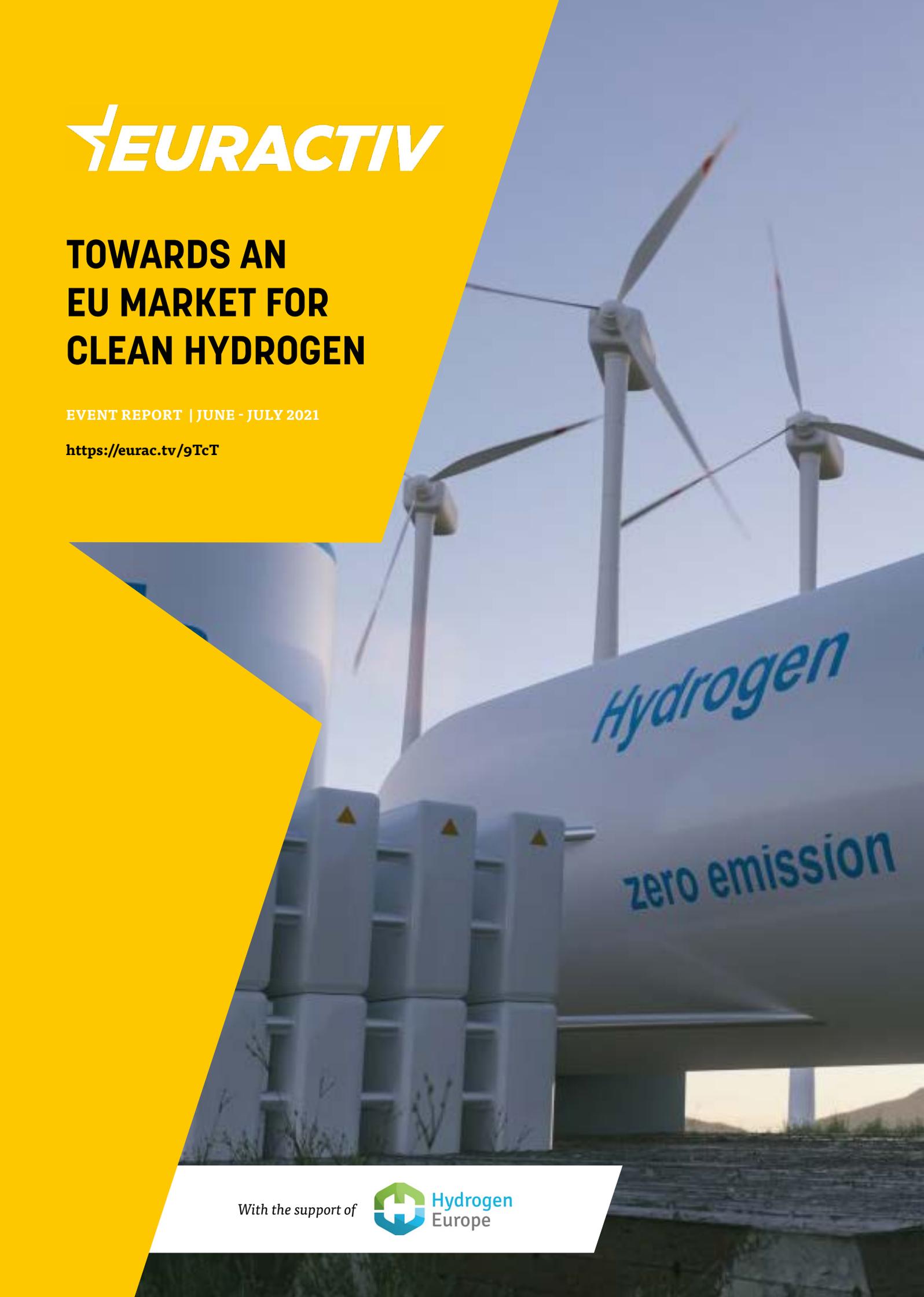




TOWARDS AN EU MARKET FOR CLEAN HYDROGEN

EVENT REPORT | JUNE - JULY 2021

<https://eurac.tv/9TcT>

The background image shows a clean energy facility. In the foreground, there are several white, cylindrical hydrogen storage tanks stacked in rows. Behind them, a large white structure, possibly a hydrogen storage or processing unit, is visible with the word "Hydrogen" and "zero emission" written on it in blue. In the background, several wind turbines are visible against a clear sky.

