FRANK WOUTERS

Chairman of the MENA Hydrogen Alliance

Marc-Antoine Eyl-Mazzega, Director of the Center for Energy & Climate of Ifri

I turn now to Frank Wouters. Thanks for being with us today.

You are the president of the Hydrogen Alliance for the MENA region. What is not always clear but that everyone needs to understand is that low carbon hydrogen has multiple potential utilizations. However, one thing needs to be made very clear, which is the certification that it is really low-carbon, and there are different ways of producing it. Therefore, if we want to make sure all across the world that we are talking about the same product then we need to have common rules. However, before we enter this topic, perhaps you could tell us, based on your latest study, about how hydrogen can be stored and how to basically improve the flexibility of energy systems, building on various technologies, including hydrogen. The floor is yours.

Frank Wouters, Chairman of the MENA Hydrogen Alliance

Yes, thanks. Actually, the study was a little bit broader because what we really wanted to understand was the role and the size of storage. Because even though I wrote a book on batteries in the 1990s and I was the president of the Long Duration Energy Storage Council for several years, and I have made investments in solar thermal projects in Spain with molten salt storage, I always had this nagging feeling that I did not really have the big picture on the role of storage and what it means in an energy system. Therefore, we started a project last year and we started looking into it, and the first thing that shocked me was that actually nobody knew. Therefore, now we know because we did the research, but there was not the IEA, not IRENA, not McKinsey. Nobody actually knew how much storage we have in the world to make the energy system function.

Then the second question is why you have storage. The first reason why you have storage is obvious. It is to match supply and demand. That is a technical requirement. That is what you understand if you think about storage, and that is also what the modelers understand, which is important because they actually do not understand the other two reasons for storage or at least they do not take them into account. The modeling was the second finding. The first was that nobody had an overview.

Secondly, the modelling is wrong because they do not look at storage from a system perspective.

The other two reasons why you have storage – it is obvious – we have strategic reserves. With the IEA since the 1970s we have had 90 days of strategic petroleum reserves. Since this year, the European Union mandates that 90% of your gas storage has to be full on November 1st because of the Russia issue and the Ukraine war, etc. Strategic reserves are therefore significant. The third one is also obvious. It is trade. People buy molecules when they are cheap and then they sell them when they are more expensive. That adds up to quite a significant amount of molecules. When we did the numbers, we found that, of course, there are a lot of people who know everything about oil, and then there are the gas people, the battery people, the coal people, but the aggregate added up to more than 20%. Therefore, more than 20% of all the molecules that we consume in a year are in storage for the three reasons that I just mentioned.

If you then look at electricity storage, which is what everybody also understands – batteries, the growth of batteries, the critical minerals and all the geopolitics around this –is completely insignificant. I am on the board of Gore Street Capital. We make investments in battery systems, so I know the markets and why you have batteries, etc. However, in overall numbers, it is 0.03% of electricity consumption in a year, which is 30,000 terawatt hours. Therefore, you store nine and a half terawatt hours. Batteries are therefore not even part of the nine-and-a-half terawatt hours. It is pumped hydro. Batteries are growing exponentially, so they will be bigger than pumped hydro in the future, but it is still going to be insignificant.

Because then the next thing we did is that we understood the massive amount of molecular storage, 3,000 times more than electricity storage, if you will. The question is now to project a future that is clean. We looked at various models. We looked at BP, very well-documented. We looked at IRENA. I used to work at IRENA. I looked at the World Energy Transition Outlook for 2050 latest, by when we need to be clean, we need to not have any more emissions. Then we found that none of the models took storage into account. Somebody mentioned that more than 85% of new additions for several years have been renewables, so that is growing exponentially, but still the electricity system runs on molecules. 60% of electricity is still generated using coal and natural gas. You therefore have a lot more clean electricity – solar and wind, etc. – but it is backed up by molecules.

