Demonstrating sustainable value creation from industrial CO2 by its thermophilic microbial conversion into acetone

Project type: IA – Innovation Action
Start date of the project: 01/10/2021
Duration: 60 months

STRATEGIC INTELLIGENCE BULLETIN 04

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FOREWORD

We are delight to release the third strategic intelligence bulletin.

The current scenario shows a complicated environmental for companies in terms of investments mainly caused by two main levers : pos covid period and Ukraine war . Companies are facing in Europe an increasement of energy and raw materials prices which have a strong impact in their investment plans leading in a smaller appetite for some major projects.

Even in this adverse scenario, some companies continue to focus on large CCUS projects. Some main factors leading these companies to prioritize their investments in decarbonization are: the upward trend in carbon prices and the change in the European legislation framework (Fit for 55 for example) which will have a strong impact mainly in the sectors linked to the ETS market as Iron and Steel, cement, electricity, fertilizers, aluminum etc.. The Carbon Boarder Adjusted Mechanisms (CBAM), if fully implemented in 2026/2027, will be an important lever to support CO2 emission reduction projects. A change in the European legislation in favor of the utilization of fossil CO2 for CCU projects still needs to be developed and will be a key element to leverage these projects in the next years. In this document, you will be able to have access to the new legal and regulatory framework for CCUS handbook released, last month, by IEA (International Energy Agency) .

New opportunities for CCU projects are being created. One example is the conversion of biogenic CO2 to methane by the methanation process that is gaining strength and has a great potential to substitute part of the methane imported by the European countries mainly in the methanisation sector. Opportunities for feasible new green acetone markets and other products will be highly dependent on the possibility to use CO2 not only from biogenic origin but also from fossil fuel origin. Energy prices are still a bottleneck for CCU projects, especially for production of green hydrogen production.

Additional information about the document:

The strategic intelligence bulletins will be published every 3 months. It aims to help the partners of the PYROCO2 consortium to make strategic decisions and to support the emergence of the CCU market also via broader dissemination, namely with the members of AXELERA cluster in order to engage them on the emergence of new CCU projects.

The content of this document refers to information from the previous three months, however, some older data with added value can be considered.

As CCU, CCS and hydrogen topics are strongly related for some projects, some publications about CCS which are relevant to the target audience are being included.

Do not hesitate to send us any comments to improve this document by writing or sharing information that could be relevant for the next bulletin to marcos.versiani@axelera.org

Have a good read!

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MARKET INFORMATION

Lanzatech and Woodside Energy announce strategic collaboration

Globe newswire, October 2022

Woodside Energy (ASX: WDS) and LanzaTech NZ, Inc. (LanzaTech), a US-based carbon capture and transformation company, have announced a strategic with the signing of a Strategic Framework Agreement. Under the Strategic Framework Agreement Woodside will, in collaboration with LanzaTech and subject to a positive final investment decision, design, construct, own, maintain and operate pilot facilities relating to LanzaTech's technologies. The Strategic Framework Agreement also allows Woodside and LanzaTech to explore opportunities for the potential commercial scale-up of LanzaTech's technology, which seeks to convert greenhouse gas emissions into new products. For more information

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Heidelberg cement announces largest carbon capture project to date

Heidelberg cement website, September 2022

Heidelberg Cement is further expanding its portfolio of large-scale CCUS projects with a new initiative in the United States. The project at the Mitchell, Indiana, cement plant of Heidelberg Cement's US subsidiary Lehigh Hanson, Inc. aims to capture 95% of the CO2 emissions from the newly renovated production facility and store them in a local onshore reservoir in the Illinois Basin. Funding of about US$3.7 million for the upcoming project Front-End Engineering Design (FEED) study has been granted by the U.S. Department of Energy's (DOE) Office of Fossil Energy and Carbon Management (FECM) in this crucial first step. For more information

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The new biorefineries: Integration with new technologies for Carbon Capture and Utilization to produce bioethanol biofuel and biorefinery

Biofuel and Biorefinery Technologies book series – October 2022

There is a pressing need to move from the traditional linear economy, where production and consumption patterns lead to large amounts of single-use waste, to a circular economy, prioritizing environmental, social, and economic welfare. Specifically, for the bioethanol industry, process integration with new technologies for carbon capture and utilization (CCU) represents a step towards an increase in carbon utilization efficiency and revenues while tackling significant greenhouse gases emissions. Microbial gas fermentation, demonstrated at a commercial scale, offers a feasible alternative to increasing bioethanol volume production via the utilization of low-value biogenic carbon waste without threatening food, land, and water. Locally, these biotechnology routes translate in job creation, advancement of rural areas, value creation through scientific developments, and a leadership position in an emergent climate economy. For more information

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101037009.