Hydrogen

zero emission

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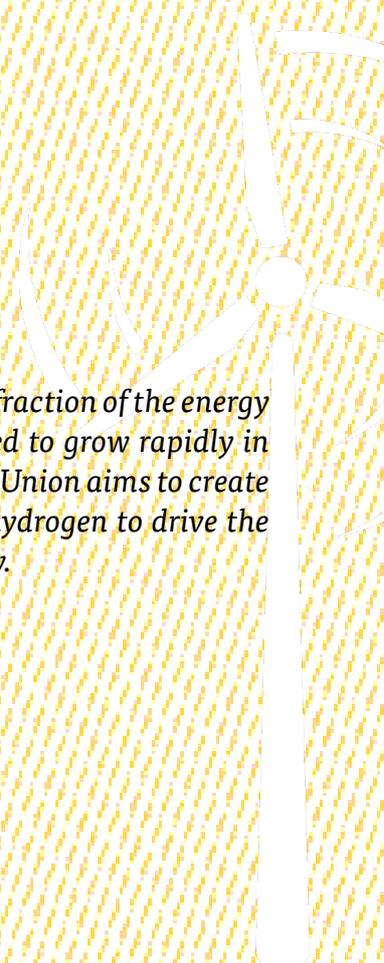


TOWARDS AN EU MARKET FOR CLEAN HYDROGEN

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Hydrogen today represents a tiny fraction of the energy mix but its importance is expected to grow rapidly in the coming years as the European Union aims to create a Europe-wide market for clean hydrogen to drive the decarbonisation of heavy industry.



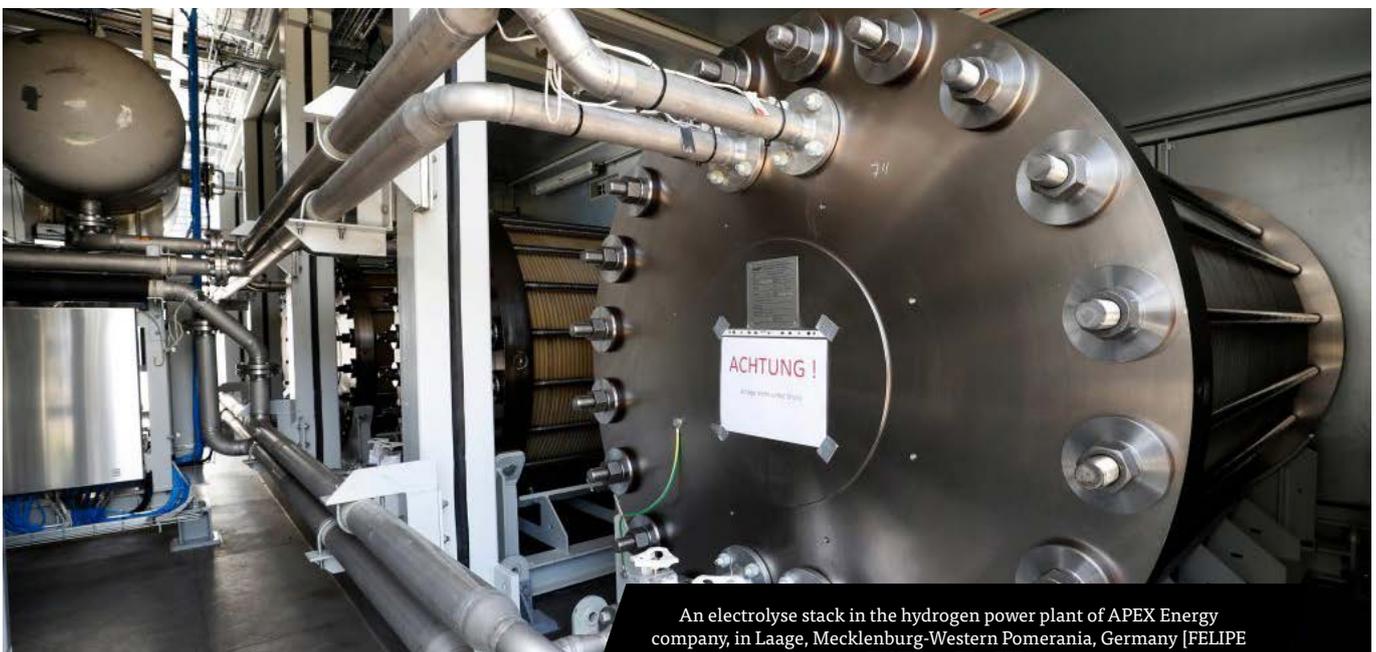
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'From champagne to table water': hydrogen sector aims for drastic price cuts by 2050

