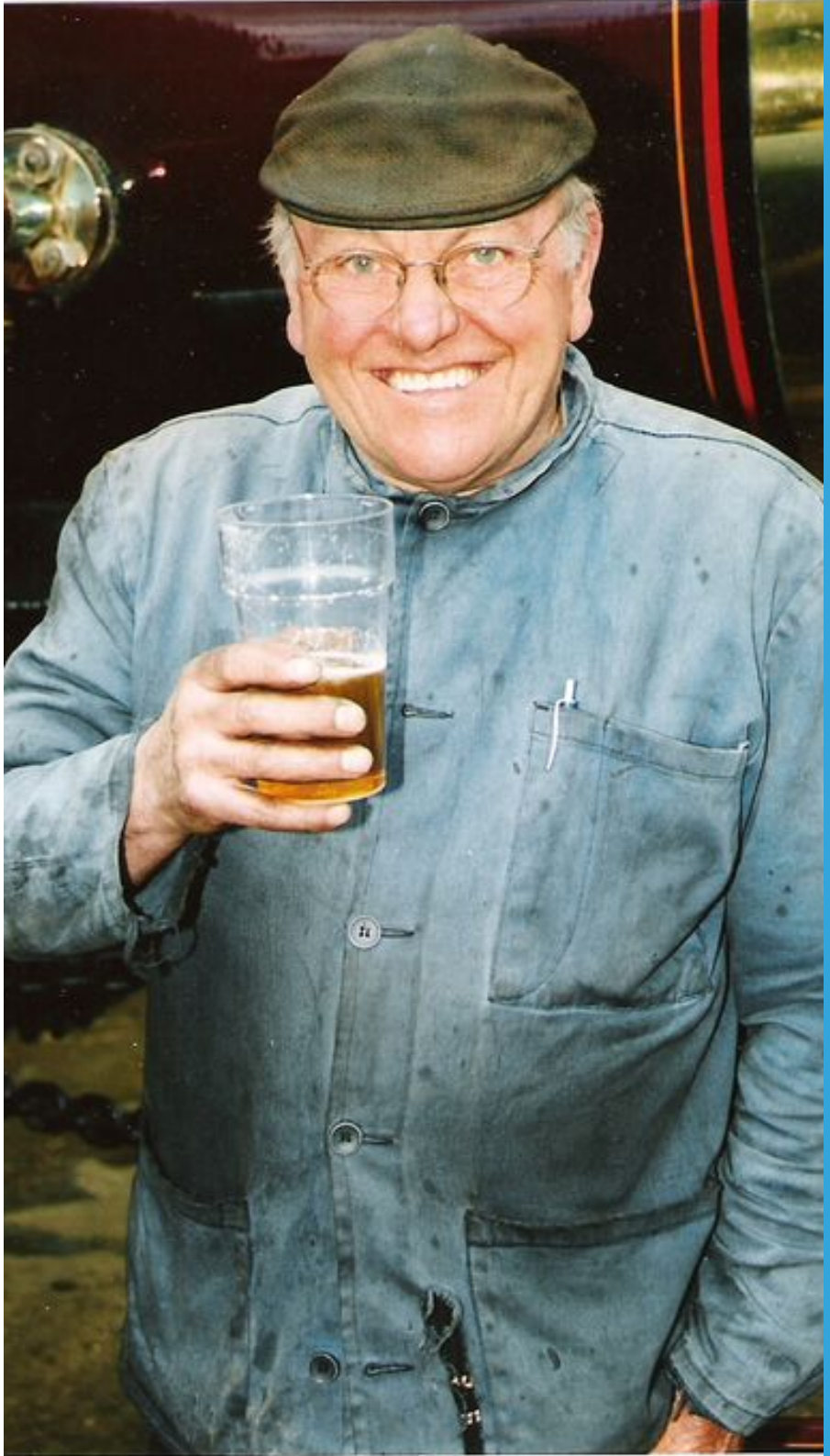
RISK ANALYSIS

AUTOMOTIVE



AUTOMOTIVE ENGINEERING

Engineering Efficiency



MOTORSPORT ENGINEERING

We Went Racing...



MOTORCYCLE ENGINEERING

Are We Gone . . . ?



WHY?

Nice One Boris!


THE
FUEL
DEBATE
NO PETROL OR DIESEL BY 2035
WHAT NOW?

