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THE HYDROGEN EUROPE QUARTERLY

FOSTERING A EUROPEAN HYDROGEN MARKET

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Welcome!



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From the CEO

Welcome to the inaugural issue of the Hydrogen Europe Quarterly! This new magazine produced by Hydrogen Europe is dedicated to keeping you up to date on European and global hydrogen developments.

I am delighted to share the magazine in time for our flagship European Hydrogen Week conference as well as the ever-important COP27 summit.

It has been an eventful quarter after the summer break and so this first issue comes at a truly pivotal time for hydrogen.

The European Parliament voted for the Renewable Energy Directive in September, which resulted in strong binding targets for renewably produced hydrogen. Members of Parliament also objected to overly restrictive rules on additionality and temporality. Definitely a highlight was the announcement of the European Hydrogen Bank by the European Commission President Ursula von der Leyen.

We in the hydrogen sector now turn our heads to the Alternative Fuels Infrastructure Regulation (AFIR) and the FuelEU Maritime initiative. With these two policy initiatives, we are presented with an opportunity to unlock hydrogen as a viable and reliable transport fuel.

Our main story covers the AFIR discussion in detail and includes the thoughts of Iveco Group's CEO Gerrit Marx and HRS' Director and Board Member Adamo Screnci. Our member spotlight concerns the collaboration between BMW and Toyota, two world-famous car manufacturers with a well-documented enthusiasm for hydrogen mobility.

In this issue you will also find an interview with Ismail Ertug, a Member of the European Parliament who shares his vision of a clean, sustainable Europe powered by renewable hydrogen and who has fought hard to achieve that vision. Ertug shares his thoughts on AFIR, as well as how his enthusiasm for hydrogen began.

Readers will also find useful policy and intelligence updates to keep abreast of the latest developments. As we continue to see major achievements at policy level, we also note an ever-increasing readiness from investors and lenders to finance this crucial infrastructure.

Please do enjoy this first issue of the Hydrogen Europe Quarterly! I hope we can count on your continued interest and support for the hydrogen sector, working to create a secure and sustainable Europe.

Jorgo Chatzimarkakis
CEO, Hydrogen Europe

AFIR set to drive hydrogen mobility

The European renewable hydrogen industry secured a significant win on 14th of September during a plenary vote on the Renewable Energy Directive II (RED II). But with a number of applications for hydrogen across multiple sectors, the campaign to create a true market continues. The next legislative target is the Alternative Fuels Infrastructure Regulation (AFIR), which – like RED II and green hydrogen production – can unlock green hydrogen mobility. To better understand what's at stake, The Hydrogen Europe Quarterly has met two industry leaders – Adamo Scenci, director and board member of Hydrogen Refueling Solutions and Gerrit Marx, CEO of IVECO Group – to discuss all things around AFIR and the need of a coordinated European approach.

AFIR sets out rules for charging and refuelling points for vehicles along the **Trans-European Network - Transport (TEN-T)**, the group of key EU transport corridors of railway lines, roads, inland waterways, maritime shipping routes, ports, airports and railroad terminals. A planned vote on the regulation was postponed from this summer to October in the European Parliament's transport committee.

AFIR, the **ReFuelEU Aviation** and **FuelEU Maritime** proposals together make up the central EU efforts to decarbonise the bloc's

transport sector and reduce its significant contribution to total European greenhouse gas (GHG) emissions, which today is close to a quarter.

There are a number of companies across the EU ready to invest in more hydrogen mobility, though they face a familiar issue.

"It's always the same chicken and egg story," **Adamo Scenci**, director and board member of Hydrogen Refueling Solutions, told **The Hydrogen Europe Quarterly**. *"Do we wait for the infrastructure, or do we wait for the vehicles?"*

Indeed, do we wait for the demand to provide the supply? Or vice versa? This question can paralyse any business, not to mention entire sectors, particularly when that sector is innovative and potentially disruptive. Resistance from legislators can be understandable as the risk-averse seek balance with the risk-takers.

In the context of hydrogen and mobility, the apprehension is whether it makes sense to commit to a multi-billion-euro expansion of hydrogen refuelling infrastructure if there are no vehicles on the roads to use them. AFIR, according to the latest drafts, will propose a maximum distance of 100km or 150km between refuelling stations – down from a previous proposal of 200km.



It would be hard to disagree that a refuelling station every 100km may not get much use today. But it is called the energy transition, not the energy transformation – these things take time and planning. And it is therefore worth attempting to look ahead to see what the horizon may bring. In this context, it is increased demand for decarbonised transport across the board.

One of the binding targets set by **RED II** included GHG emissions reductions of at least 16% by 2030. This will place increased pressure on the transport sector to clean up in a rather short amount of time, and many believe that electrification cannot be the only solution. Enter hydrogen.

“The fight is against CO2, not against electric or hydrogen. Green, blue, we don’t care,” said Screni. *“We need to think about what comes after renewables – and that’s hydrogen”.*

“If we put billions of euros into the infrastructure, you can be sure the vehicles will come.”

In a European context, a pre-existing, EU-wide refuelling station network coupled with ambitious emissions reduction targets would certainly provide an attractive environment for investors.

So, who will be the first movers?

“Recently there has been a big acceleration in vehicle types and supply,” said Screni. *“The first ones won’t be passenger vehicles – it makes sense to start with trucks and trains.”*

Indeed, the conventional wisdom is that trucks, specifically **Heavy Goods Vehicles (HGV)** traveling across Europe delivering cargo, are the best-suited road vehicles to hydrogen and the added range it offers over lithium-ion batteries. Although an alternative point of view is presented in this very issue of **The Hydrogen Europe Quarterly**, there is no doubt that HGVs and other heavy-duty transport will be at the front of the (refuelling) queue – at least initially.

