Oil and Solar: The World's Most Surprising Power Couple

The world moves on fossil oil. However, that's beginning to change – and not in the way you might expect.

Electric vehicles are coming, fast and hard

We are becoming increasingly familiar with electric vehicles. Elon Musk's recent teaser photograph of his Tesla lorry is an example of how road transport is changing. As time goes on, we will begin to see electric aircraft (check out Wright Electric). Of course, electric cars are now becoming mainstream – and Tesla's affordable Model 3 will soon be shipping – slightly a of schedule. At least in this regard, we're starting to see the end of the oil age.

As we've discussed before, commodities are a really important part of this story. We can't legally offer trading tips in *Exponential Investor* – so you'll have to use this link, to get access to our latest research.

Recently, Morgan Stanley added itself to the Bloomberg, in the pool of commentators anticipating a slow roll out of electric vehicles. I don't agree – and I think we're going to transition very quickly. You can clearly see evidence for this, such as in the reservations data from challenger brands like Tesla. The pace of adoption of electric technology by "big auto" is also stunning. Ford is predicting 70% of its Chinese sales will be electric by 2025.

But what of the trickier applications?

Long-distance transport is very difficult to decarbonise. Long-haul aircraft and ocean-going ships need high-energy fuels. Batteries just won't cut it, for endurance applications. Recent research from the Massachusetts Institute of Technology (MIT) has given hope for a new generation of fuels, which don't rely on extractive industries. Instead, these fuels will obtain their carbon from the air, or from smoke stacks. (Of course, I wouldn't bet on the latter being around for very long.)

To give us a source of CO_2 long term, we'll need to pull it out of the air – before turning it into something useful. One firm working on this is Climeworks – and it has just got going, on its direct air capture CO_2 project. This machine pulls carbon dioxide out of the air, and sends it to paying customers. The firm's first sale is to a commercial greenhouse. The plants in this greenhouse grow faster, because they benefit from a CO_2-rich atmosphere.

CO_2 capture technology is likely to go a long way beyond greenhouses – and there's been some very important new research from MIT – which is all about turning CO_2 into fuel *directly*. The CO_2-to-fuels idea is simple, but the execution is difficult.

Here's how it works

Hydrocarbon fuels – gas, oil, etc – combust to water and carbon dioxide. If you want to make fuel, you can reverse the combustion process by splitting up the water, or the CO_2. Regardless of whether you start with water, or CO_2, the process consumes energy. The end result is a usable chemical feedstock – the basis for a new set of chemical fuels.

Previously, in *Exponential Investor*, we've covered a technique that turns sunlight directly into chemical energy by splitting water, to make hydrogen. Tearing apart carbon dioxide is essentially the opposite chemical approach. You take carbon dioxide from the air (as Climeworks or Carbon Engineering do) and use the energy in sunlight to split the molecule into parts – specifically carbon monoxide, and oxygen. There's no electricity in this new MIT process – and it works directly, using only sunlight. The clever bit is that they use a catalyst, to speed the process along. In this case, it's a chemical created by binding titanium to organic compounds. This might sound a bit nerdy, but it's incredibly important…

Sunlight-to-fuels would be transformational

In the early 20th century, the world got very good at industrial chemical processes. It's thus pretty easy for us to turn a chemical into another. With a source of cheap CO_2, and a cheap way of putting in the solar energy to split it up, an economically viable sunlight-to-fuels process is just around the corner.

Instead of having an energy economy that relies on dead-end fossil fuels, or on short-haul battery technology, we can move to a fuel and transport environment that employs *sustainable* chemical fuel supplies.

We have a difficult journey a to turn MIT's impressive chemical innovation into a commercially viable process. But the end of the fossil age needs not be the end of convenient liquid fuels for transport. Furthermore, chemical fuels can be stored safely for long periods of time. This gives us the ability to get through dark, cold winters with ease – as well as surviving other interruptions to

energy supplies. We can already do this (see for example, ITM Power) but using sunlight directly is a crucial way to make the process cheaper, and simpler.

This MIT trick gives us new hope for a sustainable, advanced industrial economy

Watch this space – it's going to be one of the most interesting technologies in the coming century. Presently, the jury is out on whether water or CO_2 will be the feedstock of choice for solar fuels – and it's something we'll be keeping a careful eye on in *Exponential Investor*.

While you're waiting for sunlight-to-fuels to take off, why not profit from the commodities behind the electric car boom? Find out how you can profit from "white diesel".

Feedback, as always, to: andrew@southbankresearch.com.

Best,

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