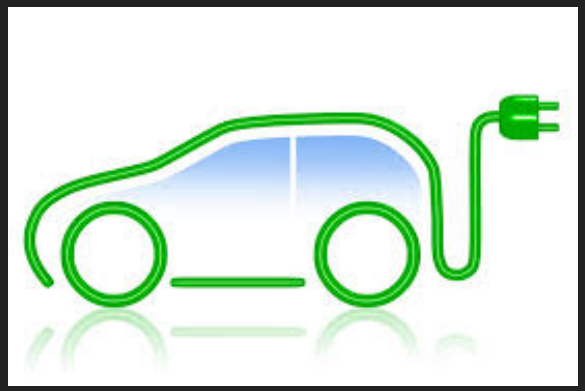


ALL ELECTRIC?

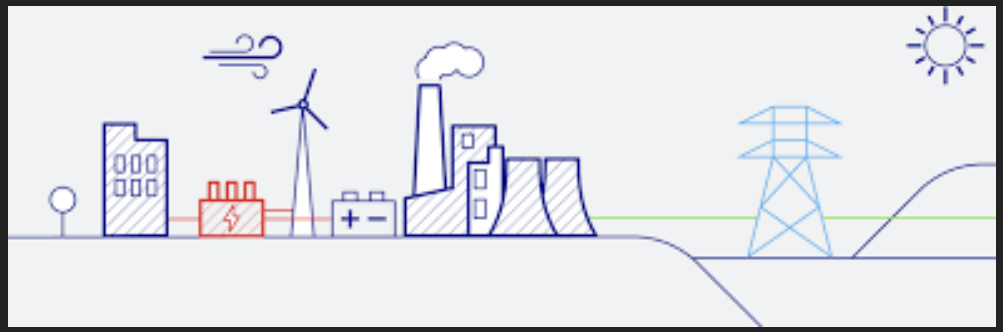
Actually NO!

But we need to be careful what we say about the future!

WHAT ARE OUR OPTIONS?









WIRED on Energy

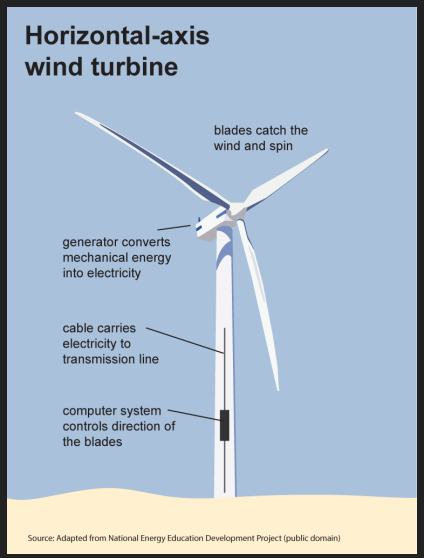
The spiralling environmental cost of our lithium battery addiction

As the world scrambles to replace fossil fuels with clean energy, the environmental impact of finding all the lithium required could become a major issue in its own right



GENERATION?





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environment and energy

ENVIRONMENT AND ENERGY | FEATURE

Biomass energy: green or dirty?

08 Jan 2020

Taken from the January 2020 issue of *Physics World*. Members of the Institute of Physics can enjoy the full issue via the *Physics World* app.

The conversion to biomass energy has played a key role in reducing our dependence on fossil fuels. But is this renewable energy source really as green as we first thought? Kate Ravilious investigates