IVECO Group, the multinational transport vehicle manufacturer, is another company keeping a keen eye on the AFIR progress. Together with **FPT Industrial** and **VDL ETS** (among other project partners), it is designing, building, and testing three new types of fuel cell heavy-duty trucks, including rigid and articulated vehicles up to 44 tonnes as part of the EU-funded **H2Haul project**.

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The fight is against CO2, not against electric or hydrogen.





Just last week, it showcased a prototype of its hydrogen-power eDaily van which it is developing with **Hyundai**. And, even more significantly, it is going to start production of its fuel cells hydrogen articulated Class A truck in Ulm, Germany at end of next year. Customer deliveries of the new truck will begin in early 2024. With so many hydrogen projects on-going, the outcome of the AFIR vote is naturally quite significant to the company.

"We support AFIR and overall it's a good first step but it's not ambitious enough," **Gerrit Marx**, IVECO Group's CEO, told **The Hydrogen Europe Quarterly**.

Marx pointed out that IVECO Group and companies like it are under increased pressure from CO2 reduction targets specifically for truck OEMs that, if missed, would result in thousands of euros in fines per vehicle. With that in mind, Marx cautioned that a lax approach would simply lead to missed targets and more frustration.

"Leaving the level of ambition of the targets aside for a moment, there should be a penalty mechanism if someone along the value chain does not deliver the necessary infrastructure. Otherwise, we will fail to meet these targets," he said.

What is paramount for Marx is the presence of alignment at the European level as well as the national level, where member states must *"walk the talk when participating in decision making"*.

"We have six or seven transport corridors and what it takes is a European coordinated approach," he explained. *"We can cover Europe with 600 or 700 refuelling stations if you focus on the main transport routes at 150-200km distance."*

"The problem is if you set the target and member states run after the targets for the subsidies, they won't really be positioning them strategically. Targets are good but we must be aligned."

For Screnci, the assessment of a lack of ambition is wholly shared with Marx: *"You can feel a lack of vision in the implementation,"* he said. *"If we talk about 400 refuelling stations, it costs about €1.5bn, which is nothing."*

However, Screnci was rightfully more concerned with a lack of any movement at all, than whether the movement is enough. Pointing to rival markets in China and the US, he argued that the time was now for Europe to establish itself as a pro-hydrogen market and avoid an exodus of investment across the Atlantic and the Silk Road.

"It's not too late, but it's time to move," he said. *"Otherwise we will have no market creation and other countries like China and the US will be faster. If we don't make our own market, we will just be buying from them later on."*

The sense from the private sector is that the time to act is now, that there has been too much stalling and not enough action. The political wheels can turn slowly in Brussels, but time is of the essence.

"Let's start doing something, because we talk a lot, we make a lot of papers, but we need to act," continued Screnci.

"Bigger will be cheaper, we know that, so let's start big. No more prototypes, no more demonstrations - we know it works. We need to buy in large-scale and consolidate the purchasing and make refilling stations."

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We have six or seven transport corridors and what it takes is a European coordinated approach



At the very least, he is optimistic that there will be a change in attitude and urgency following the passing of the US Inflation Reduction Act, which offered a simple framework and decent subsidies for clean hydrogen production.

In the absence of a comparable framework in Europe, investors have had to take matters into their own hands – as is so often the case when innovation overlaps legislation.

“In order to lower the bar for adoption [of hydrogen fuel cell vehicles] and to give customers a package they can rely on, we are creating new business models,” said Marx.

“It goes way beyond legislation because we need to anticipate what markets require. Time is running out and we have to get ahead on our own because there is no room for failure.”

Both interviewees displayed a frustration with the slow approach from legislators so far, not least because the private sector stands ready to invest and lenders – both multilateral institutions and commercial banks – are ready to lend, despite the fragility and instability of the market at present.

The story of renewable energy, namely wind and solar, rings in the ears of investors: the category who missed out on wind and solar due to the perceived risk or limitations of the time, and the category of those who did not miss out and are ready to profit from the next technological opportunity – hydrogen. ●



PROMINENT HYDROGEN PEOPLE: MEP Ismail Ertug

In each issue of the Hydrogen Europe Quarterly, we will interview a prominent person in the hydrogen sector to talk about their involvement and interest in hydrogen, as well as about the key issues that concern them. For this issue, Hydrogen Europe spoke to MEP Ismail Ertug, a member of Germany's SPD and the European Parliament's Party of European Socialists.

How did you become interested in hydrogen?

Traffic and mobility are core parts of our daily lives that influence the well-being of European citizens. Sustainable alternative fuels and expansion of their infrastructure, such as hydrogen refuelling of a car, play a key role in the transition to successful decarbonisation of the transport sector.

However, the transformation towards clean and sustainable road transport can only be made if we persuade people to accept this. That is why I have become interested in this technology as I believe it can play a crucial role to a more sustainable mobility.

Why do you believe hydrogen is important for the decarbonisation of Europe and to achieve its climate targets?

The expansion of a hydrogen infrastructure will provide the right incentives, also in the mobility sector. Now is the time when we have the opportunity to organize emission-free mobility much more quickly. This applies to both electric vehicles and vehicles based on hydrogen.

I was the Rapporteur for the AFID (Alternative Fuels Infrastructure Directive) back in 2014, and I currently see many parallels with regards to hydrogen and the recharging infrastructure. There is a huge so-called chicken and egg dilemma coming up because what do we need first? Hydrogen cars for which we build an infrastructure or an infrastructure for hydrogen cars?

We need to take a brave step forward ahead of time to find solutions for these questions. If there is no sufficient infrastructure, there will be a high risk of stranded assets for the industry. In addition, neither consumers nor manufacturers are ready to wholeheartedly buy or produce hydrogen powertrains.



What are your expectations on the Alternative Fuels Infrastructure Regulation (AFIR) report that you are heading? Can ambitions be raised?

On the 7th September we reached a final agreement on AFIR and all my ambitious aspects on hydrogen have been accepted by the majority of the groups. This means that we in the European Parliament will have a strong position to negotiate with the Council and the Commission.