Then if you fast-forward into the future, then it is very clear that we will have more electricity. I mean, nobody argues that it will be less than 50%. Right now, it is about 20, 25. It will double or almost triple. There is certainly going to be more electricity because it is cheap and cost-effective, but it still requires molecules. That is the major finding. We ran the numbers. We reduced the number of molecules in the electricity system, but you still end up with at least 2,000 times more molecules than batteries. Then the question is how to do that without emissions, and that is where hydrogen comes in. It is not therefore nice to have. Part of the narrative that I am hearing is that we have to do renewable electricity first and then we do hydrogen because you have conversion losses, efficiencies, it is difficult to store and I do not know what. The question is: how are you going to build a system without it? I do not see an answer.

Therefore, we have to think about molecules. Storage is dominated by molecules now and in the future. Then we have to focus on cleaning up the molecules more than anything else. I mean, solar and wind, that is something that we know. We have done it. We know how to do that. Just keep going. Keep building. It is cheap and cost-effective, but we need molecules. Otherwise, you cannot build a system that works.

Marc-Antoine Eyl-Mazzega

Frank, that is very convincing. We need to optimize energy systems to reduce costs and improve efficiency and security. There is not unlimited money, capital resources and raw materials. However, if we take the hydrogen economy, the future hydrogen economy, there are two big blocks that are leading in terms of ambition and in terms of industrial capabilities in this field. One is Japan. They were the front runners for various reasons, which we can discuss later on. The other is Europe. If we look at Europe, it is fair to say that, because of rising energy costs, rising interest rates, political uncertainties, and a number of problems, the ramp-up of the hydrogen ecosystem has been slowed. Nonetheless, it remains critical to get there. What is needed now, in your view, in Europe if we really want to do exactly what you have said, which is not have the sequencing, but to have the two developed together, the molecules and the electrons in this field?

Frank Wouters

That is a good question. If you look at the European situation, and it is very similar in Japan, you are a net energy importer right now, and that will not change in the future. Even in a fully renewable energy future where you have all the bells and whistles to make that work, you will still not be able to be self-sufficient in Europe, and neither in Japan. You therefore need to look at imports. Then the question is that, if you have an import dependency, you are going to have strategic reserves. That is why we have them right now for petroleum, and that is why you have this mandated storage situation for natural gas. There is no situation where I foresee a future where you are replacing fossil fuels with cleaner molecules, where you do not have strategic reserves for those. Batteries, again, are insignificant. They are important, but they will not give you that security of supply. You want to have a strategic reserve because you want to reduce price shocks and guarantee that the system works at any point in time.

Then the question is, first of all, if you are going to have a whole bunch of hydrogen and other clean molecules, and of course biomass is there and so forth, why not build that strategic reserve now? As you rightly said, we are struggling to find a market mechanism and to get going. You have to get going to reduce costs. At the moment, the costs are still high. We know that we will be lower in the future if you deploy it at scale, but you have to start, and the starting is the issue at the moment. Why not build a strategic reserve now? There we did some numbers, and a realistic number for hydrogen in 2013 for the European Union is 6.8 million tons of hydrogen. Then, if you take the numbers that we have right now, 25% of that, you would already require hundreds of salt caverns deployed by that time. However, it would provide an immediate mechanism for the projects that are there, because the projects are there. There are about 1,500 large-scale hydrogen projects that people have developed, but they do not find an immediate off-taker. If we start with a strategic reserve, which we are going to need anyway, you have an immediate mechanism to actually get going. Then you get on the cost curve, and then you start getting into a market situation.

Marc-Antoine Eyl-Mazzega

Thank you so much. Well, just to these 6.8 million tons, that will be a third of the current target.

Frank Wouters

The target is ambitious. The 20 million tons, so the 10 and 10, imported and domestically produced, that is not hardwired. What is hardwired is the Fit for 55, the gas package. It plans that there will be 1% in the fuels, etc. If you add those up, which are mandated, so the member states need to put them into national legislation, then you add up to somewhere between four point something and 6.8. That is hard. That is a hard target. The others are ambitious and not really hardwired.

Marc-Antoine Eyl-Mazzega

Okay. Thank you. Let us continue on that.