CCUS ZEN project kick-off in Paris
ECCSEL ERIC, October 2022

The challenge to develop multiple regional CCUS value chains to decarbonize industry and deliver negative emissions span numerous technologies and actors in industry, transport, energy, and CO2 storage. CCUS ZEN (Zero Emission Network to facilitate CCUS uptake in industry) address coordination challenges across value chains and actors and will provide a framework for the roll-out of CCUS in hubs and clusters throughout Europe. To reach the Paris Agreement goals, a total of 14 per cent of emission reductions within 2060 must come from CCS technologies, according to the IEA. The partners in CCUS ZEN obtain broad competence and knowledge across CCUS value chains and CCUS infrastructure, such as ports, pipelines, shipping, CO2 transport, CO2 storage, and energy. Together, the partners will elaborate detailed plans for the integration of CCUS in hubs and clusters. For more information

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Global green methanol market to reach $3.15 billion by 2031
Clean Energy Organization , October 2022

Companies are becoming increasingly interested in green methanol as it is a zero-carbon emission fuel, and with growing investment in renewable energy and hydrogen economy, the e-methanol segment within the green methanol market is expected to grow significantly during the forecast period. For more information

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Cement and concrete industry scales up CCUS efforts to accelerate decarbonization
World Cement, September 2022

The Clean Energy Ministerial CCUS (CEM CCUS) and the Global Cement and Concrete Association (GCCA) have today, at the first-ever Global Clean Energy Action Forum (GCEAF), announced an agreement that will help scale up the deployment of carbon capture, utilisation and storage (CCUS) throughout the cement and concrete industry, in a move to stimulate innovation, investment and increase the pace of decarbonization efforts. Central to the agreement will be exploring incentives, policy frameworks and finance solutions at a global level that can enable industrial-scale CCUS projects over the next ten years. The two organizations will work together to ensure the long-term deployment of CCUS, beyond 2030, via both policy and technological development. For more information

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Eurofer, associations, call for less restrictive framework for EU hydrogen market introduction
Global S&P Commodity insights , July 2022

European Steel Association Eurofer July 15 called for the European Commission to set out a practical framework and timetable for phasing in the European Union's hydrogen market, including

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a lengthening of the proposed transitional period for its introduction until at least 2030. For more information

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North-west Europe primed for CCUS, but where's the investment?
Energy Monitor, August 2022

Europe's industry-heavy north-west has the continent's greatest potential for carbon capture, use and storage (CCUS). Yet demonstration projects remain few and far between. For more information

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The PYCASSO territories Project: a large Onshore CCUS Hub for southern Europe
EarthDoc, on line geoscience database, October 2022

Beginning of 2021, thirty institutions, universities and industrial companies teamed up to form PYCASSO, a territories project and operational consortium focused on advancing CCUS development studies onshore SW France and NE Spain to reach the net zero emissions European objective in 2050. The initiative aims at accelerating the adoption of CCUS to help decarbonizing large segments of the present industrial sites and to appeal other new greener industries). Access here

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Launching of the je decarbon networking platform
'Nouveaux Système Energétique', September 2022

This site is a platform designed for all stakeholders (equipment manufacturers, solution providers, integrators, design offices, manufacturers, financiers, etc.). It puts manufacturers in contact with equipment manufacturers and solution providers based on solutions developed and manufactured in France. Its ambition is to support decarbonization and energy savings in industry. For more information

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Votorantim Cements invest 1 billion euros in Andalusia Cement plants' decarbonization
Global Cement, October 2022

Brazil-based Votorantim Cements' Córdoba, Niebla and La Araña cement plants in Andalusia are at the center of a planned Euro1bn decarbonization project by the company. Votorantim Cements will publish details of its plans, which include renewably powered green hydrogen and biofuels production, in early 2023; For more information

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101037009.

Hydrogen for clean energy could be produced from seawater
Farlex free library, October 2022

Seawater electrolysis research emerged in the early 19th century. Although scientists made advancements in hydrogen production, it never gained traction or became a viable energy solution. In the 20th century, hydrogen was mostly extracted from natural gas and used to power cars, buses, blimps, and rockets. While using this hydrogen was feasible, its production was energy-intensive and contributed to carbon emissions, one of the main causes of climate change. Additionally, some cities filter municipal solid waste with hydrogen fuel cell technology, which produces hydrogen and prevents waste-derived contamination in local water supplies. For more information

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Landmark European CCUS agreement signed, China predicted to be world's largest market
SCI, September 2022

TotalEnergies has signed what is said to be the world's first commercial agreement on cross-border carbon dioxide transport and storage. The agreement will see 800,000 tonnes of carbon dioxide captured, compressed, liquefied and transported from the Yara Sluiskil ammonia and fertilizer plant in the Netherlands, to the Northern Lights project site off the coast of Øygarden, Norway, where the carbon dioxide will be permanently stored in geological layers some 2,600 metres under the seabed. For more information

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101037009.