Why is it important to add hydrogen to the mix rather than focusing on electrification-only?

According to the Commission's proposal, it is still too early for the full deployment of a hydrogen infrastructure. The Commission proposal states that by 2030, publicly accessible hydrogen stations along the TEN-T core and comprehensive networks are being deployed.

In my opinion, this proposal is not ambitious enough. The EU should incentivise the hydrogen infrastructure development and not LNG (liquid natural gas) for trucks on road for example. The plans of the major manufacturers suggest that fuel cell trucks will be ready for series production as of 2026.

It is therefore absolutely worth having a discussion around the binding targets not only for 2030. In my draft report on AFIR, I do suggest a hydrogen infrastructure for trucks as of 2027 and a card payment obligation like in charging stations which is more ambitious than the Commission's proposal.

How would you respond to those who say that hydrogen in mobility is not the way to go?

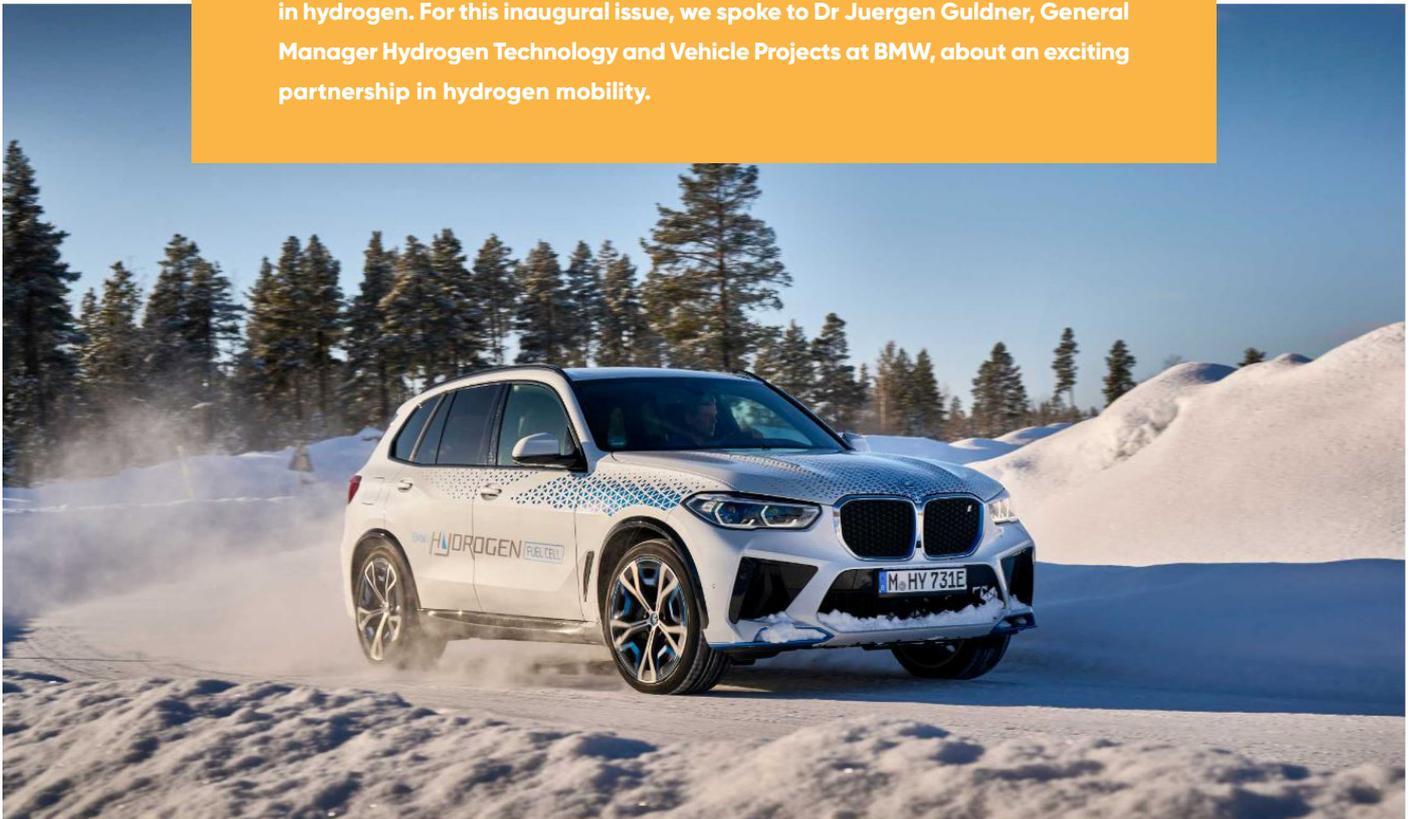
Now a rapid technology development is taking place. While drafting my report, I met a lot of stakeholders developing and investing in this technology. And I believe that Europe must harness the full potential of the hydrogen refuelling ecosystem.

We should now give the manufactures the security for further investment and development for the hydrogen technology. Also, for maritime ports I call for infrastructure deployment of hydrogen as of 2030. In addition, I propose to further examine other modes of transport for hydrogen such as rail or aviation. 

Member spotlight:

BMW and Toyota join forces

As part of The Hydrogen Europe Quarterly, each issue our member spotlight will cover one of Hydrogen Europe's members and its activities and ambitions in hydrogen. For this inaugural issue, we spoke to Dr Juergen Guldner, General Manager Hydrogen Technology and Vehicle Projects at BMW, about an exciting partnership in hydrogen mobility.



Developing Europe's hydrogen market to the necessary scale cannot be achieved by one or two companies acting alone. It requires the coordination of the EU, member states, and every business along the value chain. Cohesion, innovation, and drive are required; from the legislative level to the smallest small medium enterprises (SMEs).

Speaking of "drive", what hydrogen fans around the world will surely have noticed in recent times is a small yet growing challenge to the dominance of lithium-ion battery electric vehicles (BEVs). The challenger? Hydrogen fuel cell vehicles (FCEVs), as a clean and sustainable option with distinct advantages on offer.