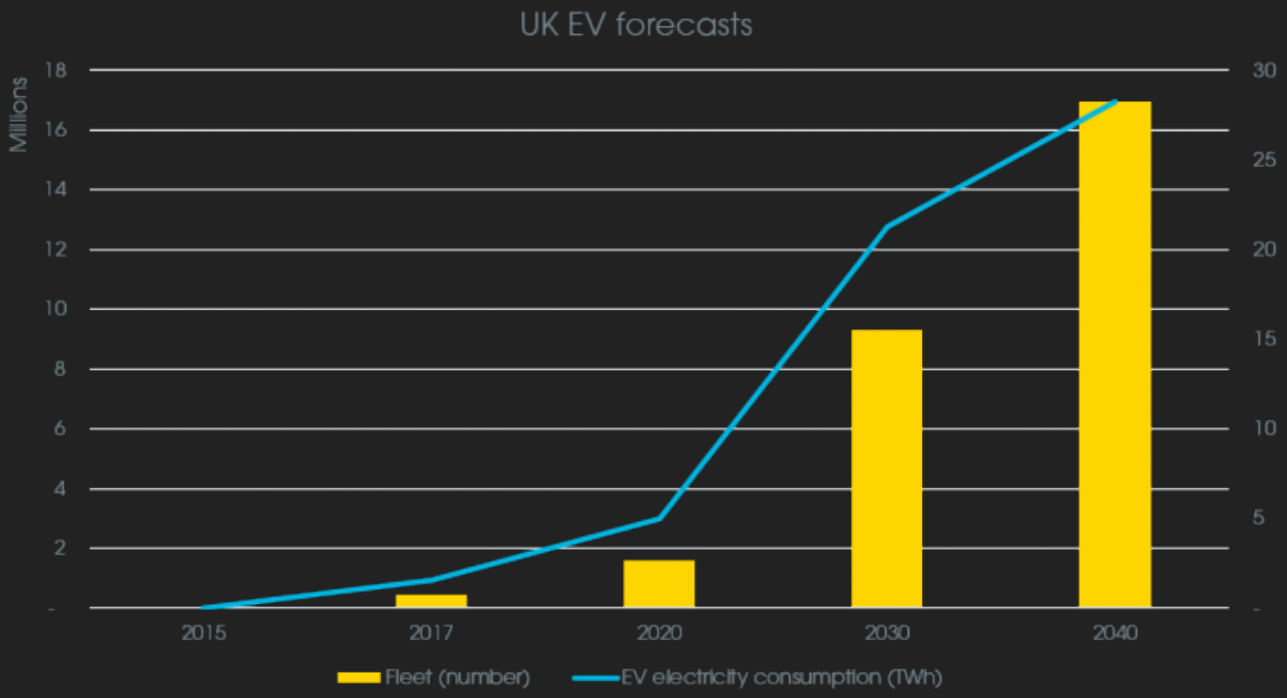
INFRASTRUCTURE?

What we are proposing:

50 locations	Cost: £0.5bn – £1bn
50 strategic motorway service locations will allow 95% of drivers in England and Wales to be within 50 miles of a charging station, regardless of their direction of travel.	**50 future-proof, high powered grid connections** will cost: £0.5bn – £1bn. This equates to 66p per car per year over the life of the assets.

How could this be paid for?
Conversations are required across industry and Government departments to agree the best way forward. Options include:

Private sector	EV drivers to pay a premium for ultra-rapid charging on the motorway
Via tax	Government funding through department budgets or other allocated pots
Drivers	Through vehicle excise duty or car tax
Electricity bill-payers	As part of wider network costs



nationalgrid



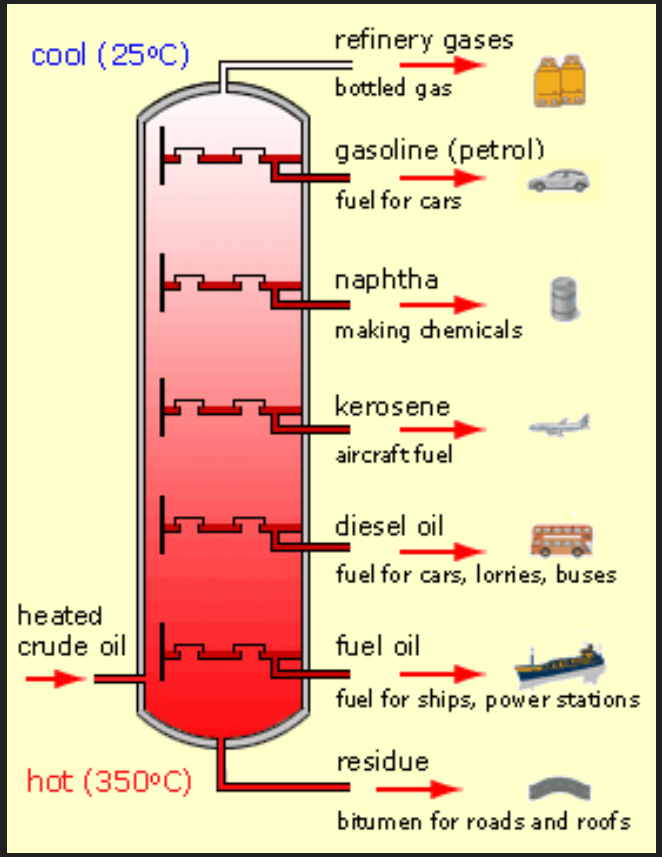




WHAT'S LEFT?

Fuels for the Future!

COMBUSTION ENGINES?