TECHNOLOGY WATCH

Implementing CCUS at scale and speed: The path to achieving its potential (Report)
Volker Sick, Gerald Stokes and Fred Mason, September 2022.

Abstract: CO2 capture and utilization (CCU) is an essential tool in the global carbon management toolkit. CCU can contribute to gigaton-scale removal of CO2 from the atmosphere and can serve as a source of carbon for many essential products made with carbon. It is important to understand, however, that effectively using CCU to help meet our climate goals means that we need to build an entirely new industry coupling carbon capture with carbon utilization. This report assesses the state of the emerging industry, identifies key actions that are needed, and projects market share for key products up to 2050 for a range of scenarios. For more information

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Techno-economic analysis of integrated carbon capture and utilization compared with carbon capture and utilization to syngas
Yuanting Qiao, Weishan Liu, Ruonan Guo, Shuzhuang Sun, Shuming Zhang, Josh J. Bailey, Mengxiang Fang, Chunfei Wu, October 2022.

Abstract: Currently, excessive CO2 emissions have become a global challenge due to their influence on the climate. According to the Paris Agreement, global warming should be limited to 1.5 °C by 2100. Carbon capture and utilisation (CCU) are attractive as they can both reduce CO2 content and utilise CO2 as a carbon resource. However, in conventional CCU processes, CO2 needs first to be extracted and purified for the following utilisation. In contrast, the recently reported Integrated Carbon Capture and Utilisation (ICCU) was designed to realise the overall process in one reactor, where CO2 is captured by adsorbents (e.g., CaO) and utilised in-situ with the introduction of a reducing agent (e.g., H2). This CCU technology can promote CO2 conversion with fewer intermediate steps, leading to a reduction in overall cost. Energy and economic analysis of ICCU are thus urgently required. For more information

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Optimization methodology to dimension a CCU chain by maximizing the cost efficiency of the infrastructure
Duquenne Julien, 24/10/2022

Abstract: Carbon capture and utilization (CCU) technologies will likely become an important approach for CO2 emissions mitigation in the heavy industry sector. However, due to the high investment risk and cost, the technology has not yet been commercialized. The more established technology of CCS, rather similar to the one of CCU, is nowadays already proposed thanks to a higher R&D background. Therefore, CCU still needs more research in order to unlock its full potential. Actively mitigating the CO2 emissions, as done by the CCS, while going a step further by utilizing this carbon dioxide as carbon source in various sectors (e-fuels synthesis, construction materials, chemical industry, etc.). The document, here, focuses on the use of CCU for Power-to-Fuel applications, more specifically it compares several production routes and their different

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components to determine the advantages and drawbacks of each, focusing on their global efficiency, selectivity and operability. Simulations have been also realized. For more information

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New trends in catalysis for sustainable CO2 conversion
Javier Ereña and Ainara Ateka, October 2022

This Special Issue on "New Trends in Catalysis for Sustainable CO2 Conversion" shows new research on the development of catalysts and catalytic routes for CO2 valorization, and the optimization of the reaction conditions for the process. For more information

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The environmental impacts of CCUS on the electricity sector
Facchino, M.; Popielak, P.; Panowski, M.; Wawrzyńczak, D.; Majchrzak-Kucęba, I.; De Falco, M, August 2022

Carbon Capture Utilization and Storage (CCUS) is a set of technologies aimed at capturing carbon dioxide (CO2) emissions from point-source emitters to either store permanently or use as a feedstock to produce chemicals and fuels. In this paper, the potential benefits of CCUS integration into the energy supply sector are evaluated from a Life Cycle Assessment (LCA) perspective by comparing two different routes for the CO2 captured from a natural gas combined cycle (NGCC). Both the complete storage of the captured CO2 and its partial utilization to produce dimethyl ether are investigated. Moreover, the assessment is performed considering the region-specific features of two of the largest CO2 emitters in Europe, namely Italy and Poland. For more information

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CO2 capturing CONSTRUCTION materials for climate change mitigation
Morales, David - University of Cordoba, August 2022

Abstract: In this doctoral thesis, several lines of research are studied in order to give rise to new, more environmentally sustainable construction materials: Firstly, a CO2 capturing additive (MgAlCO3 hydrotalcite) is studied. Once all its physical, chemical and microstructural properties and its capacity to capture CO2 were obtained, it was mixed in different percentages with an industrial one-coat mortar, since in order to reduce the level of CO2 in the atmosphere, building façades have a large surface area that may be suitable for CO2 capture. Secondly, the mortar phase of a concrete for non-structural prefabricated products (paving stones, vaults, urban furniture and others) is studied using mixed recycled aggregates from construction and demolition waste and using CO2 curing (accelerated carbonation) as an innovation, promoting the concept of circular economy and giving added value to CO2 as a commercial product. For more information

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101037009.