Dr Juergen Guldner,
General Manager
Hydrogen Technology
and Vehicle Projects
at BMW.

You don't have to convince Dr Juergen Guldner, General Manager Hydrogen Technology and Vehicle Projects at BMW.

"It's something we've been working on for a while," Guldner told The Hydrogen Europe Quarterly, "more than ten years ago we decided to investigate fuel cells seriously".

BMW did indeed experiment with its Hydrogen 7 model in 2005, although unlike other notable models, from the likes of Toyota, Hyundai, and Honda, the H7 used a combustion engine to burn the hydrogen. Following this, the company opted to focus on fuel cells and has been a strong advocate for the technology in passenger cars. When seeking a partner, it turned to an established candidate with which BMW already shared a history of successful collaboration.

"We looked for partners because it's a big topic and we wanted a very competent fuel cell partner to enhance the project," said Guldner.

Toyota and BMW had been in a technical partnership since 2013 and had success more recently collaborating on the BMW Z4 and Toyota Supra. With a relationship of trust and a foundation of mutual respect in place, Toyota was the obvious candidate. Equally important is that both companies are committed to hydrogen passenger vehicles.

The corporation agreement will see the two manufacturers work together on the Toyota-made fuel cells, with an overall system design around the cell done by BMW. The BMW iX5 Hydrogen and

Toyota Mirai 2 will both feature the Japanese multinational's fuel cell system under the bonnet. The individual fuel cells are assembled into a fuel-cell stack using a compression machine and BMW is providing the stack shells and contributing to the overall system design. The hydrogen needed to supply the fuel cell is stored in two 700-bar tanks made of carbon-fibre reinforced plastic (CFRP), which together hold almost six kilograms of hydrogen.

BMW showcased the SUV at the 2021 Munich Motor Show (IAA 2021) in September 2021. A small demonstration fleet is currently in production and is slated to be ready by the end of the year, while a BMW blog said that market launch would take place sometime in 2023.

While fuel cell technology in mobility has usually been associated with heavy goods vehicles (HGV) – long-haul freight trucks traveling across Europe to deliver their cargo, benefitting from the range offered by fuel cell batteries – it seems that many in the automotive industry have detected an opportunity to bring the technology to standard passenger vehicles as well. Another advantage further down the chain is the need for a small fraction of the raw materials needed to produce BEVs, which gives manufacturers more certainty on price fluctuations.

The pragmatic view, however, is to treat FCEVs as another tool in the belt to decarbonise transport, rather than as a usurper in a battle for supremacy.

"We see fuel cell electric vehicles as complementary to battery EVs," said Guldner, "there is a percentage of users that will view fuel cells as a better solution for their individual mobility needs.

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We see fuel cell electric vehicles as complementary to battery EVs
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Much like the benefit of increased range offered by hydrogen to HGVs, there are private citizens with similar needs and wants. Some customers will value shorter refuelling times as well more time on the road, while others may not have the ability to install home charging stations for a BEV.

“So we don’t see it as a competition between technologies, but there are limitations to battery-only and it’s always better to have several solutions.”

Hydrogen transport faces limitations too, not least the current lack of consistent refuelling infrastructure across the European continent. This is effectively the key policy to kickstarting a true hydrogen market for mobility – you cannot drive without fuel, and you cannot get very far if you can’t refuel. But this issue could be resolved sooner rather than later. There are encouraging signs in the **Commission** and the **Parliament** that more hydrogen refuelling stations (HRS) will soon be a point of policy.

The **Alternative Fuels Infrastructure Regulation (AFIR)** will soon be voted on, and the statute is set to include binding targets for hydrogen refuelling. There is currently discussion between the two EU branches of government about whether to set the maximum distance between each HRS at 100km or 150km, and naturally the industry position is largely in favour of the smaller number.

“We are hoping to see AFIR get through quickly and with ambitious targets,” said Guldner, “if that gets decided, it would give a major push into the industry and the roll out of refuelling infrastructure.”

“Building a hydrogen infrastructure in this decade for commercial vehicles and passenger cars together is the basis for the roll-out of fuel cell technology on European roads.”

Some other limitations linger, such as fuel cell prices. But there is positivity there too with the fact that there is already widespread knowledge of, and familiarity with, the components of the fuel cell. This technical know-how will serve to facilitate economies of scale – a primary driver in price changes. Research indicates expected cost decreases over the next ten to twenty years as the production line is scaled up and standardised.

“We expect to see some scaling and it will happen through the multiple uses of fuel cells – not just in passenger vehicles: cars, trucks and trains all use very similar fuel cell systems. The technology is basically the same,” explained Guldner.

Despite some relative uncertainty over the legislative outlook for hydrogen cars, the **Toyota** and **BMW** partnership brings together two long-time proponents of the technology – not to mention two founding members of the **Hydrogen Council** – as they work to establish a new application in sustainable transport. Guldner was quick to praise the **Toyota** side for their expertise and shared vision.

“Both of us have benefitted not only from a technical perspective, but also by bringing the hydrogen topic ahead in Europe and the world,” he said. ●



Hydrogen Focus: REDII targets revision and AFIR

Under the REPowerEU plan, the Commission has further revised its own proposed target set in the draft revision of the Renewable Energy Directive (RED II) for the share of renewable energy sources by 2030, along with several sectoral targets in transport, buildings, and industry to ensure the expansion of renewables beyond the power sector. It proposed to raise the renewable target from 40% to 45% by 2030. On hydrogen, it proposed increasing the binding targets in industry and transport to 75% and 5% respectively from the previously proposed 50% and 2.6%. These new targets, if adopted, would translate into an estimated hydrogen demand by 2030 of around 5 million tonnes for industry (excluding refineries), and 4.2 million tonnes of RFNBOs for transport (including refineries).



