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DEEP DIVE SESSION 2: HYDROGEN SOCIETY – SCRIPT

BY THIEBAULT PAQUET, DIRECTOR, FUEL CELL BUSINESS GROUP & POWERTRAIN R&D, Toyota Motor Europe

Earlier, Dr Van Zyl talked about the EU's Green Deal.

It's the boldest environmental plan in the world.

Backed by significant funding, it aims to create a better future – environmentally and economically – with hydrogen playing a central role.

This is commonly known as 'The Hydrogen Society'.

The way we generate and use energy is changing dramatically.

In the coming years, the world will continue to reduce its dependence on fossil fuels, instead, increasing the use of energy generated from renewable sources.

Markets will change.

Driven by changing customer behaviour and regulation, businesses will reinvent themselves to be part of the new future.

At Toyota we want to help build this whole new way of life,
fuelled by a sustainable energy supply.

But why then a Hydrogen Society, some wonder,
rather than simply rolling out more battery technology and expanding the grid?

Of course, batteries and electricity should be used wherever it makes sense.

But when you look at the big picture,
you find that most of the renewable energy sources are intermittent in nature.

Meaning that electricity is not always produced when you need it
and where you want it.

electricity needs to be stored in large quantities,
over long periods of time,
from one season to another.

Batteries cannot do that.

And, in many cases, hydrogen is simply a better way,

So, we need both electricity and hydrogen.

And this is recognised by energy providers, industry and politics.

In addition, there are areas in the world
where renewable energy is, and will be, more abundant.

This renewable energy can be transported

from one region to another when conveniently stored in hydrogen.

Furthermore, some applications and sectors are really very difficult to decarbonise, where electricity or batteries are simply not a solution.

Take steel production for example.

Today, the extraction of iron from ore generates huge amounts of CO₂.

Tomorrow, green hydrogen can actually replace the cokes needed in the conventional process.

With this in mind, it is easy to understand why the EU is significantly investing in infrastructure for green hydrogen.

So, hydrogen will definitely come, and it underlines why Toyota remains strongly committed to the ongoing development of fuel cell technology and vehicles.

Today we're commercialising our 2nd generation fuel cell technology in the shape of the new Miraa.

This impressive car comes with 30% more range and a lighter, more compact stack with a higher power density. And, at a 20% lower price than the outgoing model.

The base price in Germany is now 64,000 euros. And it comes with a 650km range.

A battery-electric car, with a 100kWh battery for a similar range, costs 77,000 euros.

The Mirai, takes just 5 minutes to refuel.

Whereas the battery-electric car will take minimum 1 hour with a supercharger, and more than 50 hours with a home charger.

There are many other applications, that can benefit from hydrogen and fuel cell technology, to decarbonise.

Good examples are heavy duty vehicles, where high load, long range and extended operation are the norm.

Here, hydrogen will deliver the desired benefit of zero emissions with very fast refuelling which avoids the long periods of downtime that a battery-electric alternative would need.

These large vehicles will also have an important role to play in infrastructure sustainability.

[PAUSE]

So, the benefits are clear.

That's why we expect our global sales of fuel cell systems to increase by a factor of ten in the short term, and why we've dramatically increased our production capacity.

Now, having explained the benefits of hydrogen and fuel cell technology, and how it can be used to reduce CO2 on a wider basis, it shouldn't be a surprise to hear that we are already transferring our know-how to other applications.

My colleague Freddy Bergsma will give you an overview

of how we are making our fuel cell technology available beyond Mirai.

**BY FREDDY BERGSMA, SENIOR MANAGER, FUEL CELL BUSINESS GROUP,
Toyota Motor Europe**

Thank you, Thiebault.

The beauty of Toyota's fuel cell technology is,
that it's highly transferable.

Our compact fuel cell modules
are already being used in a variety of large vehicle applications.

For example, in Japan, we have introduced the Toyota Sora bus.
And, in Europe, our fuel cell technology is installed in buses
produced by our partners at Caetano, in Portugal.

In the US and Japan, we are demonstrating how our technology is adopted in trucks.

And the story goes well beyond trucks and buses.

For instance, these forklifts are powered by hydrogen fuel cells.

We're also testing our technology in trains,
and integrating it into boats ...

Last but not least, we're piloting our modules in generators,
to provide power at factories, large events or in case of emergencies.

So, what about the cost?

Toyota has a strong track record in steadily reducing the cost,
of new environmental technology,
as can be seen by our ability to make hybrids affordable for all.

The new Mirai provides us with a large base volume,
that delivers increased economies of scale.

Furthermore, taking advantage of our latest technology,
we have developed improved modular systems
for use in a wide variety of applications.

This approach allows for the standardisation of key components,
which again, results in lower costs.

Some people ask us,
“Should we then wait for a few years,
before implementing the latest technology?”

I have a simple answer.
Decarbonisation is inevitable,
there is no turning back.

In such case, the smart thing to do,
is to get started, move fast and be first.

Toyota is leading the way by investing strongly in Hydrogen Society.

We invest in next generation fuel cell vehicles.

We invest in opening new markets and new applications.

We invest in additional production capacity for fuel cell stacks

And, we invest in our organisation, right here in Europe.

To support the rapidly-expanding interest in hydrogen technology, we have established a dedicated Fuel Cell Business Group in Brussels - with commercial, engineering and module assembly responsibilities.

So we are ready, and our technology is ready, for an increasing number of customers and partners, that are inspired by the future Hydrogen Society.

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Thank you, Freddy.

As we add new applications the business case for fuel cells becomes stronger and The Hydrogen Society comes closer.

But what can we do to get there sooner?

The key to accelerating progress, is building scale and momentum in key areas, and then widening from there.

And that suggests a focus on hydrogen 'clusters', or eco-systems, in the short term.

A cluster can grow from a critical mass of infrastructure – linking hydrogen suppliers and consumers –

Fleets of taxis, buses and commercial vehicles,
can be concentrated around hydrogen infrastructure.

The use of hydrogen in other applications – like generators – can complement this.

This concentration will drive the demand for hydrogen
and make the hydrogen infrastructure viable, as scale brings down cost.

And then this in turn will attract more hydrogen consumers,
and we enter a positive spiral of further demand growth and lower prices,
which gradually brings hydrogen into the mainstream.

The first hydrogen clusters, are already expanding across Europe -
for example, around Paris in France, or Hamburg in Germany where
industry partners are working with federal and local governments to move things
forward.

In the Netherlands, Poland and the UK, we see similar developments.

All around Europe there is strong momentum building for hydrogen.

So, the big question is:

“How can we build on this momentum?”

Toyota will deliver its leading fuel cell solutions,

- in our passenger cars of course -

but also in other applications

like buses, commercial vehicles, stationary power,

and a number of other areas.

We'll also be working closely with industry partners and governments,
to help stimulate the development of hydrogen ecosystems, in more places.

Today we can really feel the momentum for hydrogen growing.

Every day there's a new,

significant announcement that involves fuel cell technology.

The costs are reducing, applications are multiplying

and infrastructure is rapidly expanding.

And Toyota is at the forefront of this movement.

So we will continue to strongly work,

with industry partners and governments,

to deliver 'The Hydrogen Society' for the better of all.

Thank you for your attention.