Research progress of steel slag-based carbon sequestration
Northeastern University, Shenyang, October 2022

Abstract: Large amounts of steel slag (SS) and CO2 are produced globally each year during steel production. An SS-based carbon capture and utilization (SS-CCU) process for CO2 mineralization is suitable specifically for steel-making industries for simultaneous mitigation of CO2 emissions and valorization of wastes. However, the SS-CCU process is currently in the stage of laboratory research and far away from industrial application. In this review, some SS-CCU processes, including direct and indirect carbonation processes, were explored and summarized. Herein, the key factors and mechanisms of the SS-based CO2 sequestration process were identified. The carbonation process efficacy and its environmental impact (including global warming, energy use, water use, and metallic pollutants) were evaluated. Furthermore, the challenges and prospects of the further development of the SS-CCU process were discussed. For more information

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CCU by integrating water electrolysis, electrified reverse water gas shift / methanol synthesis
Technical University of Munich & Research and Technological Development, Ravenna, Italy, October 2022

Abstract: CO2 conversion into syngas followed by methanol synthesis, has already been extensively investigated in the last two decades (Ghosh et al., 2019; Joo et al., 1999; Park et al., 2004; Wu et al., 2015). However, a promising solution, known as CAMERE process, did not result into a viable industrial technology since the reverse water gas shift (RWGS) [4] required temperature above 830 °C to be able to have satisfactory CO2 conversions as well as minimum methane production ([1] and [5]). Integration and operation of a high temperature and pressure (HT-HP) RWGS would require a furnace with clear disadvantages related to necessary fuel combustion (CO2 emissions).CO2 + H2 → CO + H2O (ΔH° = 42 kJ/mol)CO + 3 H2 → CH4 + H2O (ΔH = - 206 kJ/mol) In this work we show that the utilization of an electrically heated RWGS reactor (E-RWGS), which uses renewable energy for heating, overcomes this problem. For more information

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Production of Aviation Fuel with Negative Emissions Via Chemical Looping Gasification of Biogenic Residues: full chain process modelling and techno-economic analysis
Chalmers University of Technology, September, 2022

Abstract: The second-generation bio aviation fuel production via Chemical Looping Gasification (CLG) of biomass combined with downstream Fischer-Tropsch (FT) synthesis is a possible way to decarbonize aviation sector. The CLG process has the advantage of producing undiluted syngas without the use of an air-separation unit (ASU) and improved syngas yield compared to the conventional gasification processes. This study is based on modeling the full chain process of biomass to liquid fuel (BtL) with LD-slag and Ilmenite as OCs using Aspen Plus software, validating

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the model results with experimental studies and carrying out a techno-economic analysis of the process. For more information

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Valorization of micro-algae biomass for the development of green biorefinery: Perspectives on techno-economic analysis and the way towards sustainability
Kiane de Kleijne, Steef V. Hanssen, Lester van Dinteren, Mark A.J. Huijbregts, Rosalie van Zelm, Heleen de Coninck, October 2022

The Paris Agreement's temperature goals require global CO2 emissions to halve by 2030 and reach net zero by 2050. CO2 capture and utilization (CCU) technologies are considered promising to achieve the temperature goals. This paper investigates which CCU technologies—using atmospheric, biogenic, or fossil CO2—are Paris compatible, based on life cycle emissions and technological maturity criteria. We systematically gathered and harmonized CCU technology information for both criteria and found that CCU with technology readiness levels (TRLs) of 6 or higher can be Paris compatible in 2030 for construction materials, enhanced oil recovery, horticulture industry, and some chemicals. For more information

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Regional power-to-x concept : techno-economic assessment and regulative aspects
School of Energy Systems, Energiatekniikka Finland, September 2022

The purpose of this thesis was to research the field of power-to-x (PtX) and the current regulative aspects on the EU and national level. Furthermore, a techno-economic assessment was prepared for a regional PtX concept. A technology overview of different PtX process components was evaluated which included electrolysers, carbon capture and fuel synthesis. Their associated main products and side streams and their utilization potential were identified as well. The regulative aspects concerning EU Fit For 55 packages was analyzed and their impact to the field of PtX. Current regulation status on a national level was also presented.
. For more information

LCA of CCS and CCU compared with no capture: How should multi-functional systems be analysed?
Norwegian Institute for Sustainability Research, May 2022

This paper is an original article, based on a presentation at the LCM 2021 conference. It aimed to assess the environmental performance of CCS and CCU value chains when compared with no capture, for steam production at a Norwegian paper mill, by employing LCA methodology on the basis of the relatively new guidelines provided by Zimmermann, Müller [19]. The results will be discussed in light of these guidelines and will pinpoint where pitfalls might have arisen if guidelines had not been applied. For more information