The **Parliament** has taken an historic step towards the future of renewables and renewable hydrogen. Following calls from the **European Commission** on **REpower EU**, the **Parliament** has agreed to a 45% renewable target by 2030. With regards to the sectoral targets, it calls for an industry binding target of 50% by 2030 and 70% by 2035 and a RFNBO target of 5.6% for transport along with a sub-target for maritime transport of 1.2% by 2030. On the other hand, the **Council** did not follow the Commission's recommendations outlined in the **REPowerEU** and has instead

supported the original proposal of a 40% renewable energy target. In its position, reached during the French Presidency of the EU in June, it also came out with a proposal for a 35% binding industry target for hydrogen. While this is below the initial expectations, the Council still endorses a binding target for the industry. The same cannot be said for the transport target where the Council drastically reduced the Commission's ambitions by not supporting a binding target for RFNBOs in the sector, but an indicative one of 5.2%.

The final targets will be negotiated in the trilogues during the coming months. However, the Council's lowering of the ambition for hydrogen in transport risks the whole transformation of the sector and casts doubt on countries' readiness to move beyond biofuels in maritime, aviation and heavy-duty transport.

Delegated Acts on RFNBOs

The **European Parliament** also decided to challenge the **Delegated Act (DA)** on additionality. Under the current framework (the Renewable Energy Directive adopted in 2019), the **European Commission** was tasked with developing a full proposal for the definition of renewable hydrogen, always based on the principles of additionality. After more than 2 years of exchanges with stakeholders, there is no final draft for the European Parliament to rubber stamp. But considering the strict requirements seen in the draft consultation in June, and thus the lack of a viable business case for the production of renewable hydrogen, the EP decided to intervene and to take back the powers provided to the EC in the delegated act.

The proposal from the EP goes a long way from the draft DA, removing all requirements that would impose any sense of additionality. Environmental NGOs are not happy with the proposal as they perceive it as green washing.

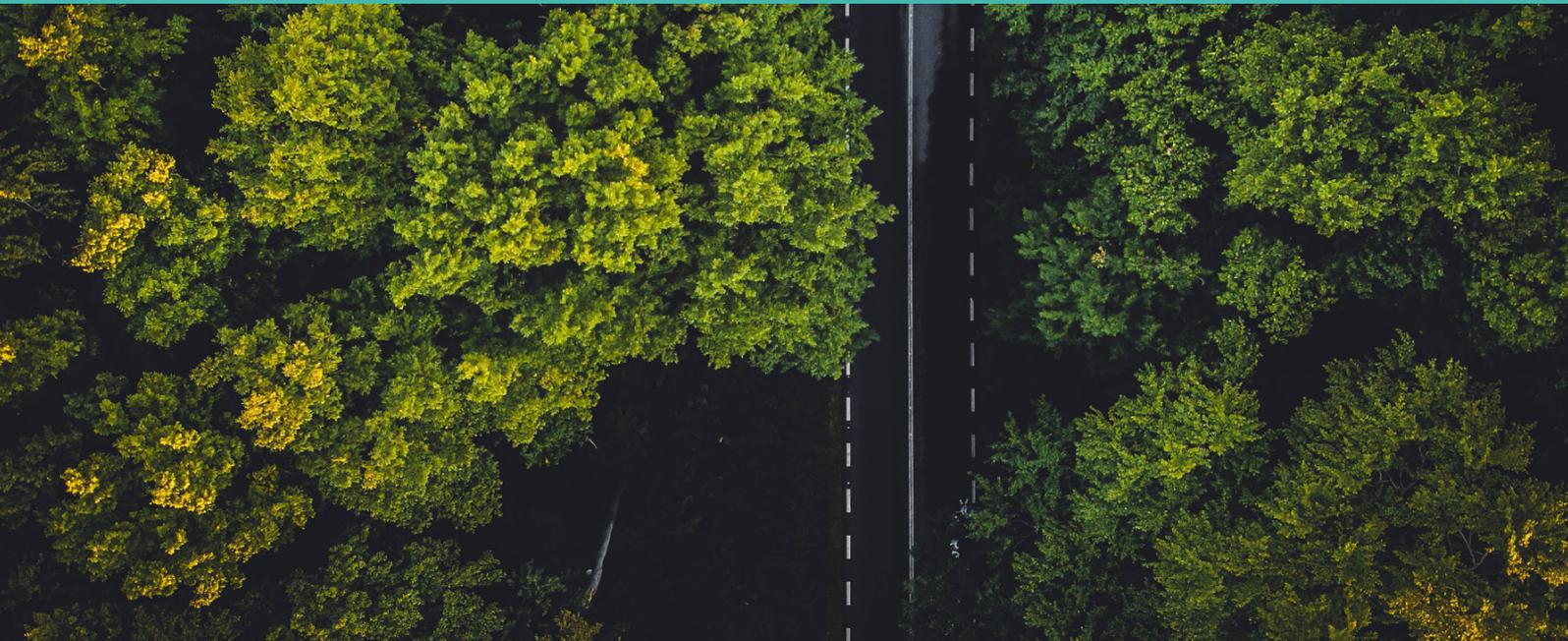
So what's next?

The EP will still have to negotiate with the council whether this is a viable approach. In a way, deleting the DA would lead to more uncertainty in the sector as the **RED II** directive will now be subject to national transposition, a process that could last up to a year and could also lead to a fragmentation of rules across countries. It would also set a precedent with Parliament revoking the powers provided to the EC. None of these are good things for the sector, who would rather see a final delegated act be endorsed with less stringent requirements. All parties seem ready and interested in finding an agreement to improve the DA, rather than in scrapping it.



THE HOTTEST ASPECTS OF THE PROPOSAL ARE:

- The length of a transition phase under which a project promoter will not have to prove additionality
- The temporal correlation between the renewable power plant and the hydrogen production. Moving from hourly resolution (EC) to monthly (EP).
- The geographical correlation: agreeing on a bidding zone or national level.
- Allowing RES power plants that receive operation aid to also provide power to hydrogen producers (EP proposal).