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By Nikolaus J. Kurmayer | EURACTIV.de



An electrolyse stack in the hydrogen power plant of APEX Energy company, in Laage, Mecklenburg-Western Pomerania, Germany [FELIPE TRUEBA / EPA-EFE]

The price of clean hydrogen can be cut drastically by mid-century if the EU creates a dedicated market structure to develop the fuel, according to the industry. Environmental groups, meanwhile, are sceptical about the emergence of a hydrogen economy.

“We need capital and operating expenditures ... to bring the price of renewable hydrogen from champagne to prosecco, and later table water,” said Jorgo Chatzimarkakis, secretary general of Hydrogen Europe, an

industry body.

Chatzimarkakis was speaking at the release event of the [Hydrogen Act](#), a new policy roadmap put forward by the industry, which charts a path towards creating a European hydrogen economy.

According to Chatzimarkakis, regulators cannot just copy and paste the laws currently applicable for gas and use them to grow a European hydrogen market. This is because the two markets are fundamentally

different, he argues, citing as an example end-use applications like fuel cells used in vehicles.

Instead, Hydrogen Europe proposes a distinct legal framework for hydrogen, based on two pillars – markets and infrastructure – to unlock the necessary investments.

To that end, the report proposes relaxing EU state aid rules for hydrogen, and make them eligible for bigger subsidies from national governments by flagging them as

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Important Projects of Common European Interest (IPCEI).

ROADBLOCKS TO HYDROGEN

There are plenty of roadblocks ahead, though. Today, hydrogen represents only a tiny fraction of the EU energy mix, and over 95% of it comes from fossil fuels, mainly natural gas.

That will need to change as Europe aims to reach climate neutrality by 2050. First, renewable energy supply will need to double at least by 2030 in order to produce the amount of electricity necessary to power electrolyzers and generate sufficient amounts of clean hydrogen.

And that will require faster permitting procedures for wind farms.

Permitting “is the single biggest bottleneck to the expansion of renewables today,” said Giles Dickson, CEO of WindEurope, an industry body.

“Permitting process procedures take too long and they are too onerous,” added Ann Mettler, vice-president for Europe at Breakthrough Energy, an investor-led fund chaired by US billionaire Bill Gates. Mettler called on EU states to simplify procedures and accelerate renewable electricity deployment in order to make sufficient capacity available for clean hydrogen production.

Another major hurdle stymieing investment in hydrogen facilities is the so-called additionality principle, which according to the industry requires electrolyzers to run exclusively on dedicated renewable

energy infrastructure. According to the industry, this would de facto exclude using excess renewable electricity that would otherwise be curtailed on windy days.

