France Hydrogène
Engagée pour la transition écologique

February 2023

Position paper on the use of industrial CO_2 to produce e-fuels - *Delegated Act from Article 28(5) of RED2*

France Hydrogène – the French hydrogen industry association, which gathers more than 460 members from across the value chain – welcomes warmly the adoption of both DA on RFNBOs, as regulatory certainty is crucial to unlock the final investment decisions in the sector. Nonetheless, in the Delegated Act from Article 28(5) of the Renewable Energy Directive 2018/2001, adopted on February 10, 2023, **the European Commission prohibits, from 2041 onwards, to use CO_2 stemming from industrial sources for the production of RFNBOS.**

We warn that **this provision will block many planned projects and will be counterproductive in climate terms, harming severely the decarbonization strategies of whole branches of industry without offering alternative solutions**. At the same time, such a provision may put at risk the balanced approach of the European Commission between hydrogen domestic production and imports.

The French hydrogen industry shares the Commission's issue to consider CCU with caution but reminds that the adoption of such very structuring measures must follow a strict impact assessment on the concrete existence (or not) of alternatives. It should notably take into account these three variables:

- **Sectoral**: where avoidable, the emission of CO_2 must be avoided first. However, there are some industries which cannot avoid emitting CO_2: it's notably the case of cement industry (process emissions from the limestone decarbonation) or lime production, as well as the remaining emissions in the steel sector (even after the implementation of Direct Iron Reduction method) caused by the cementation process. **It is needed to distinguish this *unavoidable CO_2* category from the other types of industrial CO_2.**

- **Geographical:** when the transport and storage infrastructure is available for the emitting industrial site, we agree on the need to favor CCS instead of CCU. However, many industrial sites (including a part emitting unavoidable CO_2) are located in zones which are not served and aren't ensured to be served, in the mid and long term, by CO_2 transport infrastructure. **In such cases, not giving any financial viability to the production of e-fuels is equal to block the decarbonization strategy of these industrial sites.**

- **Temporal:** the sunset clause in 2041 is equal to block all the major e-fuels projects production, whose the entry into service is planned by 2027-2030, and which require at least a 20-year period to amortize investments.

Therefore, France Hydrogène calls for setting two distinct grandfathering clauses for the use of CO_2 from industrial sources, providing that the environmental benefit of each CCU solution has been checked on a case-by-case basis:

- **One for the RFNBOs projects using *unavoidable industrial CO_2* and put into service before January 1st, 2037.**
- **And another one for the RFNBOs projects using other types of industrial CO_2** (except from the combustion of fuels for electricity generation) **and put into service before January 1st, 2032.**

In the case where the above proposal wouldn't be considered by the EC, given that DAs have been adopted, **we strongly recommend replacing the strict prohibition to use industrial CO_2 after 2040 by the possibility for the stakeholder to buy an amount of credit equivalent to 50% of the industrial CO_2 used in the process**. These

credits would be sourced in the "*market of carbon removal*" that should be built following the adoption of the awaited Regulation establishing a Union certification framework for carbon removals (COD 2022/0394). **A quick communication by the Commission on this issue would be crucial to restore EU stakeholders' confidence.**

In any case, the Commission must ensure that mass balancing be allowed to differentiate, in a same flow of CO_2, the part which is from fossil source, and the part which is from biogenic source. Indeed, if we take the example of cement plants, the use of biomass should be a major lever for decarbonizing the heat source, and it is important that industry stakeholders have the possibility to use this relevant part of the CO_2 stemming to produce e-fuels. **Only a mass balancing methodology can provide this guarantee**.

1. Framework, figures and risk of *fall of the cliff effect*

Since the announcement of the European hydrogen strategy in July 2020, the European Commission sets an ambitious and very much needed framework for the development of hydrogen and its derivatives, including molecules whose synthesis requires CO_2.

