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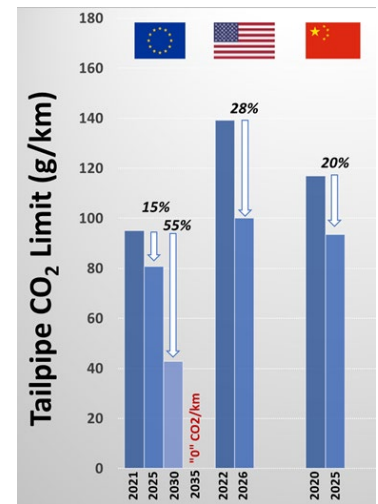
### Regulatory Update

#### Effective ICE ban in Europe starting 2035, CO<sub>2</sub> targets confirmed

The EU Council [voted](#) in favor of the Fit-for-55 proposal, requiring a 55% reduction in tailpipe CO<sub>2</sub> emissions from cars and 50% reduction for vans by 2030, relative to 2021. By 2035, new cars and vans will have to be zero tailpipe emitting, which is effectively a ban on internal combustion engines. There is still a provision to allow for carbon neutral fuels after 2035 and an interim assessment of the feasibility in 2026.

#### Euro 7 proposal delayed

Publication of the Euro 7 proposal was expected in July, but it has been delayed to later in the year. As per the [latest](#) information on this topic, it is now moved to a meeting held by the Commission on October 12<sup>th</sup>.



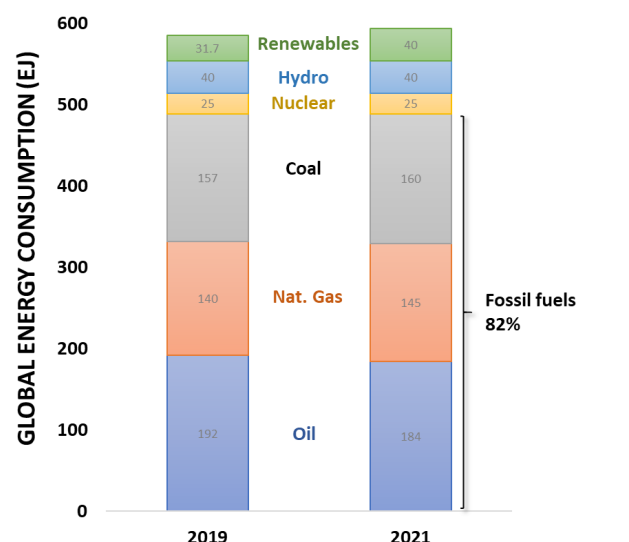
#### US Supreme Court rules against EPA on emissions from power plants

Reducing greenhouse gas (GHG) emissions from the power sector is a crucial tool for fighting climate change, and only gains in importance as transportation gets electrified. However, the US Supreme Court has [sided](#) with W. Virginia, a coal producing state, in questioning the extent of authority granted to the EPA in regulating greenhouse gases from power plants and encouraging a move to renewable energy sources.

#### BP Statistical Review of World Energy published

BP has [published](#) its annual review of world energy. The impact of Covid on energy demand seems behind us – world primary energy consumption in 2021 was up 1% compared to 2019 (after the significant drop in 2020). More than 4/5<sup>th</sup> of the energy was derived from fossil fuels, and the 4% reduction in oil-derived energy was substituted by coal and natural gas. Solar and wind accounted for ~ 7% of the energy consumed.

CO<sub>2</sub> emissions associated with energy had reduced by ~ 6% in 2020 (Covid) and in 2021 they bounced back to near-2019 levels (only 0.5% lower)



Source: BP Statistical Review of World Energy

## Electrification / Batteries

### Battery capacity in Europe projected to 1,100 GWh by 2030

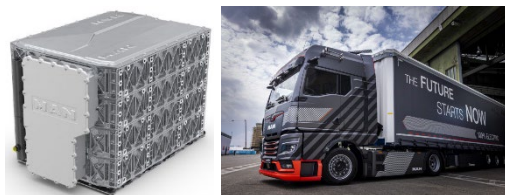
A new report from the Faraday Institution shows that the battery production capacity in Europe could reach ~ 1.1 TWh by 2030, with about half of it already open or under construction. To put this number in perspective, converting 100% of European new car sales (~ 12M vehicles) to electric and assuming 80 kWh battery pack will require 720 GWh of batteries. More would be needed for heavy-duty vehicles, consumer electronics and energy storage. The bottleneck will likely shift from manufacturing to raw material availability.



