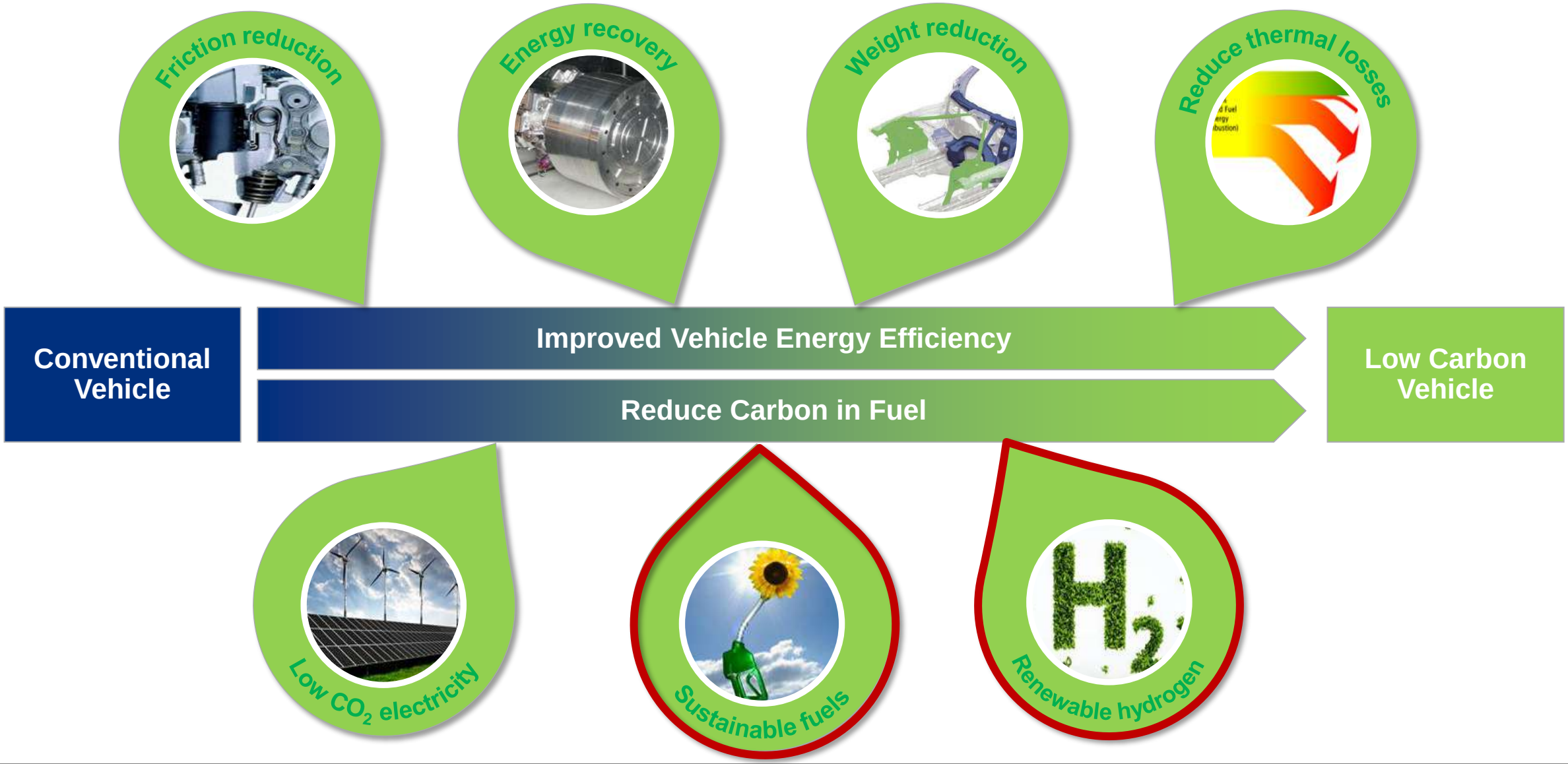
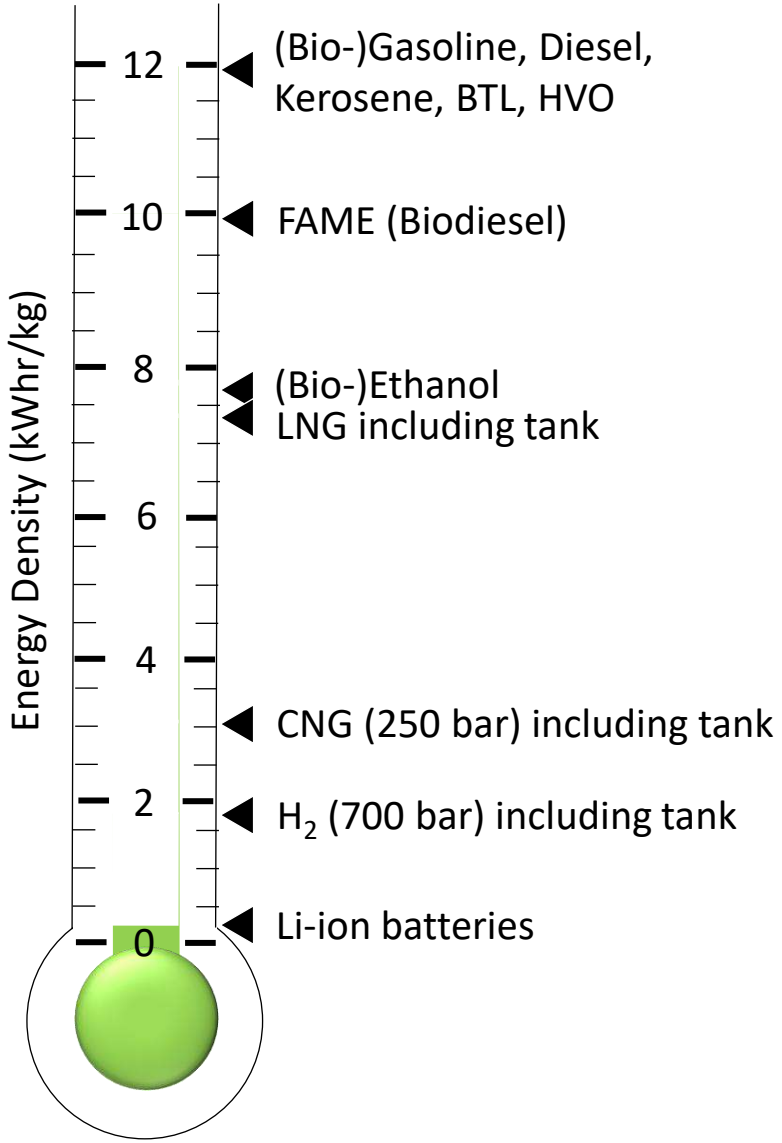
Technical options to reduce vehicle CO_2 emissions fall into two categories: improved vehicle efficiency & lower carbon fuels