“The bureaucratic and cumbersome additionality principle is a show stopper,” said Chatzimarkakis.

The European Parliament scrapped the additionality principle from [its report on the EU hydrogen strategy](#), adopted on 20 May. In their version of the text, MEPs also sought to accelerate market development by pushing an intermediary phase where “low-carbon” hydrogen would be produced from natural gas, with carbon capture technology to bury the emissions.

But the additionality principle has its supporters too, including the European Commission, which says it will ensure that renewable hydrogen develops in sync with renewable electricity deployment.

That view is also supported by a large range of stakeholders, said Antonio Lopez-Nicolas, head of unit at the European Commission’s energy department.

However, the industry says additionality is difficult to implement in practice and is off-putting for investors because it forces production to rely on dedicated renewable energy capacity.

GREEN SCEPTICISM

Meanwhile, environmentalists have expressed doubts about the emergence of cheap, abundant hydrogen.

“Hydrogen will never be tap water,

prosecco at most,” said Dries Acke, director of energy systems at the European Climate Foundation.

“Hydrogen is a highly processed, inefficient energy carrier that will always be scarce and expensive,” said Acke, dampening expectations that hydrogen could one day replace fossil fuels.

“There is no such thing as a hydrogen economy,” he added. “Let’s not forget, hydrogen’s role in the net zero economy will be dwarfed by the actual giants, the actual heroes of climate action being solar, wind and direct electrification.”

INTERVIEW

Industry chief: Policymakers must set clear thresholds for low-carbon hydrogen

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By Frédéric Simon | EURACTIV.com



With a 75% emission saving threshold, the EU taxonomy “is quite ambitious, it excludes lots of blue hydrogen projects,” says Jorgo Chatzimarkakis. “But it’s not very ambitious, there’s room for improvement,” he adds. [International Transport Forum / Flickr]

The way clean or low-carbon hydrogen is defined under the EU’s green finance taxonomy could have been more ambitious, with a higher emission threshold excluding all unabated fossil fuels from hydrogen manufacturing, says Jorgo Chatzimarkakis.

Jorgo Chatzimarkakis is secretary general of Hydrogen Europe, an

organisation representing the industry and national association members covering the entire hydrogen value chain. Chatzimarkakis was a Member of the European Parliament from 2004-2014. He spoke to EURACTIV’s Frédéric Simon.

INTERVIEW HIGHLIGHTS:

- 75% CO₂ emission saving threshold for clean hydrogen

could have been “more ambitious”

- Carbon content should be erected as “new currency” of EU’s emerging hydrogen market
- Upcoming EU certification scheme must ensure that hydrogen is: traceable, trackable, tradeable, transparent, and trustworthy
- “Additionality principle” currently prevents using curtailed

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wind energy for hydrogen production and must be revised

- Carbon contracts for difference could get hydrogen market off the ground

The European Commission [presented a hydrogen strategy in July last year, saying the EU should aim at producing hydrogen coming exclusively from renewable energy sources, some time after 2030. What progress has been made so far? Is European industry on track to deliver that promise?](#)

Yes, I think we are on track. The most important element – to bring different partners together – has been achieved. There are six round tables in the European Clean Hydrogen Alliance representing all parts of the hydrogen value chain.

This is a big achievement – to have a collaborative approach with the wind and solar industry, the chemical industry, the car industry, and also the heating and the energy sector – and share the results with partners in the Alliance. This explains also the high number of participants in the alliance – there are around 1,500 so far.

The Alliance will define clear parameters for the selection of projects that might be funded from the EU budget. One of those criteria is defined by the emissions thresholds established in the green finance taxonomy.

We have always said it's up to the policymakers to decide about the ambition of this threshold. With a 75% emission saving threshold, it's quite ambitious, it excludes lots of blue hydrogen projects.

But it's not very ambitious, there's room for improvement.

Are you saying the 75% emission saving threshold should have been even more ambitious?