### MAN battery plant to support e-trucks and e-buses

MAN Truck and Bus has invested ~ €100M to manufacture [batteries](#) for its electric trucks and buses at a new production facility in Nuremberg. The plant will produce > 100,000 batteries per year.

MAN will start serial [production](#) of heavy-duty e-trucks (range of 600 – 800 km) and e-buses starting 2024.



### Megawatt Charging System (MCS) demonstration

A prototype Megawatt Charging System (MCS) was unveiled by [CharIN](#), along with a demonstration on a Scania electric truck at the International Electric Vehicle Symposium in Oslo, Norway. Megawatt charging will be a critical technology enabler for long-haul trucking and off-road sectors. The MCS aims to develop a worldwide standard with DC fast charging connectors, designed for charging voltages of up to 1,250 volts and 3,000 amps.

The MCS is being added to new trucks already - Mercedes-Benz Trucks will [unveil](#) its first long-distance electric truck with the megawatt charging capability. The truck is projected to have a range of 310 miles and could be charged to 80% in under 30 mins using MCS.



### Daimler liquid H2 truck

Daimler Truck is [testing](#) its Mercedes-Benz GenH2 fuel cell truck which will utilize cryogenic liquid H<sub>2</sub> stored in two 40 kg tanks at - 253 °C. The higher energy density (relative to gaseous H<sub>2</sub>) is expected to give the truck a range of up to 1000 km. Other than the on-board storage, also being demonstrated is the refueling infrastructure for liquid H<sub>2</sub>. Next, Daimler Truck and Linde are working on “subcooled” liquid hydrogen, “sLH2 technology, a new process which would enable even higher storage density and easier refueling.



## Low carbon fuels

### Cargill biodiesel plant

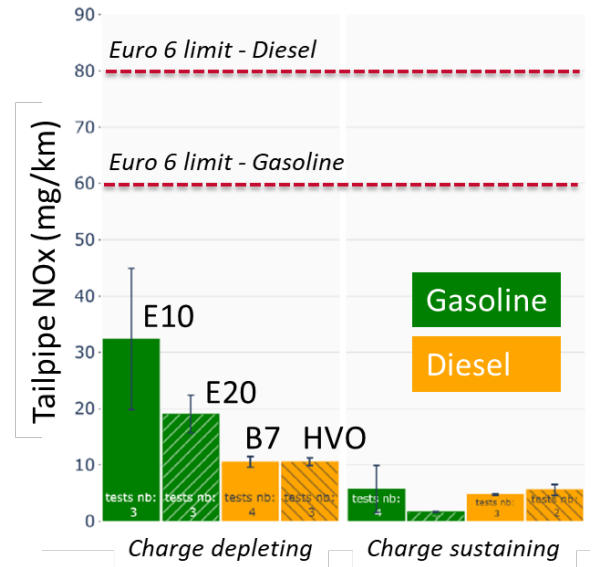
[Cargill](#) has completed one of the largest waste-to-biofuel facilities in Europe. Starting with waste cooking oil, tallow and residues from edible oil production, the Belgian plant will produce up to 115,000 metric tons of biodiesel per year.

### Neste renewable fuels

Neste [increased](#) its investment into renewable fuels and feedstock for polymers and chemicals. A new unit will enhance the renewable production from 1.4 to 2.7 million tons per year, starting 2026. Including other production, total capacity is expected at 6.8 million tons by end of 2026.

### Plug-in hybrids with renewable fuels deliver WtW CO2 reduction while also meeting potential Euro 7 limits

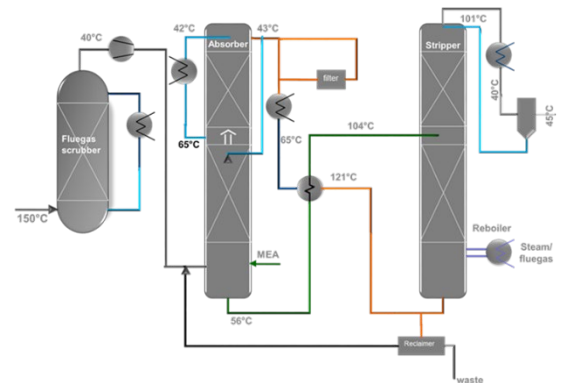
CONCAWE has [published](#) the results of a study to measure real-world fuel consumption, GHG and criteria pollutant emissions from two Euro 6d plug-in hybrids - one gasoline and one diesel - running on regular and renewable fuels. Gasoline fuel was changed from E10 to renewable E20, while diesel was changed from B7 to 100% renewable HVO. There was almost no change in CO2 emissions from a tank-to-wheel basis in both cases (a significant reduction is expected from a well-to-wheel basis). Compared to a hybrid, the gasoline PHEV was found to reduce fuel consumption by 34% if charged once in 3 days and 69% if charged daily (the electric range was ~ 55 km), highlighting the sensitivity of the benefits to charging behavior. Moreover, both NOx and particulates were found to be well below Euro 6 limits due to the advanced after-treatment systems (including GPFs for gasoline).