Steve's energy density barometer will give you some idea of the scale of the challenge facing the alternatives to hydrocarbons



Which is best?

Sprint/endurance

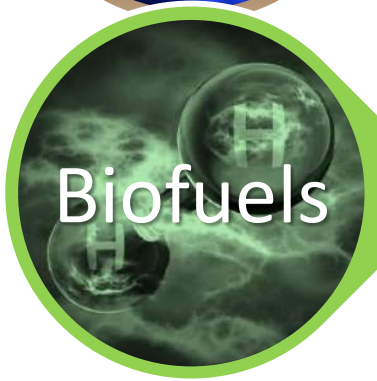
Track/off-road

Open/closed wheel

So what are all these sustainable fuels?

- A specific subset of synthetic fuels made using green hydrogen e.g. hydrogen made using renewable electricity to electrolyse water

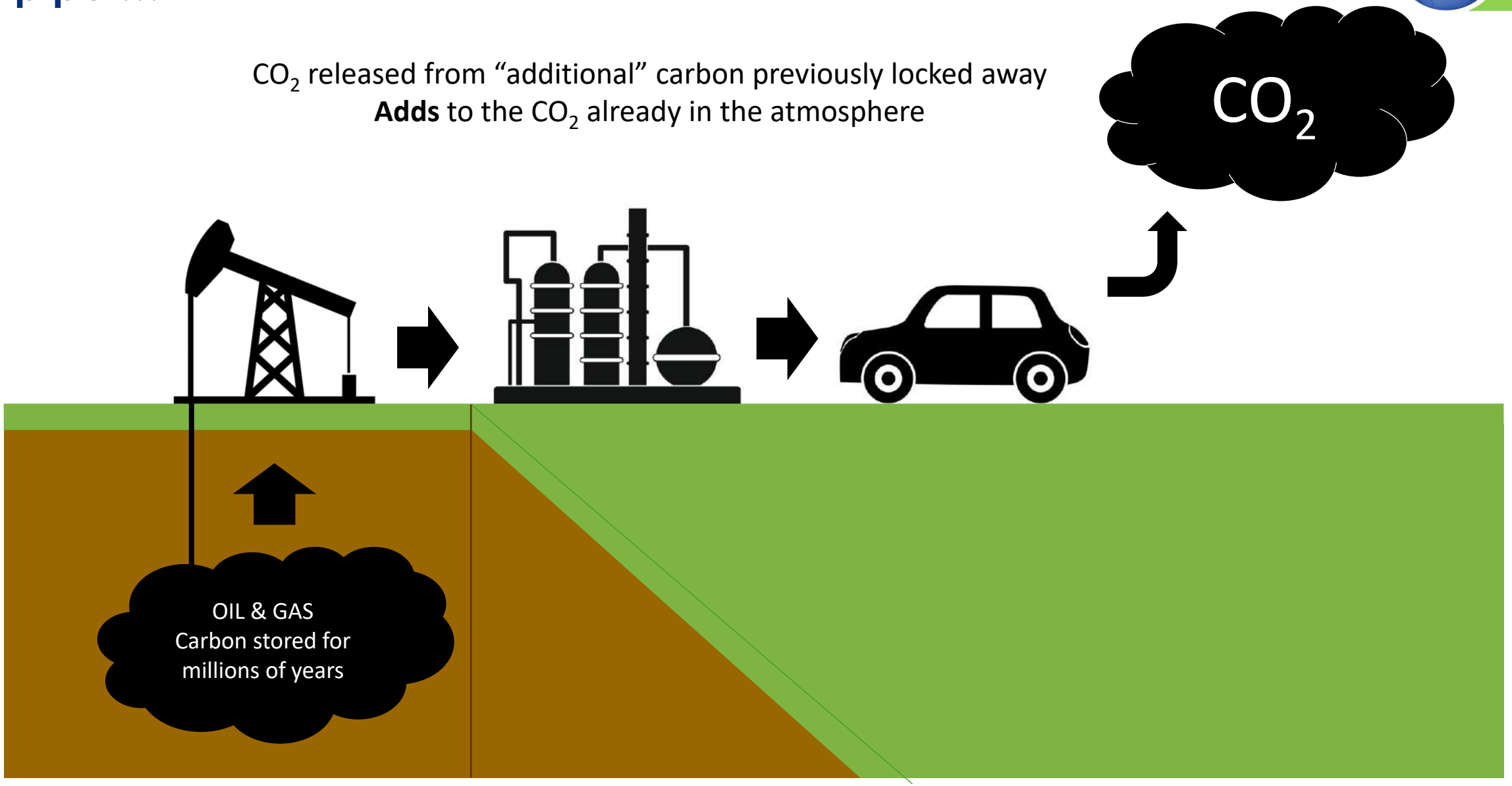
- The set of hydrocarbon fuels made using CO, CO_2 and hydrogen via syngas and Fischer-Tropsch-type processes
  - CO/CO_2 sourced from industrial processes, biomass or direct air capture
  - Hydrogen source is critical



- Made by fermentation of plant-based material or hydrotreatment or esterification of plant-based oils
  - Focus on 2nd generation i.e. waste-based products