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A review of technologies, costs, and projects for production of carbon-neutral liquid e-fuel
Harpreet Singh ORCID , Chengxi Li , Peng Cheng , Xunjie Wang and Qing Liu - Houston, Texas, October 2022

This study reviews a large number of technologies for H2 production (16 technologies), CO2 capture (7 technologies), their performance data, and the costs. Further, this study reviews the processes, including reactions, catalysts, and costs, to produce two liquid e-fuels (e-methanol and e-kerosene) that can be used as carbon-neutral alternatives to their fossil fuel-based conventional counterparts. The current and future projects for commercial production of liquid e-methanol and e-kerosene are also reviewed. Finally, the outlook and challenges to produce liquid e-fuels are discussed along with recommendations. For more information

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Incremental approach for the life-cycle greenhouse gas analysis of CCU
Journal of CO2 Utilization, November 2022

Abstract: Electro-fuels (e-fuels) are examples of carbon capture and utilization (CCU) hydrocarbon products that are derived from captured carbon dioxide (CO2), while using renewable electricity as the energy feedstock. The environmental impacts of CCU products (e.g., e-fuel) are systematically quantified through life-cycle analysis (LCA). Previous studies evaluating LCA of e-fuels proposed frameworks with an expanded system boundary approach that included the entire supply chain of the production process generating the CO2 for CCU, in addition to the supply chain of the CCU product. This expanded system boundary approach evaluates two system boundaries, and uses deduction methods to calculate the carbon intensity (CI) of the CCU product (e-fuel). This paper proposes a simpler system boundary using an incremental approach that can calculate identical CI of the CCU product (e-fuel), while avoiding the extensive calculations in the expanded system boundary framework. For more information

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EU POLICIES & LEGISLATION

EU parliament backs ambitious targets towards the deployment of renewable fuels use
CO2 Value Europe, October 2022

the European Parliament adopted positions on the so-called FuelEU Maritime and the Alternative Fuels Infrastructure Regulation (AFIR) – both part of the broader Fit-for-55 package released in 2021 – at a plenary session in Strasbourg. The FuelEU Maritime report, which was voted with 451 votes in favor, introduces a 2% sub-quota for Fuels of Non Biological Origin (RFNBOs) for the maritime sector by 2030 and more ambitious targets when compared to the proposal made by the European Commission. For more information

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Legal and regulatory frameworks for CCUS. An IEA CCUS handbook
IEA , July 2022

This IEA CCUS Handbook is a resource for policy makers and regulators on establishing and updating legal and regulatory frameworks for CCUS. It identifies 25 priority issues that frameworks should address for CCUS deployment, presenting global case studies and examining how different jurisdictions have approached these issues. The handbook is supported by a web - based legal and regulatory database, and model legislative text that is found at the end of this report. For more information

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EU Innovation fund to invest in seven CCS and CCU projects
Global CCS institute, July 2022

The European Commission has announced that it will invest €1.8 billion towards seventeen large scale innovative clean tech projects, including carbon capture and storage efforts. The investment is part of the EU Innovation Fund, which aims to allocate over €38 billion towards low-carbon technologies by 2030. Seven of the seventeen approved projects include a CCS or CCU component. The selected CCS and CCU efforts are located in Bulgaria, Iceland, Poland, France, Sweden and Germany, with projects ranging from low-carbon cement production, carbon mineral storage site development and sustainable aviation fuel production. For more information

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United States inflation reduction act delivers major incentives for CCUS technologies
Global CO2 Initiative , August 2022

The signing of the Inflation Reduction Act (IRA) into law provides a dramatic boost for efforts to reduce the levels of carbon dioxide (CO2) in the atmosphere. The new law calls for major tax reductions for systems that sequester CO2 in geological formations as well as those that re-use CO2 by embedding it within products like cement blocks and other building materials. For more information

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MEPs to G20: Increase your climate change targets before COP27
News European Parliament, October 2022

The Environment Committee calls on all countries to step up their 2030 climate targets before COP27 to limit global warming in line with the Paris agreement. On Monday, the Environment, Public Health and Food Safety Committee adopted a resolution outlining its demands for the UN COP27 Climate Change Conference in Egypt on 6-18 November 2022.For more information

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CCUS legal and regulatory database
IEA , September 2022

Database of laws and regulations that support a framework for CCUS development For more information

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Legal framework analysis for CO2 utilisation in Latvia
Viktorija Terjanika, Emils Zarins, Lauma Balode and Jelena Pubule , October 2022