The AFIR debate

The **Alternative Fuels Infrastructure Regulation (AFIR)** is a key piece of legislation for the development of hydrogen mobility, as it sets national mandatory targets for the deployment of hydrogen refuelling stations (HRS), along with infrastructure for electromobility.

The **Parliament** and the **Council** have nearly concluded their respective positions on AFIR (summarised in the table below) and will start with the negotiations on the file towards the end of the year. While the Commission and the Parliament are more or less aligned on the file, with the Parliament being even more ambitious and calling for a minimum distance of HRS of 100 km instead of 150 km, the Council's position differs significantly.

Some EU Member States do not see a strong market uptake for FCEV passenger cars and trucks fearing that the costly infrastructure would not be utilized. Therefore, the Council's position is far less ambitious with regards to HRS targets increasing the minimum distance of HRS from 150km to 200km and applicable only to the **TEN-T Core** networks. It also leaves the decisions on minimum capacities, HRS in urban nodes and deployment of liquid H2 for a potential revision of the regulation in 2024. The final legislation is expected in early 2023.

Positions of the EU institutions on AFIR targets

	EC proposal	Council position	EP draft position
HRS	Every 150 km along TEN-T Core and Comprehensive	Every 200 km on TEN-T Core	Every 100 km along TEN-T Core and Comprehensive
HRS in urban nodes	At least one in 424 large EU cities	Possibly, under a 2024 revision	At least one in 424 large EU cities
HRS capacity	Min. 2 t/day	Possibly, under a 2024 revision	Min. 2 t/day
700 bar and liquid H2	Yes	Possibly, under a 2024 revision	Yes

Looking at the minimum number of HRS to be deployed, the difference between the three positions is rather drastic (Table 4). The Commission’s proposal would lead to the deployment of about 1,100 stations, the Parliament’s draft position would lead to nearly 1,500 while the Council’s position would result in a mere 230 HRS. These differing opinions will complicate the upcoming negotiations on the final version of this critical piece of legislation. The lack of ambition expressed by the Council is particularly worrying as it sends a wrong signal to car and truck manufacturers which are deciding now on their investments in technology development and industrial scale up.

Estimated of the minimum number of HRS to be deployed across EU-27

	Clean Hydrogen JU Study: HRS needed by 2030	European Commission Impact Assessment – the absolute minimum needed for HRS	Industry minimum needs	EU Parliament (TRAN Committee Draft Report)	Council General Approach
Number of HRS for EU-27	~ 4,800 across the EU	798	1915	1491	233



On 3 October the Committee of Transport voted on the AFIR and opted for the most ambitious proposals. All parliamentary groups are aligned with the rapporteur’s proposal (number above under the EU parliament). The plenary vote is expected on 19 October. ●

Unlocking hydrogen investments and funds



Investment gap

The European Commission estimates that a total of between €80-120 billion will need to be invested in key hydrogen infrastructures to reach the EU's ambition of 20 million tons of hydrogen production by 2030, as outlined in the REPowerEU Communication.

These estimates are significantly lower than those presented in other available studies and reports. According to Deloitte Finance's Hydrogen for Europe study, €480bn to €890bn needs to be mobilised between the early 2020s and the mid-2030s to finance the hydrogen value chain. This excludes required investments in electrolyser manufacturing lines, which the study evaluates between €0.6 trillion and €1.5tn to 2050.

In a very rough estimate, adding the whole 2022-2027 budget from EU leading public funds with opportunities for the hydrogen sector like the Connecting Europe Facility, the Innovation Fund, the Clean Hydrogen Partnership or LIFE with the cumulative amount of funds available for hydrogen among other clean technologies, from all Member States Recovery and Resilience Plans does not exceed €135bn.

This highlights the existing investment gap and the critical role that private investment will play in enabling the deployment of the hydrogen sector.

Investor interest

In their recent Unlocking the hydrogen economy study, the **European Investment Bank** consulted with nearly 50 financial investors, and their analysis highlighted the increasing investor's interest in hydrogen, with expectations that it would play a key role as a renewable energy carrier to decarbonise EU economies, especially in energy-intensive sectors. This investor's appetite for the industry translates throughout the private finance value chain.

In 2021, venture capital activity in hydrogen totalled almost €2 billion. While in 2021 invested capital nearly tripled, the number of deals doubled, signalling that VC funds are already willing to "pay to play". If the US is still leading with almost half of the global transactions in 2021, in Q1 2022 Europe held the highest share of capital invested in hydrogen, according to **Pitchbook** data.

New Hydrogen Pure Players Private Equity and infrastructure funds are being raised, and hydrogen investment is changing scale. **French Ardian** and **FiveT's** set up **Hy24**, a €1.5 billion clean hydrogen infrastructure platform in 2021 and attracted industrial LPs such as **Air Liquide**, **Total Energies**, **Vinci**, **Credit Agricole** and **Airbus**.

In August 2022 **Copenhagen Infrastructure Partners** clean hydrogen fund **CI ETF I** was oversubscribed and closed at the hard cap of €3 billion with more than 65 prominent institutional investors, primarily pension funds, life insurance companies and sovereign wealth funds.



Lenders on-board

In the last couple of years, banks, and debt finance providers such as **Natixis**, **Citibank**, **Deutsche Bank**, **ING**, **ABM AMRO**, **BBVA** have joined the **European Clean Hydrogen Alliance (ECH2A)** and are developing hydrogen strategies and building expert groups to build their understanding of the sector. However, most if not all of them are still to fund large projects through non-recourse financing, due to the still higher risks involved with renewable hydrogen projects. Market making support schemes and public support are still required to help mitigate these risks while the market is ramping up. For instance, **Deutsche Bank**, one of **H2Global** founders, is performing due diligence on three to four concrete projects under the German government's offtake contracts backing and identified these as the first large-scale project financeable transactions.