And how are these fuels sustainable? They still produce CO_2 at the tailpipe …

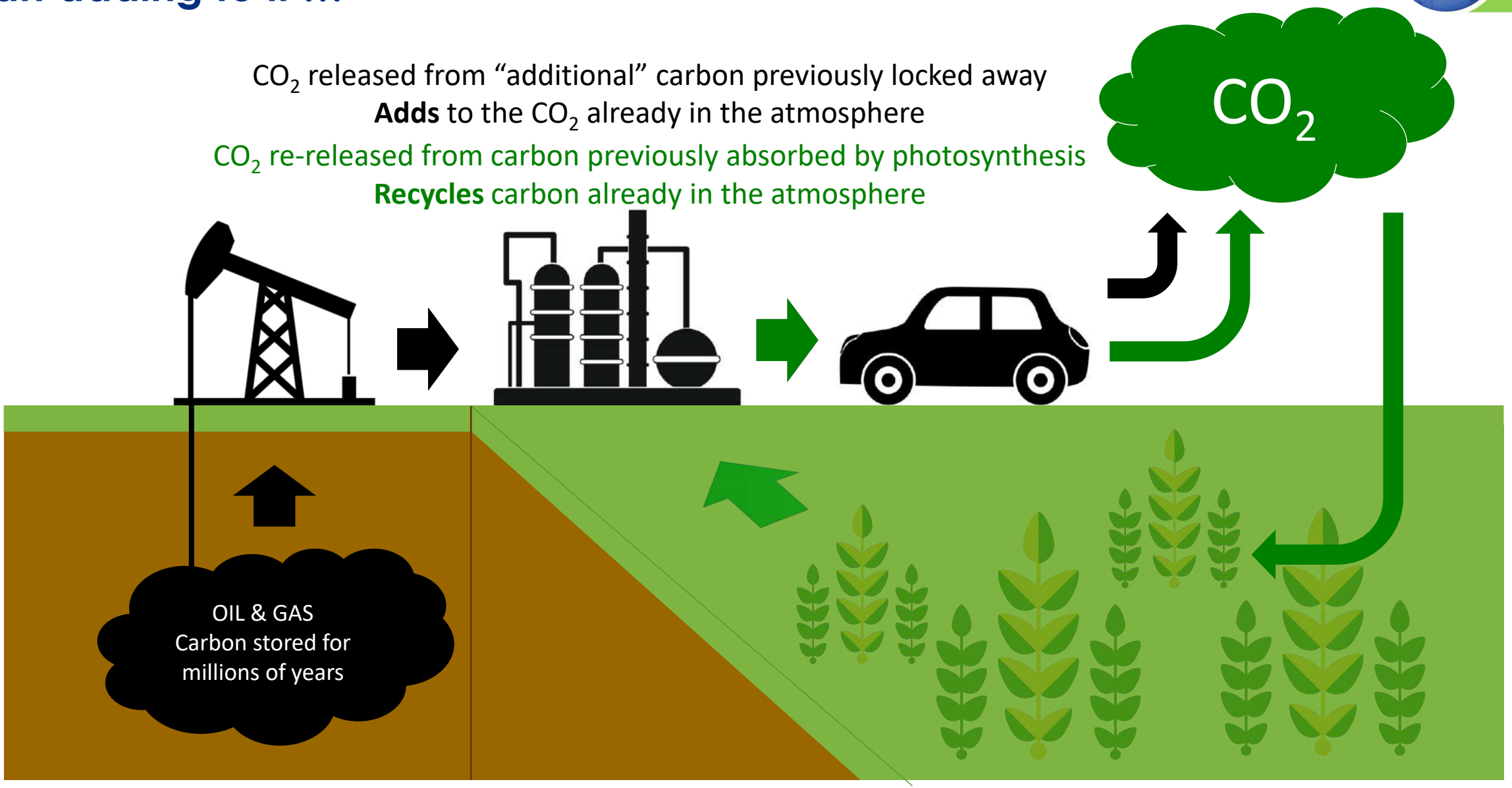
CO_2 released from "additional" carbon previously locked away
Adds to the CO_2 already in the atmosphere



How are these fuels sustainable? By recycling the carbon rather than adding to it …

CO_2 released from "additional" carbon previously locked away
Adds to the CO_2 already in the atmosphere