For instance, the ReFuelEU Aviation Regulation proposal sets a sub-target to use 0,7% of e-kerosene by 2030, over the total energy consumption of the air transport sector. Considering a total consumption of 50Mt of kerosene within the EU by 2030, fulfilling this 0,7% sectoral quota induces a need of 1,352 Mt of CO_2[1]. By 2040, if the Commission's proposal to set a e-kerozene subquota at 8% is adopted, and considering an iso-consumption for this sector, this would induce a need to source – for aviation sector alone – about 15.52 Mt of CO_2 would be required. Furthermore, the Commission's proposal on the ReFuelEU Aviation is assessed not to be in line with the objective of reaching net zero by 2050 by some organizations, notably given the tensions on biomass feedstocks, thereby proposing higher binding mandates for e-SAF. The NGO Transport & Environment call for setting, by 2040, a binding target of 32% of e-SAF[2]. In such a case, and still with an iso-consumption hypothesis, the EU would need to source 62Mt of CO_2 only for the aviation needs.

The on-the-ground reality of projects confirms the willingness of the European Commission to accelerate on hydrogen and its derivatives. In the unprecedented data collection carried out by France Hydrogène in 2022 to see the "in-the-pipe projects" in France by 2030[3], the first use for hydrogen is the production of synthetic fuels, with 205Kt of H2 to produce e-methanol[4], 165Kt to produce e-kerozene, and 55Kt to produce e-methane[5]. **It corresponds to a need of nearly 2.3Mt of CO_2 per annum, from 2030 onwards, only for France.**

▪ *Refining*	50,000
▪ *'Conventional' ammonia*	20,000
▪ *Synthetic molecules*	425,000
e-methanol	*205,000*
e-fuels such as SAF and e-kerosene	*165,000*
other needs (e-methane, etc.)	*55,000*
▪ *Steel-making*	250,000
▪ *Decentralized industry*	12,000
▪ *Process heat*	6,500
▪ *Not specified*	51,500

Industry uses (815kt) of decarbonized hydrogen in France by 2030

[1] Producing 1kg of e-kerozene requires about 0.32kgH_2 and 3.88kgCO_2
[2] *Why the EU can and should increase e-kerosene targets in ReFuelEU*, Transport &Environment, June 2022
[3] *A road-map for an ambitious hydrogen strategy by 2030 – part 2*, France Hydrogène, December 2022
[4] Producing 1kg of e-methanol requires about 0.24kgH_2 and 1.72kgCO_2
[5] For 1kgH_2, about 5.2kgCO_2 is required

These massive needs cannot be addressed, by 2030, with biogenic or direct air captured CO_2. All the e-fuels projects for 2030 thereby rely on the capture of concentrated steams of CO_2, from industrial sources. **Yet, if the regulatory framework induces an impossibility to value their output from 2040 onwards, these projects will just not be launched at all**. Following the French case mentioned above, and considering that the CCU allows to divide by 2 the emissions, we can anticipate the following consequences if penalizing too strictly the use of all the types of industrial CO_2 from 2041:

- Many individual decarbonization projects relying on the on-site production of synthesis molecules would be given up, without having at their disposal a technical alternative. In France, it would correspond to continue emitting yearly about 1.15Mt CO_2.

- More important is the triple industry ramp-up carried by these projects, and what we would miss without setting the right conditions to develop them:
  - With 425Kt used by 2030 over a total French consumption of decarbonized hydrogen estimated at 1070Kt, the production of e-fuels would be the first type of final use for hydrogen. It will be thereby a crucial contributor for scaling up clean hydrogen production.
  - **To launch an industry which will produce synthesis molecules with CO_2 directly captured in the air (DAC) when the technology will be available, it is imperative to create European champions now.** Using industrial CO_2 in 2028-2030 will allow to unlock the potential of e-fuels on later stages, while not creating new dependencies. Mostly, this first deployment of domestic production will allow to gather, around the producers, many local SMEs which then will have the weapons for going to export. **It is essential to keep in mind that, outside the EU, other countries will have very less strict rules that will allow stakeholders to develop projects in the upcoming years. If we don't develop domestic production projects in the same time, that are these stakeholders from third countries which will be the only ones well positioned to answer the EU needs.**
  - The final uses must be considered as a decisive part of the equation. The very positive dynamics on methanol vessels that can be observed with main European shipowners (notably CMA-CGM and Maersk) may be threatened if the legal framework makes clear that the sustainable fuel will not be available in Europe.