In this context, **Hydrogen Europe** has been working to build a bridge between key funding players and game changing European hydrogen projects and bring multiple financing institutions together to support the value chain deployment. For this reason, it partnered with **Tech Tour** for the organisation of the **European Hydrogen Financing Forum**, which aimed to unlock new opportunities for the sector by creating a platform for diverse private and public funding organisations to join forces and mitigate risk through co-investment and experience sharing. During its first event it welcomed 334 participants, among which a selection panel of 100 investors who took part in the online selection and provided more than 300 individual reviews to applicants, demonstrating a growing appetite to be involved in the hydrogen market build up. ●

Events Overview

1. EUROPEAN HYDROGEN WEEK, 24 – 28 October 2022, Brussels, Belgium

Free Registration for the B2B Forum and Exhibition is now open!

euhydrogenweek.eu



Don't miss the chance to engage into thought provoking conversations about hydrogen with the most important experts in the field.

Join the European Hydrogen Week on 24-28 October 2022: the must-go event to build a carbon neutral future and a strong network of sustainability leaders.

Explore the Exhibition and indulge between innovative ideas and the latest hydrogen products. Additionally, in the expo space you can also join the industry's most brilliant minds and discover the latest ground-breaking technologies at the B2B Forum. Both will take place on 25-26-27 October 2022.

B2B Forum

Come and check this unique opportunity, open to all the exhibition visitors. At the centre of the Expo area, speakers will go beyond regulative frameworks and inspire you with new discoveries, knowledges and peer to peer exchanges. Stakeholders from all hydrogen-related sectors will be able to join and meet peers, investors, and partners as they unpack the latest developments in this fast pace industry. [Click here for more info.](#)

Meet our Exhibitors

Industry, institution, and academia leaders... ready to meet them all? Get in touch with all the key-players of the industry and make the most out of this networking experience! Find out the latest trends in the production, distribution, and use of global renewable hydrogen.

Our Exhibitors will showcase the newest hydrogen trends, technologies and projects as well as to discuss the latest developments of the hydrogen value chain! [Click here for more info.](#)

For any enquiries reach out to events@h2flagship.eu

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2. COP 27 – 6 – 18 November 2022, Sharm El Sheikh, Egypt



The 2022 United Nations Climate Change Conference, more commonly referred to as COP27, will be the 27th United Nations Climate Change conference, to be held from 6 to 18 November 2022 in Sharm El Sheikh, Egypt.

We are delighted to announce that Hydrogen Europe team will be present at COP27. You will be able to find us at our own booth in the Green Zone or hear from us at some of the side events we are planning.

Stay tuned for more!

3. Hydrogen Europe General Assembly, 30 November, Online



Hydrogen Europe General Assembly takes place twice per year online. More information regarding the agenda, registration link and next steps will be shared with members on Members Only Area closer to the day.

4. Hydrogen Europe Winter Market Drinks Reception, 30 November, Brussels, Belgium



Hydrogen Europe’s Winter Market will take place on Wednesday, 30 November 2022 at 18:30 CET.

It will take place in Brussels, Belgium, face-to-face, and invitees will have the opportunity to bring together members and stakeholders of the hydrogen sector, in a great networking atmosphere. Don’t miss out on this opportunity with great food and drinks, set in a beautiful Winter Market ambience!

More information will be announced closer to the day on the [events webpage](#). Stay tuned for more!

5. H2 TALK WEBINAR SERIES

In 2022 Hydrogen Europe Hydrogen Europe launched its monthly webinar series tackling important hydrogen related topics. Visit Hydrogen Europe webpage and register for upcoming H2 Talks.

Missed previous edition?
Please check our past webinars:

Hydrogen Europe logo

HYDROGEN TALK

RED II REVISION

Will the Renewable Energy Directive ensure the future of renewable hydrogen in Europe or drive the industry out?

14.09.2022 | 15:00-16:30 CEST

Hydrogen Europe logo

HYDROGEN TALK

REPOWEREU AND THE BUILDING OF THE GREEN HYDROGEN PARTNERSHIP

Designing trade corridors between the EU, Africa and the Gulf

06.07.2022 | 11:00-16:30 CEST

Hydrogen Europe logo

HYDROGEN TALK

20 MT OF RENEWABLE HYDROGEN BY 2030- TURNING THE REPOWEREU PLAN INTO ACTION

25.05.2022 | 15:00 - 16:30 CEST

Hydrogen Europe logo

HYDROGEN TALK

CAN THE RED II DELIVER THE EU'S HYDROGEN AMBITIONS?

02.02.2022 | 10:00-11:00 CET

A warm welcome to all our new Hydrogen Europe members



ARTHUR BUS

ARTHUR is a mobility company and system manufacturer based in Munich.

The first solution of ARTHUR is a 12 meter hydrogen bus for public transport. 25

The ARTHUR BUS is currently the most advanced hydrogen bus on the market in terms of efficiency and consumption.



CONTACT

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CluBE

CluBE is a non-profit company established among local stakeholders of the Region of Western Macedonia, Greece.

CluBE is developing R&D and business activities in the fields of hydrogen and bioeconomy. More specifically regarding hydrogen, it focuses on the development of the green hydrogen economy and the establishment of a hydrogen value chain in the area to facilitate the region's decarbonization process.



CONTACT

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EIFHYTEC

EIFHYTEC is a European manufacturer of non-mechanical hydrogen compressors, based in the north-east of France. The company develops thermal compressors from 1 to 1000 bar, adapted to the requirements of hydrogen infrastructure for different use cases, including: filling centers, hydrogen refueling stations, industrial applications and power-to-gas.



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GEMÜ

GEMÜ Group is a leading manufacturer of valves and accessories employing over 2,200 employees worldwide. With six production plants, 28 subsidiaries and a network of partners, GEMÜ is active in over 50 countries.

Through Hydrogen Europe, we pursue to establish our presence in the Green Hydrogen Supply Chain and contribute our part in achieving the SDGs.'



