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STRATEGIC FRAMEWORK FOR THE DEVELOPMENT OF THE BIOHYDROGEN PRODUCT MARKET

In Europe, until 2050, there will be a new document "New Green Deal" [New Green Earth], which covers all definitions of CO2 reduction for the so-called. the ETS sector, which is obliged to purchase CO2 emission rights, and the so-called non-ETS that are not part of the system, such as transport and agriculture, which are also required by special legislation to reduce CO2 emissions. The main aim #EUGreenDeal is decarbonization, namely, waste from the use of coal and its derivatives, as well as natural gas and crude oil.

For this purpose, new activities, financial instruments and legal acts are being launched. In the transport sector and in the industrial sector, the most profitable solutions are the use of biomethane [purified biogas] and biohydrogen - hydrogen derived from biomass or other renewable energy sources. Currently, the industry uses hydrogen derived from coal or natural gas. However, in the near future, the use of biohydrogen should become a priority for the national goals of the EU countries.

On March 14, 2020, the European Commission announced the Clean Hydrogen Alliance – a method of conduct that involves the largest companies in Europe, such as refineries or gas operators, to implement the largest projects in the field of decarbonization in the gas or industrial products market. The second area of action is the development of hydrogen technologies in transport, primarily in public transport. According to Hydrogen Europe, the largest industry organization that unites the largest companies that offer biohydrogen technologies for the industrial and transport sectors, the key document Hydrogen in the EU Green Deal COM (2019) 640 final includes the most important postulates on hydrogen that will allow governments and EU sectors to effectively implement new policies on this key technology for decarbonising the economy:

Sector Energy: “Foster the deployment of hydrogen networks or CCS / CCU, Energy storage and enabling sector integration“ Decarbonising gas” and “Enhancing support for development of decarbonised gases ” and “ Forward looking design for a competitive decarbonised gas market” Measures to enable smart integration of renewables.

Impact for hydrogen: The Commission commits to the decarbonisation of the gas sector. This represents a clear signal to the gas sector that the Commission is ready to act on this. Power to Gas, and CCS /CCU to take a higher position on the EU Agenda. The smart integration package given clearpriorities in terms of both decarbonisation gases (market and support) as well as integratinghigher share of renewables.

Industry: “Decarbonisation of energy intensive industries (steel, chemicals, cement) is essential” “EU industry needs climate and resource front runners to develop first commercial applications of breakthrough technologies. Priority areas include clean hydrogen, fuel cells, energy storage and CCU/CCS “The Commission will support clean steel breakthrough technologies. (including ECSC and IF” Review EU mesures on pollution for large industrial installations (IED).

Impact for hydrogen: The Commission explicitly recognises the central role for hydrogen in decarbonising the industrial sector and, beyond this, the importance of an industrial policy supporting priority areas such as clean hydrogen and fuel cells. Support to be expected for the steel sector, creating more opportunities for hydrogen.

Climate ambitions: “European “Climate Law” will set the 2050 climate neutrality in law”, ”Increase GHG target reduction target by 2030 to 50% or 55%, including”, Revision of ETS to include other sectors (maritime), MS targets in non ETS sectors, “National Energy Climate Plans will be assessed and revised (again) if necessary. They will feed into relevant energy legislation tied to increasing ambition for GHG reduction. NECPs most important planning tools for ensuring coherence with the Green Deal.”

Impact for hydrogen. Hard to abate sector will have to look for solutions to decarbonise, and clean hydrogen is one of them, even the most cost efficient for some sectors. Deployment of clean hydrogen technologies in both ETS and non ETS sector should be accelerated significantly.

Sustainable financing: “Direct financial flows to green investment and avoid stranded assets”, “Renewed sustainable finance strategy’’, “Adopt Taxonomy for classifying environmentally sustainable activities

Impact for hydrogen: This can have a major impact on what types of investments receive finance. Future proofing of investments (especially in gas infrastructure) means that current investments in Clean Hydrogen technologies will receive funding and other investments have to be compatible with the reality that clean hydrogen is Betting on.

Hydrogen and biomethane can be used for almost all energy end use. In some cases, such as for heavy industry, full decarbonisation is difficult to achieve without the use of gas. In power generation, using hydrogen and biomethane for the dispatchable electricity that complements large shares of wind and solar power avoids an overly expensive climate transition and assures security of supply at all Times. Is possible to scale-up the deployment of biomethane and hydrogen to 2,900 TWh (net calorific value), which is equivalent to 270 bcm of natural gas. It also showed that renewable electricity should be scaled up sevenfold by 2050 (to almost 7,000 TWh) to enable full decarbonisation.

Today, projects of biohydrogen production from agricultural raw materials are overwhelmingly unprofitable and have no value for investors. At the same time, starting in 2030, predicted risk of return on investment by investors in biohydrogen production projects from agricultural raw materials indicates that such projects will be valuable to investors, and the number and scale of such projects will increase significantly worldwide. On the basis of the conducted researches it is established that the forecasted growth of scales of projects and level of technologies on reception

of biohydrogen will give the chance to reduce prime cost of its manufacture that will lead to growth of profit of investors of the specified projects.

It is predicted that in 2030, at the request of investors for a minimum return within 0.1… 0.2 $ / kg of biohydrogen obtained, the risk of obtaining it will be acceptable, within 0.3 в 0.5 $ / kg - average, within 0,6… $ 0.8 / kg - high, and more than $ 0.9 / kg - critical. At the same time, in 2050, with changes in the minimum profit within 0.1… $ 1.0 / kg of biohydrogen produced, the projected risk of profit by investors will change from the minimum to the average.

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RESULTS OF A COMPREHENSIVE STUDY OF THERMAL TREATMENT OF TULIP BULBS

The production of tulip flowers is accompanied by the accumulation of a large amount of waste in the form of immature bulbs after cutting the flowers. It is proposed to use this raw material for energy purposes. The research was conducted