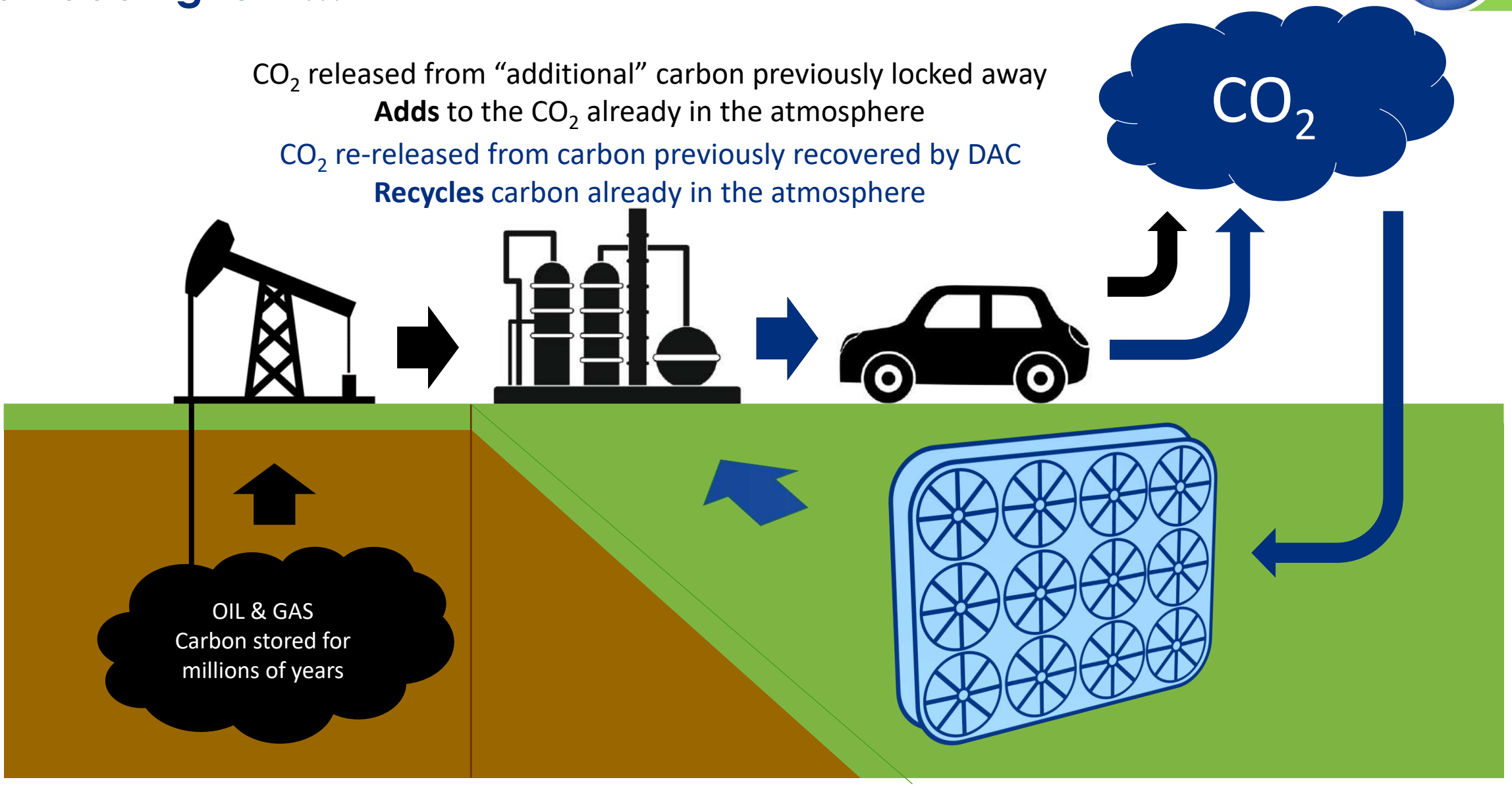
CO_2 re-released from carbon previously absorbed by photosynthesis
Recycles carbon already in the atmosphere