Abstract – The ever-increasing amount of greenhouse gas emissions are forcing countries and the industrial sector in particular to develop ways to improve the manufacturing industry and reduce the amount of emissions created in compliance with the requirements of the European Green Deal initiative. However, all modifications must be under local laws and European directives. The purpose of this work is to analyse existing laws, regulations, and directives, both local and European, to identify limiting factors and factors that contribute to a more active introduction of systems for capturing, using, and reducing the amount of carbon dioxide created in production processes. The results of this analysis will determine the strengths and weaknesses of the local manufacturing sector and its ability to meet ever-tightening requirements. For more information

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Carbon capture, utilisation and storage: Incentives, effects and policy
International Journal of Greenhouse Gas Control, October 2022

We develop a model to explore the incentives, consequences, and policy implications related to utilizing captured carbon. Our model incorporates the decision by a firm considering investing in carbon capture technology, as well as the market for . By including the latter, we investigate the effect the increase in supply of (from captured sources) has on the equilibrium price, allowing us to accurately understand the revenue the investing firm will receive. More importantly, it also allows us to understand the implications for the behavior of firms that use as an input: the reduction in the price of lowers their marginal cost of production, encouraging them to produce more. For more information

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101037009.

FUNDING & TENDER OPPORTUNITIES

FRANCE

Appel à projets (IBAC) Stratégie d'accélération décarbonation
ADEME

Deadline date: 17/04/2023, 16/10/2023 (The dates have changed by ADEME)

This call for proposals aims to support projects led by SMEs developing innovative, competitive and sustainable methodologies, technologies, industrial solutions and services in the field of industrial decarbonization. For more information

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Investments for the decarbonization of production process
ASP (Agence de services et de paiement)

Deadline date: 31/12/2022

This topic is addressed to industrial companies of all sizes that wish to equip themselves to reduce their CO2 emissions or improve their energy efficiency. For more information

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Appel à projets (DEMIBAC) Stratégie d'accélération décarbonation
ADEME

Deadline date: 17/04/2023, 16/10/2023 (The dates have changed by ADEME)

This call aims to support innovation projects led by companies which accelerate in the market the implementation of sustainable technologies and/or solutions to decarbonize industry, from the industrial research phase to the demonstration phase. For more information

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Favoriser le développement de Zones Industrielles Bas Carbone (ZIBAC)
ADEME

Deadline date: 15/11/2022 , 15/05/2023 (The dates have changed by ADEME)

This call aims to support industrial territories in their ecological and energy transformation in order to gain in competitiveness and attractiveness. For more information

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101037009.

FUNDING & TENDER OPPORTUNITIES

EUROPE

Breakthrough Energy Catalyst

Deadline date :13/05/2022 - Submissions received after 15 June 2022 will be evaluated on a rolling basis, but no less frequently than semi-annually

Commission President Ursula von der Leyen and Bill Gates have announced a pioneering partnership between the European Commission and Breakthrough Energy Catalyst to boost investments in the critical climate technologies that will enable the net-zero economy. Presented on the occasion of the sixth Mission Innovation Ministerial meeting, the new partnership aims to mobilize new investments of up to €820 million/$1 billion between 2022-26 to build large-scale, commercial demonstration projects for clean technologies – lowering their costs, accelerating their deployment, and delivering significant reductions in CO2 emissions in line with the Paris Agreement. For more information

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Transnational Access Call for CCUS Research Priorities / Gaps

Deadline date: 31/12/2022

The second ECCSELERATE Transnational Access call offers funded access to ECCSEL ERIC facilities. Target groups for the call are researchers or research teams from academia, industry and small and medium size enterprises (SMEs). Goal of the call is to extend existing knowledge in CCUS and target specific knowledge gaps within CCUS research. For more information

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Development of algal and renewable fuels of non-biological origin (RIA)

Deadline date: 10/01/2023

Proposals will develop and improve algal and/or non-biological renewable fuel technologies (other than for hydrogen as a final product), through developing synthetic pathways including biological, biochemical, thermochemical, electrochemical processes or combinations of them. Improving the performance of the conversion process by increasing the efficiency, reducing the cost and decreasing the GHG emissions from the production should be addressed beyond the current state of the art. Implementing and improving circularity for energy and material use should be considered, also as means to enhance sustainability and economic feasibility of the proposed concepts. For more information

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101037009.