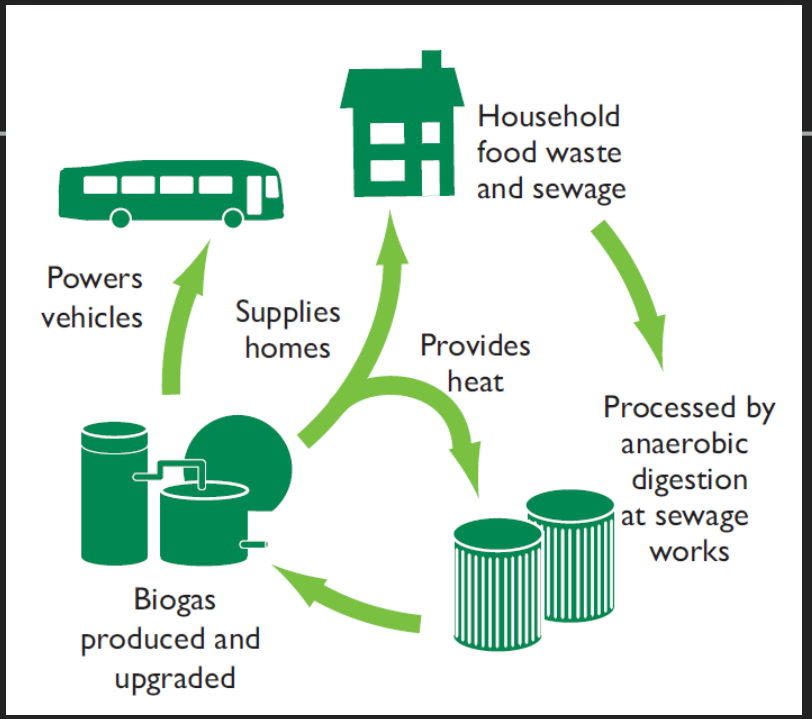
KEROSENE?

LPG BANNED OR NOT? 2035



COMBUSTION ENGINES?