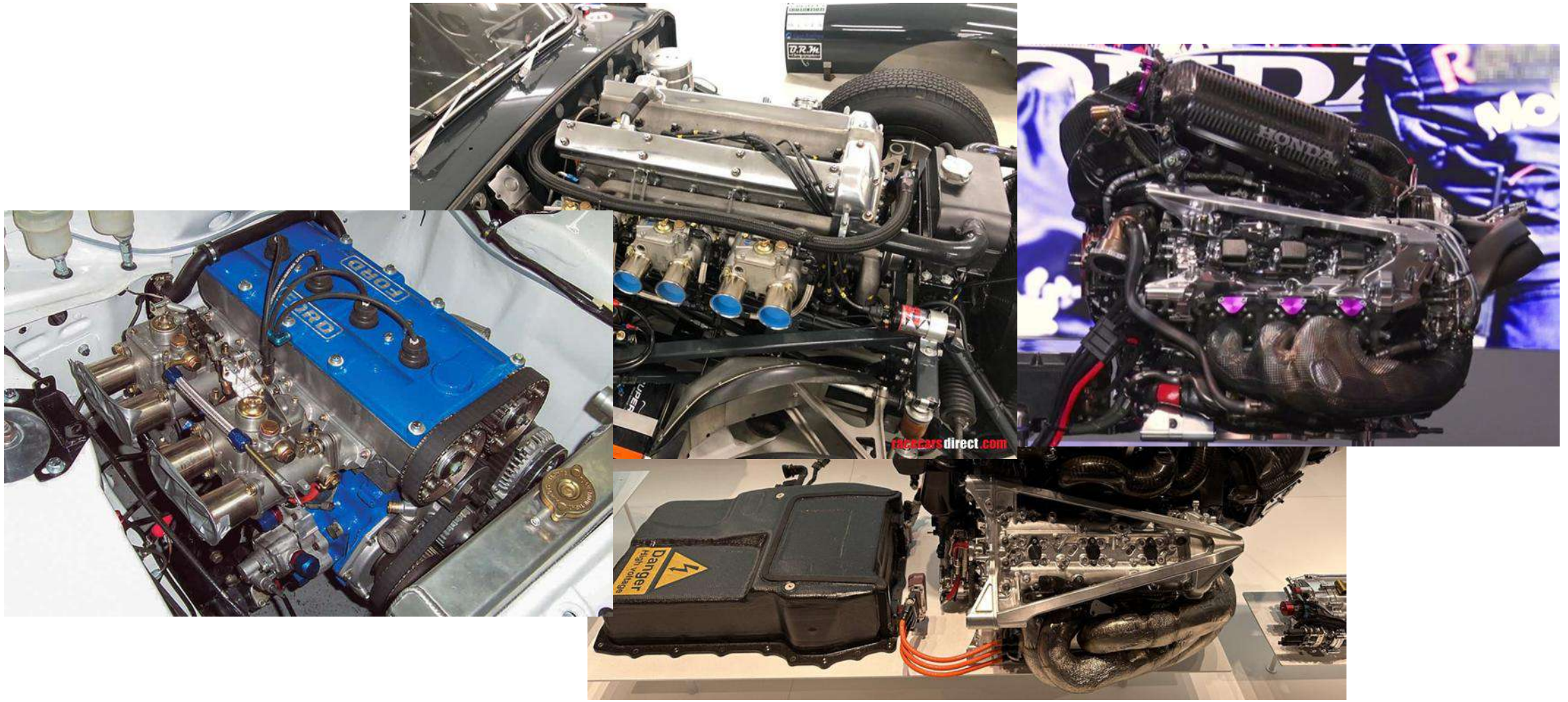
How are these fuels sustainable? By recycling the carbon rather than adding to it …

CO_2 released from "additional" carbon previously locked away
Adds to the CO_2 already in the atmosphere

CO_2 re-released from carbon previously recovered by DAC
Recycles carbon already in the atmosphere