Innovation fund - Small-Scale Projects

Deadline date: March 2023 (forecast)

The second call for small-scale projects was launched on 31 March 2022 with a budget of EUR 100 million. The call text and application process remained largely similar to those of the first call and applicants have five months to prepare their application (until 31 August 2022). For more information

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Innovation fund - large-Scale Projects

Deadline date: March 2023 (forecast)

With a budget of EUR 1.5 billion, which is increased by 50% compared to the previous call, it will finance breakthrough technologies for renewable energy, energy-intensive industries, energy storage, and carbon capture, use and storage. For more information

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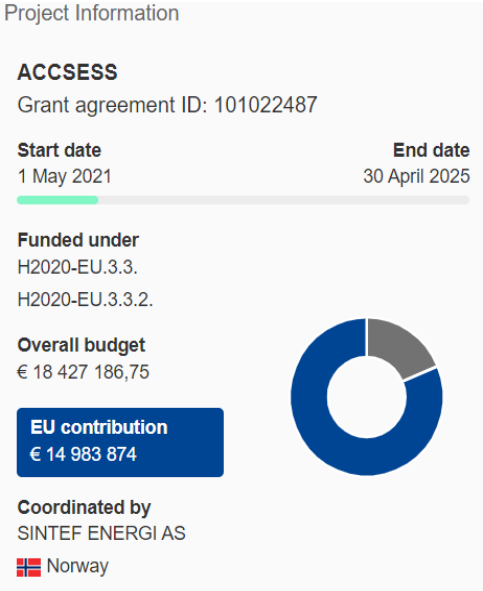
CCU ONGOING PROJECTS - *HORIZON 2020*

Providing access to cost-efficient, replicable, safe and flexible CCUS

The ACCSESS concept is centered around the project vision to Develop replicable CCUS pathways towards a Climate Neutral Europe in 2050. ACCSESS will improve CO2 capture integration in industrial installations (20-30% cost cuts) as a key element to accelerate CCUS implementation, address the full CCUS chain and the societal integration of CCUS. ACCSESS has the ambition unleash the ability of CCUS to contribute to the ambitious EU Green Deal transformation strategy. The project is dedicated to developing viable industrial CCUS business models. ACCSESS will engage with citizens and citizens, explaining how CCUS can contribute to the production of climate neutral or climate positive end-products in a sustainable cities' context. For more information



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101037009.

Demonstrating a refinery-adapted cluster-integrated strategy to enable full-chain CCUS

Almost everyone now agrees that we should decrease the amount of atmospheric carbon dioxide (CO2) to mitigate climate change. Reducing CO2 production is not the only way to reduce emissions. Carbon capture, use and storage (CCUS) refers to an integrated set of technologies to prevent the CO2 produced during the combustion of fossil fuels from entering the atmosphere. Currently, these technologies focus on the greatest sources of CO2 in a process, ignoring smaller ones. The EU-funded REALISE project is developing a way to capture up to 90 % of CO2 from multiple sources in operating refineries at a cost that is 30 % lower than existing capture methods. The project will include the evaluation of the entire CCUS chain from emitter to storage as well as socio-political aspects and social readiness assessments based on three business cases in the EU and China. For more information

Project Information

REALISE

Grant agreement ID: 884266

Start date 1 May 2020

End date 30 April 2023

Funded under H2020-EU.3.3.2.

Overall budget € 7 131 752,50

EU contribution € 6 444 163,75

Coordinated by SINTEF AS

Norway

Advanced carbon capture for steel industries integrated in CCUS Clusters

The Paris Agreement sets out a global framework to avoid dangerous climate change by limiting global warming to well below 2 °C and pursuing efforts to limit it to 1.5 °C. Without carbon capture, utilisation and storage (CCUS), it is difficult to realise the temperature levels indicated in the Paris Agreement. In the context of the European Energy Union, CCUS is a vital research and development priority to achieve 2050 climate objectives in a cost-effective way. With the focus on the iron and steel industry as part of the CCUS chain, the EU-funded C4U project will work with eight European countries and Mission Innovation countries (Canada, China and the United States) to address all the essential elements required for optimal integration of CO2 capture into the North Sea Port CCUS cluster. For more information

Project Information

C4U

Grant agreement ID: 884418

Start date 1 April 2020

End date 31 March 2024

Funded under H2020-EU.3.3. H2020-EU.3.3.2.

Overall budget € 13 845 496,89

EU contribution € 12 499 083,27

Coordinated by UNIVERSITY COLLEGE LONDON

United Kingdom

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101037009.

Creating added-value chemicals from bio-industrial CO2 emissions using integrated catalytic technologies

The European Green Deal sets the blueprint for making Europe the first climate neutral continent in the world. The goal is to reduce greenhouse gas emissions (GHGs) to at least 55 % below 1990 levels by 2030. The EU-funded CATCO2NVERS project will develop and optimize technologies that convert waste CO2 into useful bio-origin chemicals to produce plastics, methanol, cosmetics, and renewable feedstocks for industrial processes. The project's overall vision will be to use waste CO2 energy- and resource-efficiently in bio-based industries to produce zero GHGs and reduce the quantity of CO2 released into the atmosphere. For more information

Project Information

CATCO2NVERS

Grant agreement ID: 101000580

Start date 1 May 2021

End date 30 April 2025

Funded under
H2020-EU.3.2.4.2.
H2020-EU.3.2.

