EEB contribution to the assessment of the Strategic Technologies for Europe Platform (STEP)

The European Environmental Bureau welcomes the opportunity to contribute to the assessment of the Strategic Technologies for Europe Platform (STEP). *The EEB provided already preliminary responses on the first call for feedback on 21/03/2024 which are still valid as to expectations on implementation of STEP and tools needed for enabling evaluation of its positive impact* [1].

According to article 8.2 of Regulation (EU) 2024/795, the interim evaluation should assess to which extent the STEP's objectives have been achieved, as well as the relevance of STEP's actions and the appropriateness of a new legislative proposal amening the Regulation with the aim of "*reducing the Union's strategic dependencies and strengthening Union industrial policy*".

Article 2 lists the goals of STEP; *sovereignty and security*, as well as reducing the Union's strategic dependencies in strategic sectors are mentioned at the top of the list (art. 2.1), while art. 2.1.a (ii) mentions "*clean and resource efficient technologies, including net-zero technologies as defined in the Net-Zero Industry Act*". Art. 2.2 clarifies the previous provision underlining that the technologies should bring an "*innovative, emerging and cutting-edge element with significant economic potential*" or they should "*contribute to reducing or preventing strategic dependencies of the Union*".

Whilst the STEP objectives as per Art 2(1) refer to a list of "critical" technologies such as "clean and resource efficient technologies", there is no further clarification as to what is concretely meant. Depending on where the interests and ambition level lay, there may be different views as to what minimal expectations relating to supporting those options could be and under what conditions.

1. **STEP is not supporting the goals of the Union to reduce strategic dependencies, nor its sovereignty and security**

Judging from the list of projects that received the STEP seal under the Innovation Fund funding scheme, the EU is contributing with more than 1,2 billion € to develop projects based on carbon capture technologies. An additional amount of about 2,2 billion € for the same type of projects is listed despite not benefitting from any EU contribution. In total, 3,4 billion € out of almost 5 billion € is allocated for projects based on carbon capture technologies (68%).

Such an unbalanced support on carbon capture will contribute to leaving the Union reliant on fossil fuels, counteracting the original goal of the Regulation. Considering cement production, 35% of GHG emissions comes from the combustion of fossil fuels to heat cement kilns. With an unconditioned use of carbon capture technologies and without considering and prioritising fossil-free alternatives (e.g. low or zero-clinker cements) to decarbonise the sector, such dependency would be preserved. The same can be said for the production and use of e-fuels.

Our reliance on fossil fuels is hitting hard not only our economy, but our fundamental values of democracy and freedom, as well as leaving the EU at the mercy of geopolitical tensions and vulnerable to volatile fossil fuels.

Public funds should contribute to stop such dependency rather than incentivise a lock-in situation.

2. **STEP is not supporting (so far) "clean" and resource efficient technologies**

Carbon capture technologies are by definition unclean and cost-inefficient and are rather an "end of pipe" last resort option. They are unclean because they require further input energy, scrubbing agents, amines and -depending on the capture rates- will not fully abate GHG or other air pollutants that are not removed from the raw gas prior to the absorber. In waste incinerators the use of carbon

[1] Contribution ID 85838735-902f-4176-99bb-db31b86d92d7Date: 21/03/2024 12:40:28
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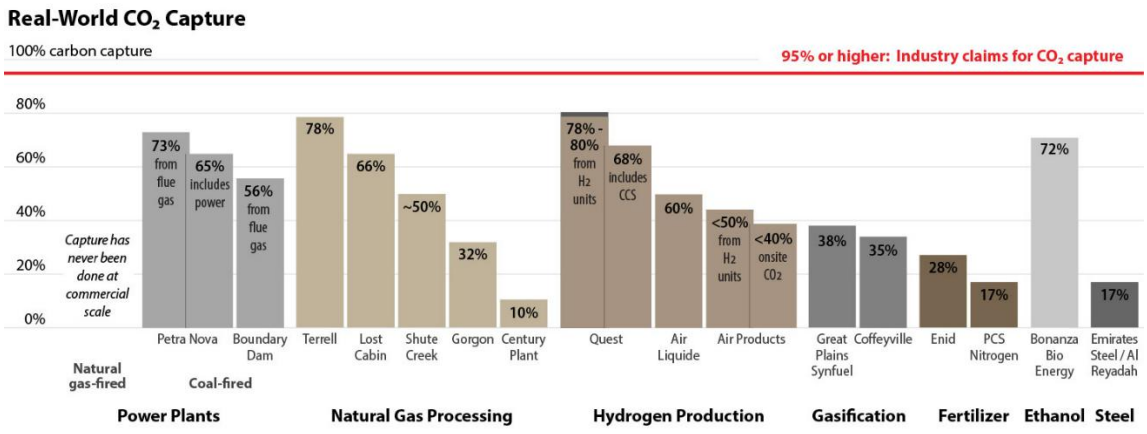
capture does not reduce the emission of persistent organic pollutants such as dioxins or furans. Additionally, by promoting processes based on combustion, carbon capture technologies increase upstream GHG emissions (e.g. due to coal mining[2]) due to the extraction of fossil fuels that would otherwise stay in the ground. Moreover, many carbon capture technologies require the use of solvents (amine process) that generate toxic waste; according to the *Haut Conseil pour le Climat*[3], an estimates solvents consumption of 1,85 kg is required for 1 tonne of captured CO_2.

