



# **Capital Markets Day 2022**

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# **Mobility Transformation: Capturing the Emerging Growth in Fuel Cells**

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## **Agenda**

Very good. Thank you. So I'm back and let's go now back to the future. So for the one that was part of the 1980s, that might still mean something. So let's now talk about another part of mobility transformation, which is called fuel cells. And actually, this is a business that may be flew a bit under the radar here may be in your view at Umicore, but it's a business actually where we are pretty successful in it.

And right now, we would like to explain a bit more on what we are doing here at Umicore and why we think that fuel cells, especially towards the end of the decade and definitely beyond, will be an important business for us, an interesting business and that we're starting from an excellent position today.

## **1. Mobility Transformation Driving Exponential Growth in Hydrogen Fuel Cell Catalysts**

### **PEM Catalyst Market to Witness Exponential Growth Towards 2040**

So in good tradition, let's start with the market because that's where everything begins. In general, one can say that there's a strong regulatory support, both in Europe and APAC for a hydrogen economy. And we have carefully studied the full value chain, the hydrogen value chain, and we came to the conclusion that for Umicore, the area where we want to play, the area where we want to capture the value and where we think the value is, which is also very close to what we know very well, is actually the proton exchange membrane fuel cell catalyst. And I will abbreviate that throughout the presentation, just fuel cell catalyst, but then I'll be talking about this specific type of catalyst.

And if we now have a look at the markets, the market's already 7 tonnes today, small, but yet it's already on a tonne scale. It's growing to 90 tonnes in 2030. And we see that the heavy-duty vehicle section is the largest portion, typically long-haul, heavy-duty vehicle. So the big loads stuff. But there's also a light-duty vehicle and there will also be green hydrogen electrolysis.

## **2. Umicore's Fuel Cell Activity Well Positioned to Capture Emerging Growth as Leading Fuel Cell Catalyst Provider**

### **Capture Emerging Growth as Leading Fuel Cell Catalyst Provider**

*Where to play*

Now, if I start off by explaining where we are and what we are going to do in fuel cells. So we intend to capture the near-term growth in fuel cell mobility. So the mobility section, as you saw in the market is the biggest section. And that's also where we are strong today. We are going to capture that growth both in the long-haul, heavy-duty, but there's also mid-duty and light-duty out there. We are going to further expand our footprint, our production footprint, and we're going to maintain our technology leads and further develop for the next generations.

There's also adjacent markets and adjacent opportunities. And for us, clean hydrogen electrolysis is an adjacent opportunity and we will use our knowledge or developments from the mobility segment, yes, there it is, also for these adjacent markets.

So here as well, we want to be a reliable transformation partner and I'll make it concrete for our fuel cell business. And we are going to work on our footprints and our processes.

### **Capture Emerging Growth as Leading Fuel Cell Catalyst Provider: Building Customer Cooperations across the Value Chain**

*Focus on customer intimacy to further grow customer base*

So reliable transformation partner. We all, and everybody probably has a different view on how the future will look from mobility. Yes, there will be electrification. Yes, there will be combustion engines. Yes, it will differ regionally, but there will also be fuel cells and they are complementary, for instance, to battery electric vehicles, especially in the heavy-duty segments. So, also, our heavy-duty vehicle customers see this, that we now also have the fuel cells; hence we have, of course, the battery electric vehicles in our portfolio.

*30 years of experience in fuel cell catalysts, serving the full value chain*

We're in this business since 1990. So over 30 years, we even have been in MEA production. So we did that around 2006 and we left actually, again, that space a bit later on because we felt actually, this is nothing for us. This is not where we want to be. I think we think the value is more on the PEM fuel cells. I would even say more.

If you would look at the value chain today, we see that our customers, the OEMs actually want to move upstream. They want to design their own plans, their own stacks, their own cells, and design their own MEAs and even CCMs. So our strategy is to work with all actors in the value chain. So we are working with the OEMs, we are working with the cell makers, with MEA makers. So really we try to tune our products and function of the components or the design that our OEMs are having. So we're listening to our customer and the customer says, 'You focus on the chemical side. That's where you are strong. That's where we need you. We'll do the assembly, the design. That's where we are strong.'

We also have focused very early on partnering and developing actually fuel cell technologies together. And we did that successfully with Hyundai motor company. And that's why we're already at mass production scale also here in this field and we have a sizeable plant in Korea.

Now, we also have news today, and you might have read it already, is that we're going to make another investment. Beside our footprint in Germany, in Korea, we're going to build the largest fuel cell catalyst plant in the world and we are going to build it in Changshu in China, in the Suzhou district. This plant will be online by the end of 2024 and will guide us in our growth, help to serve our customers towards 2030.

*Working with customers at the forefront of fuel cell technology*

I talked about the Hyundai motor company corporation, and we have already, with our product, more than 10,000 vehicles on the road. So we left the lab, right? We are not designing – we're still designing for the future, but we're on the road today. And we are producing already at tonne scale.

*Leading supplier of fuel cell catalysts*

It's good to have a customer, it's better to have a lot of customers. And we can say that we are qualified with the more than 10 OEMs worldwide. And if you would wonder, yes, indeed, the big names are on that both in Europe, North America, but also China. So the big, heavy-duty names are on those slides and all these bubbles that you see on these slides, they represent start of production dates.

And you see, for instance, HD, definitely heavy-duty vehicle application. You also see the S of stack and light duty. So really working on all segments and the different steps in the value chain.

You see that we have quite some qualifications in China and that they are coming first and later on, we'll also be seeing a lot of volumes coming in into Europe. So it's quite natural – and I should not say only Europe, actually the rest of the world, because we have customers beyond Europe. So naturally, as the volumes and the demand is kicking in the strongest in China, it's natural that we built our plant over there. And that's why we have chosen this location.