2. The need to differentiate industrial CO_2 sources: the case of unavoidable CO_2

In its last proposal for assessing the greenhouse gases emissions of RFNBOs, the European Commission differentiates CO_2 stemming from the combustion of fuels for electricity generation, and CO_2 stemming from other industrial sources. **The French hydrogen industry warmly welcomes this proposal to differentiate CO_2 sources.** Where emitting CO_2 can be avoided, it is the priority, and the electricity production obviously can be decarbonized without carbon capture.

However, we call for the Commission to go further in regard with differentiating industrial CO_2 sources. Indeed, some industries cannot be decarbonized without carbon capture. It is imperative for these emitters of ***unavoidable CO_2*** to quickly have the technical possibility (cf. part on geographical dimension) to implement carbon capture solutions.

It's notably the case of cement or lime production, for which about two-thirds of the emissions result from the limestone decarbonation in the process, for which there's no alternative. Alone, cement production is responsible for about 8% of the emissions on a global scale, and 2% of the emissions in France. **It is a major short and mid-term decarbonization issue to give a visibility to these stakeholders for valuing their unavoidable CO_2. Yet, 12 or 13 years are not enough to justify heavy investments in the on-site production of synthesis molecules (major entries into service are planned by 2027-2028, while the sunset clause for using industrial CO_2 would be set for 2040).** And thus, except for sites located close of CO_2 transport and

storage infrastructure, which are a minority, keeping the current proposal is equal to let aside and without alternative decarbonization solutions most of the sites emitting unavoidable CO_2.

Furthermore, it is important to note that the volume of imported cement was multiplied by 2.5 in Europe during the last 5 years. Not giving the possibility to value and reuse captured CO_2 (what basically allows to decrease the emissions by 50%) will bring risks on the economic viability of these industrial sites, which may basically close and provoke new increases of our cement imports. Beyond the important negative impact on European jobs, the provisions of the proposed DA28(5) create a clear carbon leakage exposure for the industry, and especially the cement one.

Another source of unavoidable CO_2 is the emissions in the steel sector caused by the cementation process, which remain even after the implementation of Direct Iron Reduction method (DRI). These residual and unavoidable CO_2 emissions processes represent about 0,1tCO_2/ton of steel. Other sources of CO_2 may be classified as unavoidable, notably in the chemicals sector.

Thus, it is essential that the Commission investigates the creation and the precise scope of such a category. In regard with the real differences of CO_2 "types" and decarbonization options within the industry, we cannot have a monolithic approach on industrial CO_2.

3. Integrating the geographical and temporal constraints at the core of the measures

It is imperative to assess precisely what would be the impacts of a general sunset clause for the use of industrial CO_2 in 2040. In France, and probably in the rest of Europe, the major entries into service for production projects of synthesis molecules are planned in 2027-2028. These projects need to work at least 15 years, rather 20 years, to amortize their investments. **Therefore, a sunset clause on December 31, 2040, is just equal to stop immediately the investment decisions and to block the projects**.

Yet, the alternative to make CCS instead of CCU is conditioned by the existence of a transport infrastructure for CO_2, from the industrial site to the port hubs which constitute the "starting point" for storing CO_2 (offshore). For the upcoming years, this infrastructure will only be deployed in the port hubs, while the sources of industrial CO_2 are far more diffuse. For instance, if we refer again to an unavoidable CO_2 source, 80% of the cement plants within the EU are located far from this needed infrastructure for deploying CCS. These plants are very diffuse, and even in 2040 it's probable that a main part doesn't be served by this infrastructure.

In the best case, keeping this sunset clause in 2040 will lead to postpone the implementation of carbon capture systems until the "arrival" of the required infrastructure. The development of such an infrastructure being highly uncertain, on the places concerned by the pipes and the timing for their development, it may harm the confidence of the stakeholders concerned by the development of CCS and provoke severe plants closings. And, when the infrastructure never or lately arrives, the result in terms of cumulative avoided carbon emissions would be substantially bad.