The economic efficiency is to be questioned: financial effort of hundreds of billion of euros to only partially address the issue of industrial decarbonisation and de-pollution; only operationalising the NZIA injection capacity target would require up to 10,5 billion €[4], while IEEFA estimated in 520 billion € the cost of the current EU's project pipeline[5]. Secondly, they are not efficient when it comes to capturing CO_2. In general, it is usually assumed that carbon capture technologies can capture 85-90% of the CO_2 released after combustion. Nevertheless, according to a study released by IEEFA[6] analysing the actual capture rate of 16 existing projects, none has consistently captured more than 80% of CO_2 (see figure below). The average capture rate of such projects is around 49%, with some only at 10-17%.



An additional issue arises as industrial facilities usually have various points of emissions, some of which might be too difficult to address due to too low CO_2 concentration in the waste gas. In fact, the lower the CO_2 concentrations, the higher the costs and the amount of energy required by a CCS facility. More transparency is needed to fully understand the actual achievable capture rates and whether those rates are kept sufficiently stable on the long term. In general, minimum capture rates should be kept stable in the >95% range.

3. STEP is not supporting innovative, emerging and cutting-edge elements with significant economic potential

First carbon capture technologies are not innovative, nor emerging. The track record of their achievements in the last decades tells a story of undelivered promises. Already in 1991, CCS was

[2] https://ember-energy.org/focus-areas/coal-mine-methane/
[3] Haut Conseil pour le Climat, 2023, Avis sur la stratégie de capture du carbone, son utilisation et son stockage (CCUS)
[4] European Commission Staff Working Document: Investment needs assessment and funding availabilities to strengthen EU's Net-Zero technology manufacturing capacity
[5] IEEFA, 2024, Carbon capture and storage: Europe's climate gamble
[6] IEEFA, https://ieefa.org/ccs

depicted[7] "as a promising solution for the near term" and, in any case, as an "interim priority". So far it has not played any role to help the decarbonisation of carbon-intensive activities. On the contrary, presently the main role of CCS is to facilitate the extraction of fossil fuels. Moreover, evidence gathered by researchers at the University of Oxford[8] suggests that the learning effect of CCS technologies, which usually brings the cost of technologies down, is unlikely to happen, mainly because its equipment consists of mature engineering components such as steel pipes and gas pumps.

In the same time renewables-based and electrification technologies are much more profitable than fossil-based equivalent technologies (e.g. heat pumps and electric vehicles).

Irrespective of the above point, we believe that the criteria of need to bring an "innovative" / "cutting edge" element is / can be counterproductive (see points 4 and 5 below). Many failures in acceleration of the industrial transformation are largely driven by failures to internalise external costs (of pollution) or the price to pay for high social standards, hence undermining the economic potential of alternative solutions due to a bias in the benefit to cost benefit assessments made. The question of economic potential should be seen as much wider context of economic gains for society at large, not the operators or project developers.

4. The need for adding to the STEP Regulation further conditions, able to unleash the potential of circularity, direct electrification and material substitution.

In the light of such elements, we do not think that STEP managed fulfil its achievements and we think that it is appropriate to amend the present Regulation to strengthen the conditions under which project can get the support of STEP. Such tightening of conditions should go hand in hand with the review of the conditions regulating the allocation of the resources under the Innovation Fund and the other programs connected to STEP.

So far, the support got granted to specific sectors and (end of pipe) technology pathway with clear shortcomings. In contrast we regret the total absence of projects on circular use of materials and material substitution, which seem to trigger from shortcomings in conditionalities within the STEP Regulation and/or its non-outcome oriented implementation.

We suggest the following four cumulative conditions:

1. Explicitly exclude from public funding any fossil fuels-based technology, including carbon capture. Prioritise fossil-free alternatives and circularity, including technologies preventing downcycling of metals, low and zero-clinker cements, electrification, energy and material efficiency technologies.

2. Any fossil fuels-based technology, including carbon capture projects, not benefitting from public funding but receiving the STEP seal (Sovereignty Seal), must respect the following conditions. The project:

- Under no circumstance allows any increase of production of any fossil fuel.
- Allows a steady minimum 95% carbon capture rate considering all emission sources, which must be communicated transparently.
- Concerns only permanent storage as per Commission Delegated Regulation (EU) 2024/2620. Any other use of CO2 for products that would release the captured CO2 after a period shorter than "several centuries or longer" must not be considered.

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[7] Nebojša Nakićenović, Aviott John, CO_2 reduction and removal: Measures for the next century

[8] Bacilieri, A., Black, R., & Way, R. (2023). Assessing the relative costs of high-CCS and low-CCS pathways to 1.5 degrees. Oxford Smith School Working Paper 23-08

- Allows liquified CO2 quality specifications stricter than the ones required by the Northern Lights project[9] to minimise risks of CO2 leakages.
- Concerns only residual GHG emissions not technically abatable after all measures to reduce GHG emissions at source have been implemented, including a higher use of circular and recycled materials, energy and material efficiency measures and electrification. Such approach is being considered also by DG Competition in the new State aid framework under the Clean Industrial Deal and would ensure that only specific processes without alternatives could benefit of carbon capture technologies.