## Other decarbonization technologies

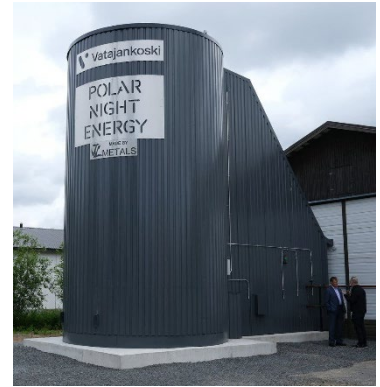
### World's first - CO2 captured and used for sodium bicarbonate production

Tata Chemicals Europe opened UK's first industrial scale carbon capture and utilization [plant](#). 40,000 tons of CO2 will be captured annually from emission stacks from a combined heat and power (CHP) plant. Absorption is done using amine-based fluid, while CO2 release utilizes steam from the CHP plant. The CO2 is purified to food grade and used as raw material for sodium bicarbonate production. The CO2 captured is equivalent of taking ~ 20,000 cars off the road (assuming CO2 / car ~ 100 g/km, 20K km per year = 2 tons per year).



## Sand batteries

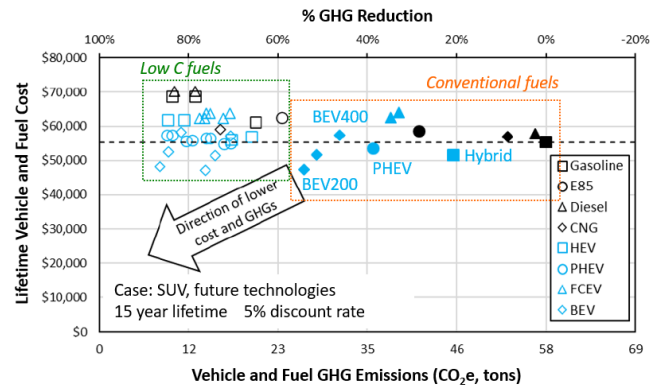
A commercial [demonstration](#) of “sand batteries” has begun in Finland. Excess power is used to heat hundreds of tons of sand (silica particles) up to 500 – 600°C using resistive heating. The stored heat is then used to serve as a backup for the local heating network. In the US, the National Renewable Energy Lab has also looked into this [idea](#), although with the sand temperature targeted at 1200 °C and end goal of converting the stored energy back to electricity (does not sound good thermodynamically).



## CONFERENCES

### ERC Symposium presentations available online

The ERC symposium hosted was by UW Madison, and the presentations are available [online](#). Shown here is a summary of one of the talks by Argonne national lab covering the life-cycle analysis of various powertrains using the GREET model. It shows the potential for deep GHG reductions in the future through a combination of improved efficiency powertrains and advanced low carbon fuels, while also reducing cost in some cases. For an SUV, hybrids and plug-ins were found to deliver 20 – 40% reduction in GHG emissions, while BEVs offer 50 – 60% reduction on a life-cycle basis.



ETH conference held online, read the summary on [DieselNet](#)

### Don't miss these upcoming events ...

International congress on Catalysis and Automotive Pollution CAPoC12, August 29<sup>th</sup> – 31<sup>st</sup>, Brussels, Belgium  
<https://capoc.ulb.ac.be/>

SAE Powertrains, Fuels & Lubricants Meeting, September 6<sup>th</sup> – 8<sup>th</sup>, Krakow, Poland  
<https://www.sae.org/attend/pfl>

Thiesel, September 13<sup>th</sup> – 16<sup>th</sup>, València, Spain  
<https://www.cmt.upv.es/#/thiesel2022>

SAE COMVEC, 2021, September 20<sup>th</sup> – 22<sup>nd</sup>, Indianapolis IL  
<https://www.sae.org/attend/comvec>

Aachen Colloquium on Sustainable Mobility, October 10<sup>th</sup> – 12<sup>th</sup>, Venue TBD  
<https://www.aachener-kolloquium.de/en/>