4. Key recommendations

Therefore, France Hydrogène calls for setting two distinct grandfathering clauses for the use of CO_2 from industrial sources providing that the environmental benefit of each CCU solution has been checked on a case-by-case basis:

- **One for the RFNBOs projects using *unavoidable industrial CO_2* and put into service before January 1st, 2037.**

- **And another one for the RFNBOs projects using other types of industrial CO_2** (except from the combustion of fuels for electricity generation) **and put into service before January 1st, 2032.**

These two provisions will allow to unlock the urgently needed Final investment decisions (FID) for production projects of decarbonized e-fuels within Europe by 2027-2030, while keeping an adequate level playing-field between CCS or other decarbonization solutions and e-fuels production, looking at what is realistically achievable and what is not.

For industries emitting avoidable CO_2, the condition to produce e-fuels will be to go fast, with a deadline on December 31, 2031, for the entry into service. Consequently:

- In regard with the total CO2 volumes emitted by the EU industry, it will be few and will absolutely not compromise the global decarbonization objectives of the EU industry.
- But the parallel positive effects on industry will be major. It will allow to structure a European value chain on synthetic molecules, which will be crucially needed on later stages to produce these e-fuels with carbon directly captured in the air, or from biogenic source.

For this type of industries / CO_2 sources, it will be a powerful incentive to accelerate on their decarbonization strategies if they want to produce e-fuels.

For the industry emitting unavoidable CO_2, which faces higher constraints, this measure will allow to take decision having (by 2037) a real better view on what can be really expected or not for the access to the CO_2 infrastructure required to develop CCS solutions.

In the case where the above proposal wouldn't be considered by the EC, given that DAs have been adopted, **we strongly recommend replacing the strict prohibition to use industrial CO_2 after 2040 by the possibility for the stakeholder to buy an amount of credit equivalent to 50% of the industrial CO_2 used in the process**. These credits would be sourced in the "*market of carbon removal*" that should be built following the adoption of the awaited Regulation establishing a Union certification framework for carbon removals (COD 2022/0394). This provision will allow to take into account the crucial geographic dimension of the problem. Indeed, in 2040, many industrial sites still:

- won't be served by CO_2 transport infrastructure, to send the captured CO_2 on storage sites;
- and/or won't be served by hydrogen infrastructure, a new final use having to be found for the production having been deployed to make synthesis molecules.

In both cases, if the sunset clause is kept in 2040 without planning a *fallback solution*, this huge risk will block any final investment decision on synthetic molecules production in the upcoming years, within the EU. Having for direct consequence that only the industrial sites located in the port hubs will be able to implement carbon capture over the next decade. This delay in the industrial deployment of CCS would be deadly for structuring an EU value chain, and stakeholders from 3rd countries would take the lead on the market.

With this alternative proposal, final investment decisions on e-fuels projects production (using industrial CO2) can be taken in the upcoming years, and the solution after 2040 will be adjusted depending on what has been achieved or not regarding infrastructure roll-out:

- If the required infrastructure is available by 2041 (date of the sunset clause), the CO_2 and hydrogen outputs will be reallocated in a more carbon-efficient way.
- If the infrastructure isn't available, these projects will go on, supporting a new cost (purchase of credits) which shall reflect rightly the new structure of the e-fuels market, dominated by carbon from biogenic or DAC sources.

A quick communication by the Commission on this issue would be crucial to restore EU stakeholders' confidence.

Last but not least, the Commission must ensure that mass balancing be allowed to differentiate, in a same flow of CO_2, the part which is from fossil source, and the part which is from biogenic source. Indeed, if we take the example of cement plants, the use of biomass should be a major lever for decarbonizing the heat source, and it is important that industry stakeholders have the possibility to use this relevant part of the CO_2 stemming to produce e-fuels. **Only a mass balancing methodology can provide this guarantee**.

In both cases, we call for the European Commission to assess how unlocking the e-fuel production projects in the upcoming years while preserving the legitimate deep decarbonization objective. With the current general sunset clause in 2040 for industrial CO_2, both are threatened.