CONTACT

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H2 ENERGY SRL

Thanks to managers, engineers and researchers with over 20 years of experience in the industry, H2 Energy is able to produce multi-megawatt sized systems Alkali, PEM, AEM,



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Hydrogen Austria

Numerous public and private institutions in Austria are successfully active in R&D, production and use of hydrogen technology. These institutions are pooling their strengths in Hydrogen Austria, the national hydrogen-cluster, enabling them to mutually benefit from each other's knowledge, to consolidate their expertise and enhance their national and international visibility.



CONTACT

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Hydrogen technologies Ltd

Hydrogen technologies Ltd is a company that has been producing hydrogen equipment for 12 years. We produce devices that are used in the automotive sector to reduce harmful emissions and operating costs, in the maintenance of cars, industrial hydrogen devices for cutting and soldering metals and devices for health - hydrogen therapy. In order to be relevant to our many customers from 2021, we started working on pure hydrogen applications.



CONTACT

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Hydrogen UK

Hydrogen UK is the UK's largest hydrogen trade association. We are committed to developing and deploying hydrogen solutions. We engage with trade associations, academics, professional institutions, Government and other opinion formers to achieve consensus around industry structure and policy changes, with the ultimate aim of building a hydrogen society.



CONTACT

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HySow

We are The Global Green Hydrogen Recruitment Specialist. We are a young and ambitious company that specialises in the green hydrogen and fuel cell sector.

We are passionate about a sustainable fuel market and the delivery of a workforce that will create a greener future.



CONTACT

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Northland Power Inc.

Northland Power is a power producer dedicated to developing, building, owning and operating clean and green global power infrastructure assets in Asia, Europe, Latin America, North America and other selected global jurisdictions. Our facilities produce electricity from clean-burning natural gas and renewable resources such as wind, solar and efficient natural gas. We have a long track record of 33 years in business.



CONTACT

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Panasonic

Panasonic Corporation is a worldwide leader in the development and engineering of electronic technologies and solutions for customers in residential, non-residential, mobility and personal applications. Since its founding in 1918, the company has expanded globally and now operates over 500 consolidated companies worldwide, recording consolidated net sales of 7.30 trillion yen (68 billion euros) for the year ended March 31, 2013. Committed to pursuing new value through innovation across divisional lines, the company strives to create a better life and a better world for its customers.



CONTACT

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Plagazi AB

Plagazi is a cleantech company working for the circular economy by recycling previously non-recyclable waste into green hydrogen with a negative carbon footprint. Our role in the hydrogen value chain is to revolutionize the green hydrogen industry with a competitive production cost, help decarbonize industries by replacing fossil fuels and simultaneously solve a global waste problem.



CONTACT

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Sakowin SAS

Sakowin is French SME developing a CO2-free, low-cost, on-site, on-demand hydrogen production solution. We design a new reactor technology to produce hydrogen and solid carbon from biomethane or natural gas. Using an energy efficient plasma, our process is not only economical in electricity but also low in CAPEX and easily scalable thanks to its modular design. It allows to produce hydrogen at very low cost directly at the consumption site and on demand by using existing gas infrastructures



CONTACT

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Sapio

SAPIO Group, founded in 1922 in Monza, operates in Italy, France, Germany, Spain, Slovenia and Turkey, produces, distributes and sells gases, technologies and integrated services, focusing on innovative solutions to create value for its customers.

SAPIO covers the entire hydrogen value chain, from production to distribution at end-user facilities via tube trailers or pipelines in different application fields (mobility, industry). SAPIO also operates production plants and refueling stations with a flexible value proposition to optimize solutions for our end customers.



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SPP DEVELOPMENT UKRAINE

SPP Development Ukraine is an international successful developer that implements investment projects in the field of renewable energy, engineering and IT infrastructure, telecommunications. EPC and full-service company, including O&M service. SPP Development Ukraine is founded and managed by a strong professional team with head office in Ukraine.



CONTACT

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Stargate Hydrogen Solutions OÜ

Stargate Hydrogen offers turn-key electrolysis solutions for the production of green hydrogen. Our electrolysers use cutting-edge alkaline technology that can provide hydrogen at high pressure, saving energy and costs. Uniquely, our technology is free of precious metals like iridium and ruthenium, making it inherently much more scalable than traditional solutions.



CONTACT

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TAP

TAP transports natural gas from the giant Shah Deniz field in the Azerbaijani sector of the Caspian Sea to Europe. The 878 km long pipeline is strategically and economically important to Europe and essential in providing reliable access to a new source of natural gas. TAP plays a significant role in boosting Europe's energy security, supply diversification, as well as its decarbonisation objectives.



CONTACT

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Técnicas Reunidas SA

World leading engineering company specialized in the design and project execution management of industrial plants worldwide, with more than 60 years of experience. More than 1000 industrial plants in the energy sector in our track record, with extensive experience in any hydrogen color: design and construction of production plants, integration with existing processes, handling and transportation.



CONTACT

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TES

We are Tree Energy Solutions (TES). We aim to be the TESLA of the energy sector, the European champion for green hydrogen and a disruptive innovator in the energy system.



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Vinci

VINCI is a world leader in concessions, energy and construction, active in nearly 120 countries. Our ambition, in response to the climate emergency, is to accelerate the transformation of living environments, infrastructure and mobility. We believe that hydrogen is the key to achieve this goal. This is why VINCI encourages the development of the hydrogen activity within all divisions of the group, as off-taker, investor or contractor.



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Westport Fuel Systems Italia

At Westport Fuel Systems, we are driving innovation to power a cleaner tomorrow. We are a leading supplier of advanced fuel delivery components and systems for clean, low-carbon fuels such as natural gas, renewable natural gas, propane, and hydrogen to the global automotive industry. Headquartered in Canada, with operations worldwide, we serve our customers in more than 70 countries with leading global transportation brands.



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THE HYDROGEN EUROPE QUARTERLY