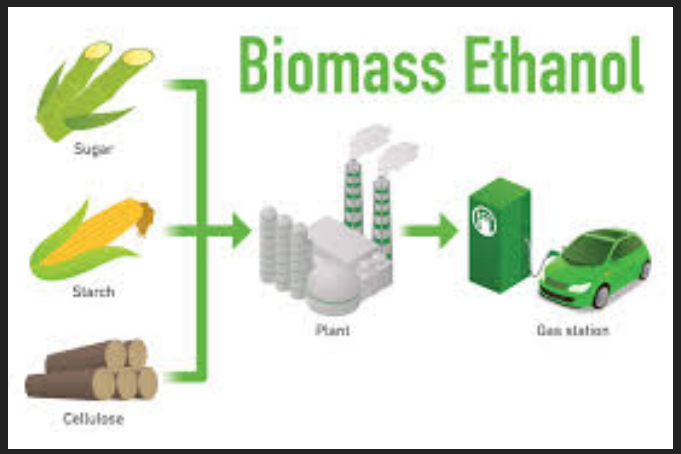




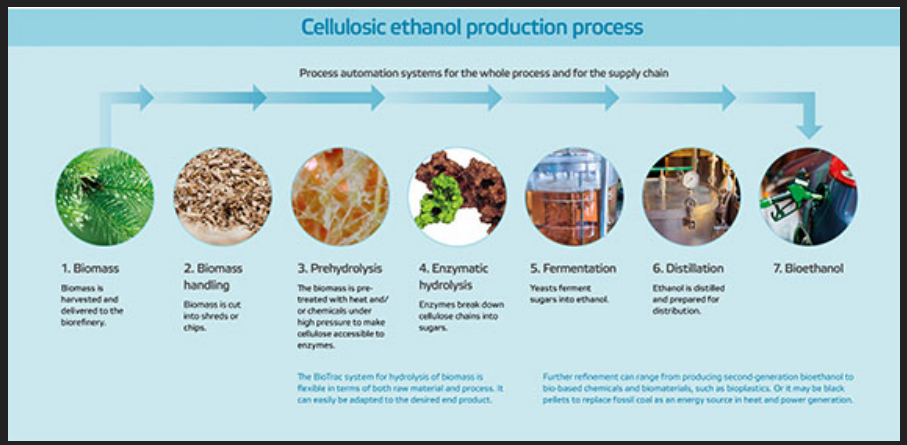
CNG / BIO-METHANE BANNED? 2035

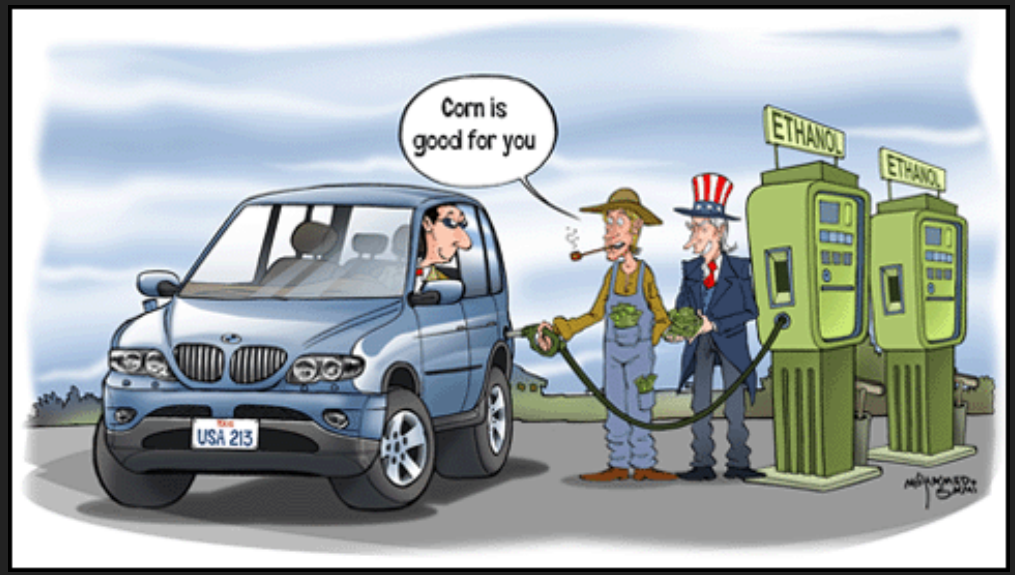


COMBUSTION ENGINES?





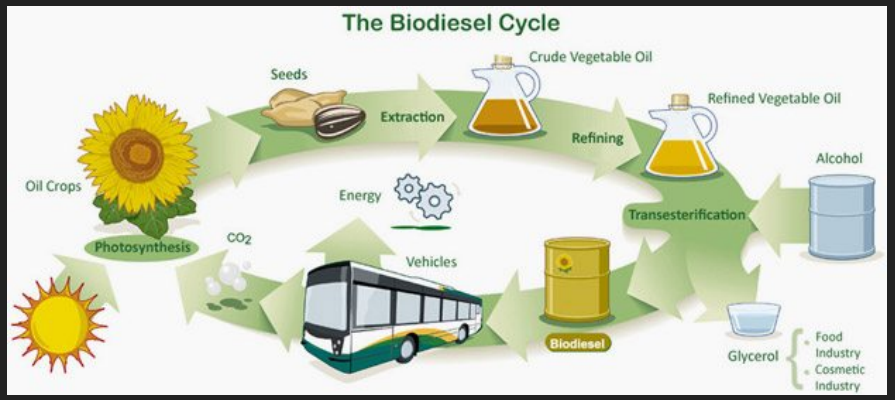




COMBUSTION ENGINES?









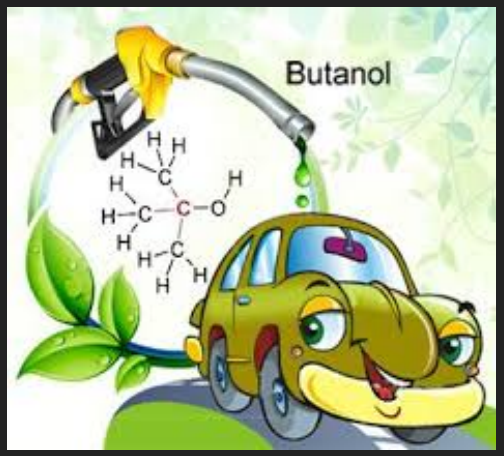




COMBUSTION ENGINES?