If you want a focus on renewable hydrogen, or extremely low-carbon hydrogen, then the level of ambition might still go higher, yes. There's room for a more ambitious approach.

That brings the question of blue hydrogen – combining natural gas with carbon capture – [which the European Commission has identified as a stepping stone towards a European-wide market for green hydrogen coming exclusively from renewables. You're saying Europe should go even faster and skip this transition phase?](#)

Europe should have the ambition to be a global leader. When I talk to investors from around the globe, it's crystal clear that they love the hydrogen story. But they also love figures and clear indications of where to go.

We must also consider the recent ruling of the constitutional court in Germany, which mandated a reduction of greenhouse gas emissions from 55% to 65% by 2030. For such a big economy, this is massive.

So now is a good time to give a clear signal to investors about what kind of hydrogen will be sustainable in the long term. And also set ethical standards excluding greenwashing with fake information, because standards must go beyond emission thresholds and encompass the whole hydrogen value chain, not just a small part of it.

If Europe wants to be the global leader on renewable and really clean hydrogen, then let's not lose time.

Are you saying Europe should go straight to 100% green hydrogen and skip the blue hydrogen phase?

That's not what I said. What I said is that the emission thresholds could have been more ambitious.

Blue hydrogen leads to about 60% decarbonisation compared to grey hydrogen made from natural gas. This is good, but you can get further emissions reductions using blue ATR technology, so there are different kinds of blue hydrogen.

In the end, it might be that technologies like pyrolysis, which is based on fossil gas, can reach a better performance and lead to zero emission hydrogen, because you get solid carbon at the end of the process instead of CO₂. And that can be used for carbon fibre applications, for example.

At the same time, we have clean hydrogen because of real-zero emission, which via pyrolysis is five times cheaper than electrolysis. If you take the energy for pyrolysis from renewables, you're super clean.

Another possibility is to use existing SMR technologies with CCS for biomethane – this would even cause a negative effect on CO₂ emissions.

That's why I don't want to exclude any technology right now. People who exclude colours are possibly not accelerating the pace of decarbonisation, that's what I want to say.

Policymakers should set clear thresholds and then let inventors and the industry come up with solutions.

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But it needs to be transparent: no loopholes, no greenwashing, just high thresholds and clear analysis about how it works. And whatever technology fails to meet the threshold should not get the corresponding public support.

In order to develop and grow, the European hydrogen market needs both supply and demand but those two are precisely lacking at the moment. How can that chicken-and-egg problem be solved?

There is a very simple idea, which combines auctioning with a carbon contract for difference.

Let's take an example: A steel company based in Belgium wants to change from coke-based steel production to hydrogen. By 2025 or 2030, they know they will need – let's say – five megatonnes of hydrogen. They will issue a tender and companies will bid. Maybe a company from Saudi Arabia can do it for \$3/kg and a Moroccan company says it can do it for \$2.5, and wins the bid.

The Belgian steel company will have a Hydrogen Purchase Agreement, a bit like Power Purchase Agreements for electricity, with the Moroccan company.

Still, the investment might be five times higher compared to steel made with coking coal. This is where the Carbon Contract for Difference comes in, to bridge that gap and levelise the cost.

A first project in the Netherlands was issued by DG competition. That's an important step because by auctioning, and by levelling costs,

you can have a big impact on this market structure to be developed. And that's definitely one of our major endeavours for the next years.

In terms of infrastructure, moving to a hydrogen economy requires upgrading gas infrastructure like gas pipelines and also building new infrastructure in some places, like electrolyzers. How can policymakers ensure that infrastructure funded with EU taxpayer money is used for clean hydrogen and not to sustain hydrogen made from fossil fuels?

Two elements: one is the threshold and we discussed that already. The second element is ensuring full transparency and prevent cheating, by introducing a system of Guarantee of Origins (GO). That certification scheme must be founded on the “five Ts principle”, meaning they must be: traceable (where does it come from), trackable (where does it go), tradeable, transparent (with digital information), and trustworthy.

