Interview Philipp Engelkamp

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Bert Beyers: Your largest plant for the production of e-fuels is currently being built at Industriepark Höchst in Frankfurt. What exactly will be produced there?

Philipp Engelkamp: Ineratec stands for the production of so-called e-fuels, i.e. fuels made from CO_2 and renewable hydrogen. And in Frankfurt Höchst we are building the world's largest plant for the production of these e-fuels. We are building a plant that will produce up to 3,500 tonnes of synthetic fuels per year from about 10,000 tonnes of renewable CO_2, in this case biogenic CO_2. We get CO_2 from a biogas plant and recycle that into synthetic fuel and chemicals.

3500 tonnes: Is that a lot or a little?
Of course, the quantities are still very small compared to what the demand is. However, we see this as a great opportunity for us. There are corresponding quotas from air traffic for 2025, 2030 and 2050, resulting in a great demand for us and other companies that are active in this field. In this respect, the plant in Frankfurt is a pioneering facility. At the same time, it is the largest in the world, both at the same time.

Is air travel the main market you are targeting?
Exactly. In the Fischer-Tropsch synthesis, the chemical process in our plants, there is always a mixture of different fuels. That means you produce chains of hydrocarbons. Depending on how long they are, we have different products: Petrol, paraffin, diesel or wax. As a manufacturer of these e-fuels, you have to ask yourself how best to bring the products to market. And for us, we decided very early on that we would tackle areas where these hydrocarbons cannot be avoided. For us, these are in particular air traffic, shipping, but also the chemical industry. We validated this last year with our new investors Safran from France from aviation and with MPC from the shipping industry.

Does that mean no e-fuels for cars or trucks?
I wouldn't say that, because there is always a mixture of products and also a fuel that can be introduced into cars in a drop-in manner. We also have automotive customers. However, we would like to focus strategically on air and sea transport. Simply because for us these are the markets where there is no doubt that fuels will be needed by 2050. In the automotive industry, the trend is very much towards electrification, which we support. But there, too, synthetic fuels are an alternative.

So you produce kerosene that can be used one-to-one to fuel an aircraft?
Now it actually becomes technically very complicated. First of all, we produce a fuel mixture via Fischer-Tropsch synthesis and that can be separated or processed. And now the question arises, which products are we targeting? If we target kerosene, for example, then we could technically produce a kerosine on site that meets the so-called ASTM standard and that could be refuelled in the aircraft. However, there are then regulatory and insurance hurdles that would not allow the fuel to actually be filled into the aircraft. And that's why there is a more elegant way for us, namely that you produce the precursors and then work with partners for the processing. That means using a refinery that already produces kerosene and also its infrastructure to then distribute the kerosene to the airports. This is the path we would like to take in the short term. If we look further into the future and very large quantities of synthetic fuels are available, one can also imagine that these fuels will also be processed and distributed decentrally.

At Ineratec, you always see pictures of containers filled with production technology. Modularity seems to suit you - why?
At Ineratec, the point is that we want and also have to provide very large capacities of fuels. The question is, how can we scale this technology? The standard approach in the chemical industry is to simply build larger plants and assume that prices will fall. We can't completely undermine that either. That is the reason why we are planning a scale-up with our plants, i.e. we want to build the plant modules larger. The unique selling point is our modular approach, which means that we can multiply our standard units. And a container is an example of such a standard unit, which produces about 350 tonnes per year. The next largest module will be in Frankfurt with about ten megawatts, and that can also be multiplied. And so we can scale and multiply. These self-contained units are of course suitable for making this tangible for the customers. This does not necessarily have to be in a container. In Frankfurt, for example, we will move into a hall. Later, the complexes will also be set up outdoors.

When will the facility in Frankfurt be ready?
We are in the process of building the plant at the moment. At the same time, we have submitted the building application. We expect that it will be approved in three to six months. And then we can also place the prefabricated modules in Frankfurt. Then we still have to connect the modules at the site and finally put the plant into operation. We want to go into the so-called commissioning phase in 2023 and increase the capacity to full production capacity.

What do you see as the main obstacles to this scaling?
It would help a lot if the legislation would provide clarity accordingly. There are very many things that have not yet been fully clarified, both at German and EU level. The tip of the iceberg is whether e-fuels will be allowed for motor transport. There are many other regulations, for example which CO_2 is considered renewable. How to deal with hydrogen? Do I have to lay an additional pipeline? Do I have to build a wind farm before I can do power-to-liquid? There are many questions that are now being asked politically. And it would be very helpful if there were more investment security. Otherwise, we are of the opinion that the economy must also follow suit. Projects have to come now. We have to find partners who will conclude projects and then get started. If we only start in five years, it will be too late to have the right impact on the climate.