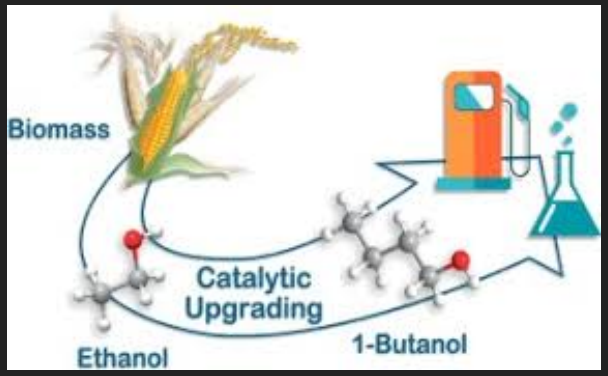


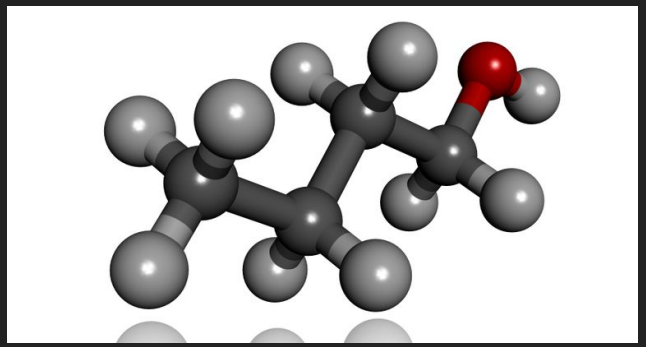












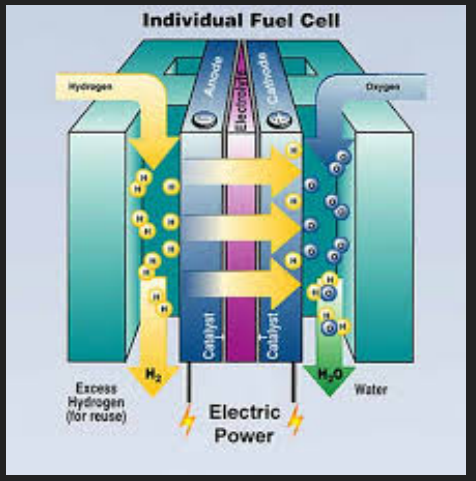


HYDROGEN?

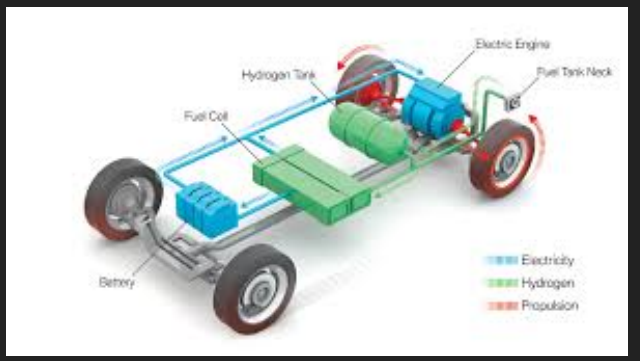
Fuel Cell or Combustion!

FUEL CELL EV?


FCV CONCEPT

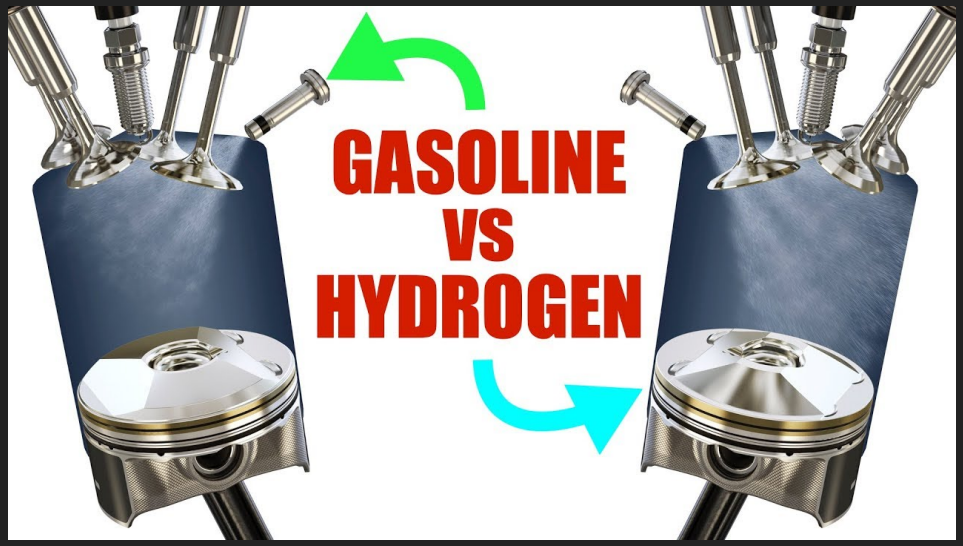

Individual Fuel Cell
Hydrogen
Anode
Electrolyte
Cathode
Oxygen
Catalyst
Catalyst
H_2
H_2O
Excess Hydrogen (for reuse)
Electric Power
Water




Electric Engine
Hydrogen Tank
Fuel Tank Neck
Fuel Cell
Battery
Electricity
Hydrogen
Propulsion

COMBUSTION ENGINES?







COMBUSTION ENGINES?

Mobility

Synthetic fuels – The next revolution?

8 min

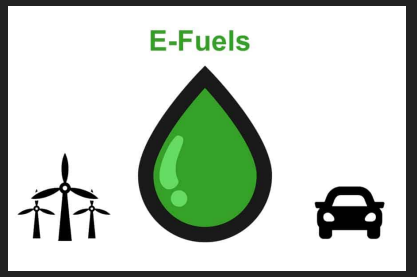


“Synthetic fuels can make gasoline- and diesel-powered cars carbon-neutral.”