So these five elements are, in our view, a precondition for a liquid, clean hydrogen market. And we believe this should be decided according to the emission threshold. Because if you exclude technologies in principle, you might exclude a faster and more sustainable solution – and that would be ideology.

I see policymakers are making that distinction, and I can fully understand them: it would be wrong to continue grey hydrogen, this is a clear message. This is why we need clear and ambitious emission thresholds in the taxonomy and carbon content to be the new currency.

The Commission is preparing a labelling system for hydrogen, which looks like Guarantees of Origin. According to draft plans, it would seem like GOs for renewable hydrogen would be regulated under the upcoming renewable energy directive while other forms of “low-carbon” hydrogen would be dealt with separately. Do you believe this is the right way to go?

In our view, the renewable energy directive should deal only with renewably produced hydrogen.

But low-carbon hydrogen, even the ones that fulfil the threshold, should be dealt with separately as part of the upcoming Smart Energy System Integration proposal, formerly known as gas regulation package, expected in the autumn. This is the distinction that we would suggest.

The reason why we strongly advocate for a separate energy carrier for Guarantees of Origin is because of transparency and accountability. Having one GO for both hydrogen and methane essentially means that they are interchangeable.

Now, when it comes to the various draft proposals that we have seen, there is one principle which is wrongly called the additionality principle, which in our view requires clarification. Basically, the renewable energy directive foresees that you can use renewable power from the grid for whatever you want – charge your car, charge your truck, charge your plane, etc. – but not to produce hydrogen, this is forbidden. And that's because you need to prove on a 15-minute basis where the electricity in the grid comes from if you plug an

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electrolyser on it.

They call it wrongly the additionality principle. This means that you need to prove every 15 minutes that it's additional renewable electricity that you are using to power your electrolyser.

You can imagine the effect this can have on investors considering to put money into electrolysers. I met recently with two people from a €40-billion investment fund. And they asked me: "do you expect us to invest in such a bureaucratic monster? No way, bye bye."

And that's the problem. We are not against additionality of renewable infrastructure, we are not against high renewable targets, quite the opposite, we support the colleagues from the renewable industry in their ambitious targets. But we are against placing the burden of proof solely on the people who are running the electrolyser.

There are more workable solutions. For example, you could ask a country like Portugal to prove that the amount of hydrogen produced from the grid corresponds to an additional renewable source over a year. Or you could use Hydrogen GOs to prove the electricity used as input is renewable. That is doable.

Or you could start the additionality accountability as of 2025, and let some flexibility in the kickstart phase until then. That would also be fine, it's a position which is very much supported by the wind industry for instance. Because with the additionality principle as it currently applies, they would be obliged to build dedicated wind turbines specifically for hydrogen production

– they wouldn't be able to use the existing ones and hence mitigate the over-capacities for the existing grid that currently lead to expensive curtailment and grid balancing.

Additionality was meant to be a cool idea. In Germany, the cost of curtailment is €1.5 billion per year and the cost of grid balancing is €30.5 billion. But today, under the current renewable energy directive, you cannot use that curtailed wind capacity to produce hydrogen. You can't do it because of this theoretical and well-intended additionality principle. But in reality it is quite stupid, if you ask me.

The hydrogen act, put forward by your organisation, advocates quotas for hydrogen use in certain sectors like clean steel and ammonia for shipping: how would such a system work?

I'll give you an example: If we ask the steel industry to use 10% hydrogen in their steel by 2025, that would be quite ambitious. It would have the highest CO₂ abatement effect on steel.

Then, you can raise this quota to 30% or even 40%. That makes sense because it forces the steel industry to change their production system. Steel is heavy on capital investments, blast furnaces cost around €1 billion, so once they go in that direction and make the investment, they also want to make sure their steel will have access to the market compared to cheaper high carbon steel imported from China.