You use biogenic CO2. Why?
Biogenic CO_2 sounds a bit absurd at first. We are engineers and CO_2 molecules are CO_2 molecules and you can't tell whether they are biological or not. In this respect, we also work with so-called point sources, where the CO_2 is highly concentrated from processes. This can be used instead of simply releasing it into the air. It is important that the CO_2 does not come from fossil sources. I can't take CO_2 from a coal-fired power plant, for example, because then in the end I simply recycle a fossil CO_2 once and then it's still in the air: we turn coal into electricity and electricity back into hydrogen. That is not an elegant way and does not lead to a reduced use of fossil energy sources. That's why the CO_2 we use must either be unavoidable, come from cement or paper factories, for example, or from biogas plants. In our case, the CO_2 comes mainly from biogas plants, which is called biogenic.

How expensive is a litre of e-fuel for you?
E-fuels are produced using the so-called power-to-liquid process. And the biggest cost driver is the electricity needed to produce hydrogen. The cheaper I can get the electricity, the cheaper I can produce the fuels. At power-to-liquid sweet spots, for example in sunny or windy regions, you can produce electricity and hydrogen particularly cheaply. There, fuel prices can be as low as one euro per litre. In a location like Germany, where electricity prices are relatively high, I can't produce cheaply like that.

Please name a price if you produce in Frankfurt.
I hope you will understand that I am not initially providing any precise information on the production process at the plant in Industriepark Höchst. However, the fact is that the fuels are not simply burned. At the moment, there are also other questions at stake: How can I perhaps increase engine power or turbine output with the fuels? How can I get that into a ship's engine? That is why the fuels, although more expensive, are interesting for customers and can be used.

You talked about the power-to-liquid sweet spots, where would that be?
The sweet spots are in the MENA region, for example, or also in South America, such as Chile, where there are very favourable wind production conditions. Also Australia or New Zealand, where there is hydropower. Likewise in Canada. In Europe, it is Portugal or Spain, for example, that are interesting for such projects.

And that's where you go and sell your plants?
That's where we are.

Where are they?
At the moment we are focusing on Europe. Of course, exciting projects are also taking place in non-European countries. But then the framework conditions are more complex. And we are a young company that focuses on doing projects in Europe. There will soon be publications that we are also looking at Asia. We have already done projects in South America. In this respect, we are active worldwide.

A lot of energy is lost in the production of e-fuels, simply through conversion processes. In this context, the efficiency of e-cars and e-fuel cars is discussed again and again. What is your position?
We think that electric cars are a very good option for moving around in urban traffic. And if I have my solar panel on the roof and my own battery in the basement, then I charge my electricity exclusively renewable - a super option. However, a lot of energy is used to make a battery. And when the raw materials for the battery are extracted, many other things happen that have a negative impact on the environment. We advocate not looking at this as either or. Rather, we should think about how we can get around in a renewable way in the future. And there will be people who drive electric cars. And then others for whom the electric car is not an option. It is precisely these people that we want to offer an option to also travel in a renewable way. And if I replace the fossil fuel with a renewable one, then the eco-balance of the combustion engine looks much better.

Where will we be in five, where in ten years?
In 2027 we will see the first large-scale projects. But we will also see many dozens of medium-sized projects, from 50 megawatts to 100 megawatts upwards. That means ten times the project in Frankfurt,

and then many projects from there. The large projects will probably be a finance investment decision because they are much more complex to structure. The first large-scale projects are announced for 2030. Then they will also start to build. We believe that we will already be underway with a number of plants by then. In 2035, we have set ourselves the goal of covering 5 percent of Europe's crude oil demand with our fuels from plants around the world. This means that we have to significantly expand capacities all over the world.

After all, these are enormous quantities. Do you see any limits?
No. We need renewable energies and CO_2 for this. Renewable energies must be expanded. But that is independent of whether I drive an electric car or produce a fuel. If I expand renewable energies here, I can perfectly feed my electric car with them. If I develop wind and solar in South Africa, I can't use it to drive an electric car in Europe - because of the electricity transport. Either way, we have to expand. I think that's good, too. We as a company are committed to using point sources of CO_2. Because they are much cheaper. If I use CO_2 from a direct air capture plant today, the fuel is of course more expensive than if I get it from a point source. But in the future we want to use such plants to suck CO_2 out of the air.