VOLKMAR DENNER, CEO

COMBUSTION ENGINES?

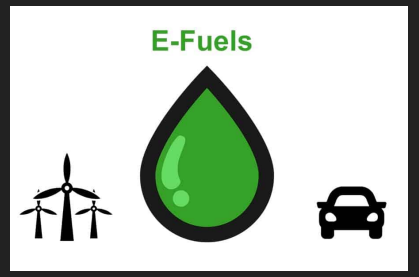
E-FUELS

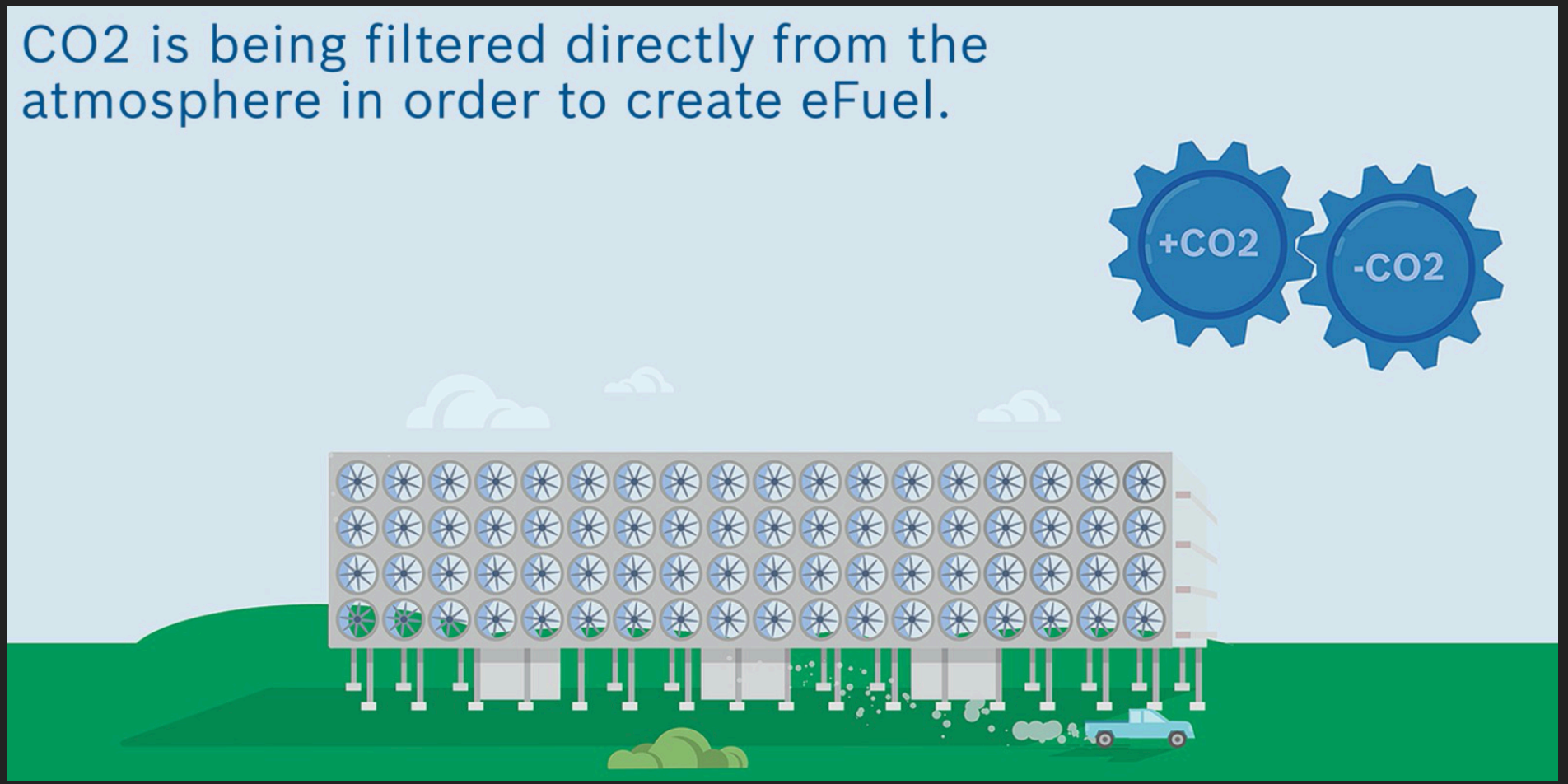




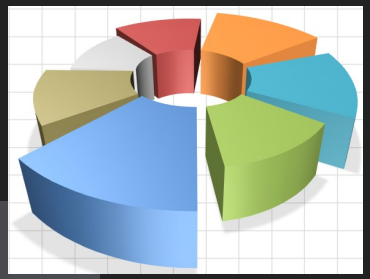
COMBUSTION ENGINES?