These fuels can be used in classic, contemporary and future engines



Hydrogen is another option but it really depends on where it comes from …

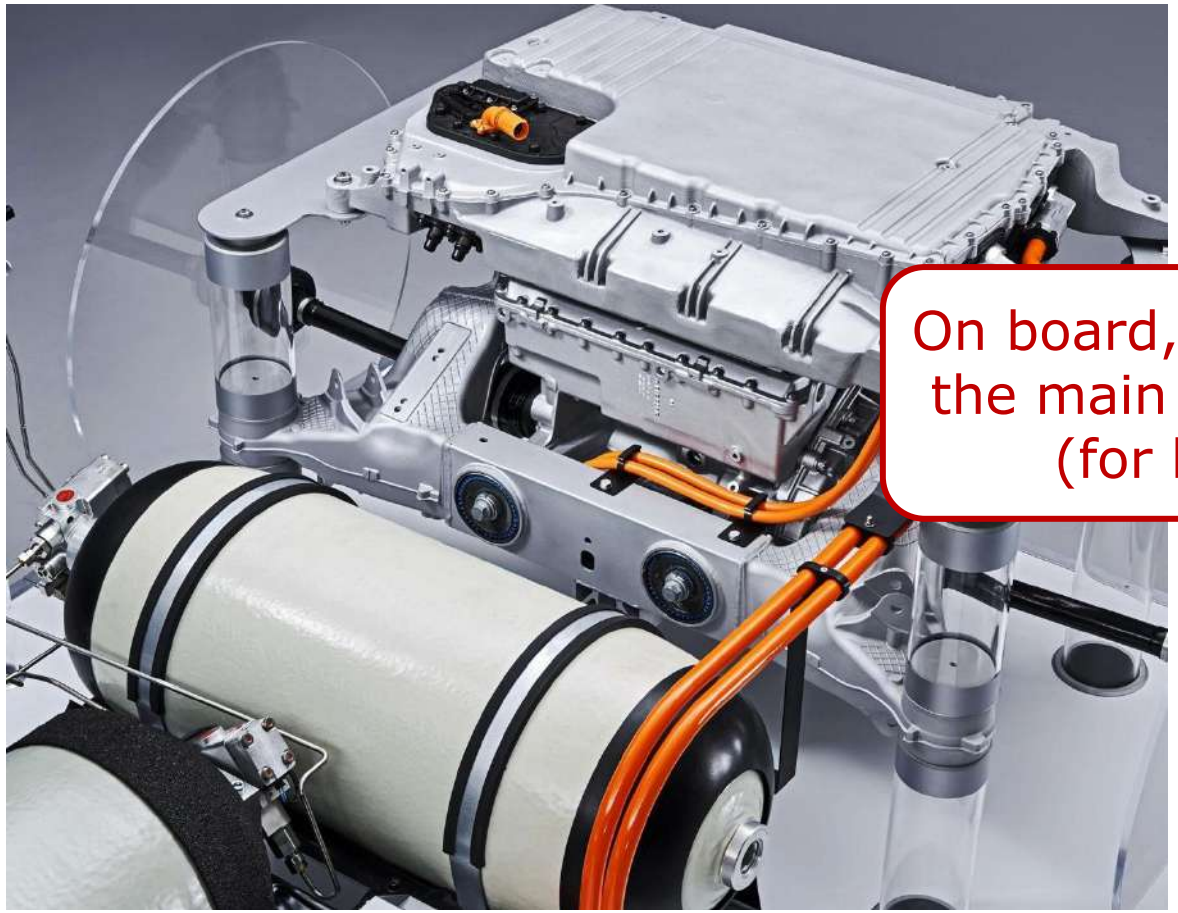
Hydrogen manufactured via steam methane reformation or coal gasification (fossil fuels) which generates large quantities of CO_2

- The CO_2 produced from the manufacture of grey/brown hydrogen is captured and processed or stored

- Hydrogen manufactured from renewable sources e.g. electrolysis using renewable energy

But the energy converter is a blank canvas; both fuel cells and ICEs can have their place in motorsport