3. the quantification of a favourable return of investment ratio for the delivered outcomes that must serve public interests e.g. (improved health, environmental and climate protection) and not generate negative cross-media effects "Best ration of public interests served for money test".

4. A time bound element as to delivery on the Zero Pollution objectives with a strong case for deploy ability / replicability of the solutions (prior to 2040), ideally with a global negative impact reduction effectiveness mindset approach.

5. **Missing elements / tools to assess best value for money against the 5 standard evaluation criteria:**

As highlighted by the EEB in the initial submission on in the first call for feedback on 21/03/2024 (via the Industrial Forum) key cross-cutting expectations remain on enabling an assessment on whether the objectives of the implementation of STEP[10] have been met.
The current 5 criteria used for evaluation are: relevance, effectiveness, coherence, efficiency (including a cost and benefits analysis), and EU added value.
So far, we miss tools designed in such a way to allow the public (and any economic actors interested in STEP funding) to understand if and how the funding is "best spent" to match the various public interests needs within the various supply chains and on what key performance indicators pursued.
Two simple proposals for improvement are as follows:
1) **An overview document as to what the eligibility criteria are as to funding allocation as to delivered outcomes that serve public interests e.g. public interests (improved health, environmental and climate protection) return of investment ratio.** Minimal expectations are not clear / vague as to whether the funding will actually match delivery expectations on the zero-pollution ambition. Some EU initiatives developed under the EU Green Deal are not yet clear as to what meaning of "essential uses" could be. The Montreal Protocol refers to essential for society to function whilst STEP (Art 2.2) refers as to 'critical technologies' (with significant economic potential or are preventing / reducing strategic dependencies of the Union). The meaning of those concepts are not the same but should get closer in synergy co-benefits effects.
2) **a data repository comparing "promises" / "expectations" from the project application phase (accepted to be funded) v. real progress delivered by the beneficiary / industrial sector on the set Key Performance Indicators to deliver on the objectives is needed**. Powerful search filters should allow to sort by various industry sectors (See Annex I of Industrial Emissions Directive 2010/75 as amended / NACE codes), environmental themes: Air, water, soil, chemicals, resource use / waste prevention, Decarbonisation, Chemicals (substitution) or general compliance support EU acquis (monitoring of progress, standards making etc);

As highlighted above, the criteria of need to bring an "innovative" / "cutting edge" element is/ can be counterproductive. Some pollution prevention options are actually available that could deliver deep

[9] https://norlights.com/wp-content/uploads/2024/06/NorthernLights-GS-co2-spec2024.pdf
[10] Contribution ID 85838735-902f-4176-99bb-db31b86d92d7Date: 21/03/2024 12:40:28 'Industrial Forum members expectations regarding the Strategic Technologies for Europe Platform (STEP)'

pollution impact reductions within being necessarily “innovative” but on the other hand scalable and much more cost effective. Being “innovative” does not mean being effective to deliver on rpgress towards the objectives set. The latter shall prevail.
One example could be LC3 cement production process that can be scaled/deployed at much cheaper cost (considering the output ratio) compared to retrofitting a traditional Portland cement clinker production plant with CCS (capturing at 50%) with similar GHG intensity performance at the concrete level. The only example known in Europe (Heidelberg materials Brevik, Norway) so far took 20 years from planning to pilot runs. Whilst the first of its kind learning process and demonstrating technical feasibility may be a value on its own, the deploy ability / replicability of the solutions (funded by STEP) need to be considered with a more open and global impact reduction purpose mindset.

The above mentioned 5 criteria ratings, in particular the criteria “EU added value” should hence build on a) minimal common benchmark(s) of reference per industry sectors b) ensure an integrated approach as to pollution prevention and restoration (funding supports are often single issue / challenge related) and also look at the full value chain, here it seems that STEP does not support demand reduction initiatives within the value chain (alternative business models, improved efficiency and circular economy aligned projects). If one of the main aim is to deliver fast on climate protection, the time window as by when the solutions (funded) can be implemented on the ground and at global scale becomes a paramount criterion also for “effectiveness” (to deliver on time).

Finally, even if the Regulation allows "any of the STEP objectives" to be met (Art 4.1) we still believe this is not in line with ‘integrated approach’ (best overall outcomes to be delivered, avoiding negative cross media effects). Situations should be avoided where a project supporting manufacture of a 'critical component' needed for other Art 2(1) point (a) technologies comes with a (significant) negative impact on the overall greening of the transition overall of the EU economy. This is further in line with the EU taxonomy principle of ‘Do no significant harm’ (DNSH) when determining techniques that are taxonomy-aligned. It would be useful that all the minimal environmental and climate performance requirements are compatibility checked as to the project expectations (Art. 4.1).

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