These are start of production dates. We have further ongoing qualifications with more customers and for more future platforms. So it's fair to say that with a 40% market share in the mobility segment already to date, not a bad starting position.

*Expanding global footprint to serve growing customer demand*

I talked about our footprints. We have production in Hanoi in Germany, we have Korea and now we'll also have Changshu. We also have applied tech and R&D centres mainly in Europe and Asia, because I said we want to be close to our customers, we want to develop together to design the right stuff for what they need. We want to listen and you have to be close.

Secondly, we are going to leverage our experience in the fuel cell industry – or experience, I should say, in the precious metals industry that we have also for the fuel cell business. It's quite similar to what we do upstream in the Auto Cat side. And we are closing the loop. Yes, we can recycle fuel cells. Small quantities today, but the [inaudible] is ready to take them in.

**Capture Emerging Growth as Leading Fuel Cell Catalyst Provider: Market-Leading Technology**

Innovation remains important. We have a very strong position today, but we have to keep it because this market is growing end of 2030, growing into 2040. And I will show you on the next slide, some metrics where we are compared to our closest spheres and industry average on certain important components.

*Benchmark PEM catalysts for heavy-duty*

So if you look for instance at efficiency, our fuel cell catalyst at the start of the run. So when you use for the first time the fuel cell stack, the customer immediately gets a 3% hydrogen efficiency. Basically, you consume already 3%, and we're talking here at HGD markets so every percent is important.

Durability. This stack has to last a long period of time, 10,000 cycles, ideally. At the end of the run, we even have higher efficiencies and we definitely have the number one durability in the market. And this is based on feedback from customers. I mean, they analyse the different specs, they show results and we really always come out on top.

On the platinum loading, compared to the general industry we're 25% lower for the same performance. So that means our customer can either increase the performance with the same amount of platinum or have a cheaper stack. So that all turns into a great cost reduction potential for our customer from the stack point of view and, therefore, fuel cell adoption, but also in the total TCO of it. And the TCO, the total cost of ownership, will be key for fuel cell adoption, which is expected in the second half of this decade, especially for HGD. So this is an important driver.

#### *Benchmark PEM catalysts*

As said before, we have great technology today, but we are already working on the future because 2030, the game is only really starting. And our focus here mainly is on PGM reduction in our catalyst. That's where you will have the technology edge. So how can you lower PGMs with the same or better durability and efficiency?

So no wonder that we spent a lot of time on research that we create IP. And that basically, we have more than 250 patents; we have six locations where we work on apply tech and R&D. But we also are open to work with leading academia and universities in these fields because we want to stay and keep that edge.

### **Capture emerging growth as leading fuel cell catalyst provider: Key Partner for the Transition to Zero-Emissions Mobility**

#### *Embedded sustainability value*

Sustainability, clean mobility, sustainability, I said it also in the ACs, in the AC section. That is what we live for and that is core of every offering that we do. So also here, we're focusing on ourselves. First, what can we do on the Scope 1 and Scope 2, and we're designing the plans from day one. So also the Changshu plant to have the lowest possible CO<sup>2</sup> footprint right from the start.

The closed loop, again, will in the future also contribute to lowering the Scope 3 emission and help in resource scarcity, because I showed you a market of 300-400 tonnes of fuel cell catalyst, towards 2040, right? This is a lot of platinum. And if you want to serve that market, you will have to bring out that platinum level. So it's value unlocking for the customer, for ourselves and Scope 3. Same story as for Automotive Catalyst.

#### *Delivering high-performance solutions*

So with our product on the roads, while maybe other companies are still in the lap, the vehicles on the road today already allowed us to avoid, basically, or prevent, I should say, probably based on what the Sustainability department would tell to me, 150,000 tonnes of greenhouse gases. Maybe not massive, but we're talking here about fuel cell vehicles. And in that space, this is truly impressive.

### **Capture Emerging Growth as Leading Fuel Cell Catalyst Provider: Scalable Volume Production**

#### *Scaling-up of production footprint in most cost-efficient way*

On the excellence part, I will talk about our new investments, and also the fact, basically, that we already have proven production capacity at scale. Remember, the total market in 2021 was 7 tonnes, mainly mobility; we have a 40% market share. You can read that, of course,

we are at tonne scale, and there are not many companies out there that are at tonne scale, because they're still in the lab, talking about what they're going to do.

Of course, the [inaudible] cost competitive processes are now also incorporated in our new investment in Changshu. And this plant will be modular so if the markets would be bigger than what we expect, we could easily add more modules. And of course, at a relatively modest CAPEX. And, by the way, I don't know if I said it already, but this will be the biggest fuel cell catalyst plant in the world.

### **Conclusion**

So if I just wrap it up, we want to capture the short-term growth in fuel cell and beyond 2030, of course, we want to capture the big markets. We have – we're also going to – we're focused right now mainly on mobility. However, we don't ignore the adjacent markets; we don't ignore those. We're going to be reliable, because we were long in the business and we're going to work closely with our customer, and we will be part of the full clean mobility offering that we have as a group.

We're leading on technology and our focus is there to stay there and we have a clear roadmap to do it. Sustainability is at the core of what we do and, again, we have left the lab and our production producing already at mass production scale.

So we think that we have a head start. And we can say that we're already profitable in this business today and that over the 2020 to 2030 period, we will be value accretive. So, again, a small gem at Umicore; we have to foster it, grow it, but certainly towards 2030 and beyond with a lot of potential.

Thank you. Kurt, welcome. Another future business that we will see.