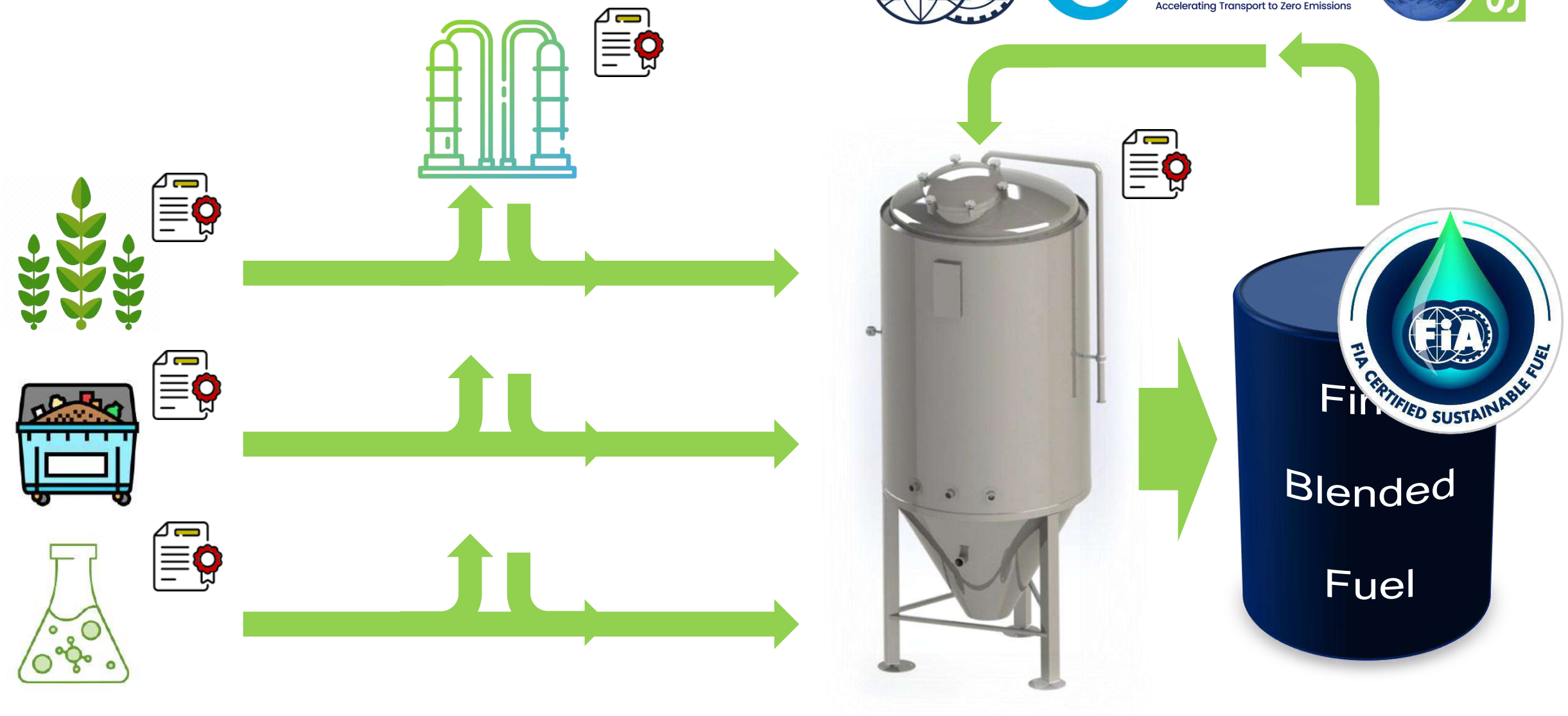
Hydrogen Fuel Cell



Hydrogen ICE

On board, storage is the main challenge (for both)

How do I *know* these fuels are sustainable?



The Sustainable Racing Fuel Assurance Scheme (SRFAS)

Conclusions

- Sustainable fuels can come from a variety of sources
  - They RECYCLE carbon already in the atmosphere
- They have a wide range of applications either as drop-in or bespoke fuels
  - Veteran, Edwardian, vintage and classic cars
  - Classic and contemporary competition cars
  - Future competition engines
- Hydrogen can also be a sustainable fuel
  - Depends on production methods
  - Distribution/transport and storage are significant challenges
  - ICEs and fuel cells are both potential users – will depend on application

BUT

- We need to be sure these sustainable fuels are what they seem
  - The FIA's Sustainable Racing Fuels Assurance Scheme (SRFAS) has been developed to ensure just that

Motorsport offers a golden opportunity to raise awareness of sustainable fuels whilst reducing our own GHG emissions

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