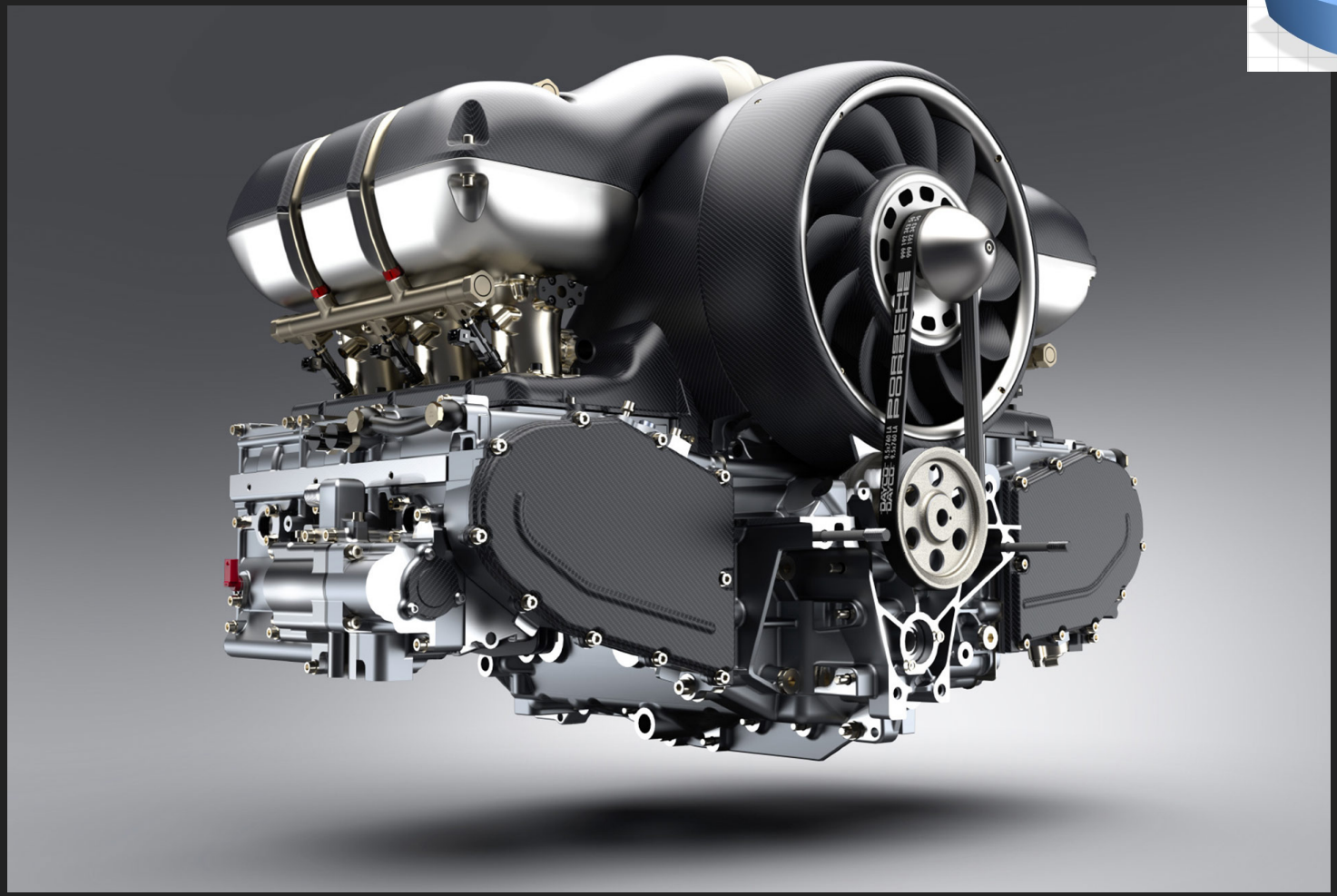
E-FUELS





COMBUSTION ENGINES?





FAR FROM EXTINCT!!!



Promote Electric Vehicles

But remember…

Alternative ‘Green’ Fuels

Clean Motorsport

Automotive Engine Innovation

PROMOTE OUR GREEN CREDENTIALS