You can do this via a Carbon Border Adjustment Mechanism (CBAM) or some other mechanism. But putting a quota on hydrogen use in steel shows how easy it is to have a high abatement

effect, give a clear signal to investors and change the whole steel industrial basis in Europe.

And you can do the same with fertilisers, which are currently the number one consumers of hydrogen worldwide and set an ambitious quota for ammonia the critical substance for the fertiliser industry that can be made out of renewably produced hydrogen.

That could be repeated with chemicals and petrochemicals. To target today's consumers of hydrogen corresponds to the low hanging fruit in order to kick-start large scale hydrogen production.

How should those quotas be determined? Should it be policymakers or should it be industry on a voluntary basis?

The rules need to be the same for everybody, which is why this is an exercise for policymakers, and should not be applied on a voluntary basis. Research and industry can work on the feasibility.

Member states may have different views on quotas, and as everyone looks at this from a different angle, it should be up to the policymakers to fix them. This will boost carbon abatement and a hydrogen based production in the European Union.

The hydrogen act says dedicated guidelines on state aid for hydrogen technologies should be promoted. Can you expand? Are you thinking about electrolysers, pipelines or both?

Everything. Things like hydrogen blast furnace for steel-making can be funded for example with the EIT

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innovation fund. That's public EU funding with clear definitions of what can be funded. A new blast furnace with an electrolyser would qualify easily for EIT funding.

Then you have the production of electrolysers themselves. Those need to be built. Countries like Greece, Italy, Spain which have huge access to the EU's recovery and resilience fund (RRF) – they could use that money for enabling CAPEX funding for electrolyser companies.

Then you have the demand side. For that, we have carbon contracts for difference in form of state aid.

The last one would be the pure infrastructure investments. Here, there is EU funding available under the 10-year energy network investment plan (TYNDP), the TEN-E regulation on cross-border energy infrastructure, and the Connecting Europe Facility (CEF).

Basically, what we need is good engineering. If I was a Belgian steel producer, I would expect the European Commission to take care of the blast furnace. And I would expect the Belgian government to take care of the contracts for difference. So it's a mix.

What you need is flexibility regarding the constraints on funding which are currently in place. And I'm very pleased that [EU Commissioner Margrethe] Vestager has expressed interest in contracts for difference, and waiving strict state aid rules for hydrogen projects, as part of the Important Projects of Common European Interest (IPCEI).

Regarding pipelines, there are heated debates at the moment about avoiding stranded assets, especially for gas infrastructure. When refurbishing gas pipelines for hydrogen, how can you make sure that those will be effectively used and will not end up as stranded assets?

Clear definitions is what's needed. A repurposed pipeline is a gas pipeline that is fully repurposed for the purpose of transporting pure hydrogen. A retrofitted pipeline is a pipeline that has been adapted to accommodate increasing shares of blends.

The only pipelines that cannot be used for hydrogen are basically middle-aged pipelines. The first pipelines that were built in the 1960s were built for town gas, which was 60% hydrogen, and produced from coal at the time. Those were built for hydrogen and don't need to be repurposed. Then, in the 1970s, came the natural gas pipelines. And those don't really like hydrogen. For those, you need to coat the pipeline, to retrofit or repurpose them.

Sure, but you could also take the money, repurpose the pipeline, and continue transporting natural gas into it, claiming it's clean infrastructure because it's hydrogen-ready.

Retrofitting or repurposing need investment. It's up to the authorities to end the transport of natural gas in pipelines that could carry 100% hydrogen. The Netherlands are a good showcase of how this works in practice. The pipeline system for L-gas is being repurposed right now for hydrogen. And believe me: It's

measurable whether there is natural gas or hydrogen in the pipelines. Cheating will not be possible.

STAKEHOLDER OPINION

DISCLAIMER: All opinions in this column reflect the views of the author(s), not of EURACTIV Media network.

Fit for 55: looking for a hero net zero

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By Jorgo Chatzimarkakis | Hydrogen Europe



Future design for an Hydrogen energy facility.

The announcement of the package to become fit for 55% CO₂ reduction by 2030 was unusual. It took Commission President Ursula von der Leyen longer to come to the press room than ever before. Clearly, a sign that the decision on how to present this historical step was disputed until the very last moment. Yet, this is understandable as the scope of the 12 initiatives is really vast, demanding and challenging. To get the job of CO₂ reduction done, you need many heroes.

Jorgo Chatzimarkakis is the

Secretary-General of Hydrogen Europe.

Obviously, hydrogen has been detected to be one of them with a role that is clearly assigned. This is a logical follow-up of the Hydrogen Strategy, which was presented at the same spot a year ago. The Fit for 55 package shows that the Commission now walks the talk and fills the ambitious targets with legislative live.

With regards to the recast of the Renewable Energy Directive, the proposal includes targets for the use of renewable hydrogen in the industry as well as the transport sector. In

transport, the 2.6% target is aligned with the assumptions of the 40GW strategy enshrined in the Hydrogen Strategy. Half of the industrially used hydrogen must stem from renewable sources until 2030. That is a real booster for the uptake of “hydrogenewables”. Furthermore, the proposal removes multipliers associated with certain renewable fuels and to renewable electricity used in transport, thus creating a level playing field. With regards to the additionality criteria, the Delegated Act is still in the making which allows more time to ensure that the scheme will be workable rather than counterproductive.

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When it comes to efficiency the notion of “energy system efficiency” in parallel to the “energy efficiency first” principle has made its way into the revised proposal. This opens the door to broader thinking on what we mean when we discuss “efficiency” such as the role of hydrogen in storage, its dispatchability, resource efficiency, time efficiency, space efficiency or material efficiency.

Really ground-breaking are the proposals for sustainable mobility: A proposal for regulation this time instead of a directive which means binding targets, directly applicable in all Member States. Moreover, this new piece of legislation promotes the rollout of hydrogen refuelling stations at a maximum distance of 150km in-between stations with the geographical scope extended along with the Trans European Network for Transport (TEN-T) core network and urban nodes. For maritime solutions, the promotion of hydrogen and hydrogen derived fuels is included in the proposal with clear targets to reduce emissions, starting already in 2025 with a cumulative effect.

One of the most important factors that increase the role of hydrogen is undoubtedly the CO₂ pricing. The proposal is designed to make the ETS able to deliver 61% GHG emissions reduction by 2030 (up from 43%), in line with an at least overall 55% target. This higher target will be achieved through a combination of a higher Linear Reduction Factor and a one-off reduction of the cap which is consistent with the discussions that took place in the Carbon Market Reform Working Group. The strengthened cap and

broader sectoral coverage provide for an increased ambition of the carbon market to trigger the clean switch and that across more applications: this is a positive step to incentivise the ramp of clean hydrogen.

Free Allocation is made conditional on installations’ decarbonisation efforts. Installations covered by energy audit obligations will be required to implement report recommendations or other measures leading to equivalent GHG reduction, otherwise, free allocation will be reduced by 25%. The proposal specifies that the requirements hold for investments with a pay-back period no longer than 5 years. Sectors covered by CBAM – steel, aluminium, cement, fertilizers, and electricity – would have a 10- years transition period to adapt to the new regime before free allocation is fully phased out. Free allocation for these sectors would decline by 10% yearly, starting in 2026 and would be zero by 2035. As most of these sectors, especially steel and fertilizers can be heavily decarbonised by the use of renewably produced hydrogen this adds massively to incentivising the role of hydrogenewables.

To sum up: The EU has come one step closer to becoming a global leader in hydrogen development. By putting targets on the use of hydrogen industry and transport the EU stands a real chance to achieve climate objectives, create thousands of jobs and protect its industry. There is no time to lose-delivering on the fit for 55 masters today!



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