Overall budget
€ 6 641 111,25

EU contribution
€ 6 641 110,75

Coordinated by
FUNDACION PARA EL DESARROLLO Y LA INNOVACION TECNOLOGICA
Spain

Production of synthetic renewable aviation fuel from CO2 and H2

Aviation fuels derived from non-fossil resources are the only way to diminish the hefty carbon footprint of air transport. The EU-funded TAKE-OFF project will bring together leading industrial players and prominent research institutes to develop an innovative process for producing sustainable aviation fuels with higher efficiency and lower costs compared to other power-to-liquid alternatives. State-of-the-art successful attempts to turn carbon dioxide into jet fuel involve complex processes such as the Fischer-Tropsch process. The unique TAKE-OFF technology will be based on converting carbon dioxide and green hydrogen into fuel via ethylene as an intermediate. In this process, carbon dioxide is captured from industrial flue gases and reacts with hydrogen produced by renewable electricity to create light olefins. For more information

Project Information

TAKE-OFF

Grant agreement ID: 101006799

Start date 1 January 2021

End date 31 December 2024

Funded under
H2020-EU.3.3.3.

Overall budget
€ 5 340 538,75

EU contribution
€ 4 998 788,25

Coordinated by
NEDERLANDSE ORGANISATIE VOOR TOEGEPAST NATUURWETENSCHAPPELIJK ONDERZOEK TNO
Netherlands

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101037009.

Creating value from industrial CO2 sources

Twenty leading industrial and research partners from 11 countries have teamed up to prove that large-scale conversion of industrial carbon emissions into value-added chemicals and materials is possible. As a game changer for European carbon-intensive industries, the EU-funded PYROCO2 project will pave the way for the sustainability of Europe's chemical industry. It will demonstrate the scalability and economic viability of carbon capture and utilisation to generate climate-positive acetone from industrial CO2 and renewable electricity-derived hydrogen. The project will demonstrate that the acetone produced is an ideal platform for the catalytic synthesis of a range of chemicals, synthetic fuels and recyclable polymer materials from CO2 for viable business cases and pre-developed processes for replication and commercialization. For more information

Project Information

PYROCO2

Grant agreement ID: 101037009

Start date 1 October 2021

End date 30 September 2026

Funded under

INDUSTRIAL LEADERSHIP - Leadership in enabling and industrial technologies

Total cost

€ 43 887 817,75

EU contribution

€ 39 999 561,18

Coordinated by

SINTEF AS

Norway

CO2 capture, utilisation and storage for a net-zero carbon future

With climate change putting people worldwide in danger and nations taking steps to decrease its effects, new innovations regarding green solutions are more welcome than ever. The EU-funded ConsenCUS project aims to assist in this goal by providing an industrial plan for a net-zero carbon reality. To this aim it will utilise 3 electricity-based innovations: carbon capture based on alkali absorption, methods for conversion of CO2 to formate and formic acids for market uses and finally a safe cyclic loading system of CO2 into salt formations and aquifers for storage purposes. These innovations should greatly benefit the EU in reaching its net-zero carbon goal. For additional information

Project Information

ConsenCUS

Grant agreement ID: 101022484

Start date 1 May 2021

End date 30 April 2025

Funded under

SOCIETAL CHALLENGES - Secure, clean and efficient energy

Total cost

€ 13 905 272,50

EU contribution

€ 12 862 331,88

Coordinated by

RIJKSUNIVERSITEIT GRONINGEN

Netherlands

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101037009.

CCU ONGOING PROJECTS - *INOVATION FUND*

K6 Program

The project will deploy a first-of-its-kind industrial-scale combination of an oxy-fuel kiln and carbon capture technology. The captured CO2, otherwise emitted to the atmosphere, will be finally stored in a permanent storage site in the North Sea (although this part of the technology chain falls outside the Innovation Fund project boundary, the storage location will most probably be located in Western Norway). The project will result in the avoidance of 8.1 Mt CO2e emissions over its first ten years of operation. The integration of the K6 Program project with the nearby Port of Dunkirk will foster the development of the port as a future European CO2 hub. For more information

Project information

Acronym	Project ID
K6	**101051358**
Start date	End date
01 April 2022	**31 December 2037**

Coordinated by
EQIOM

Funded under
Innovation Fund (InnovFund)

AGGREGACO2

AGGREGACO2 project targets the aggregates industry for a revolution through the successful commercial deployment of a sustainable aggregate as a solid alternative of conventional aggregates not fully environment-friendly. The AGGREGACO2 proposes a FOAK innovation through the introduction of CO2 captured of refinery processes in an Accelerated Carbonation Technology (ACT), that revalorise Air Pollution Control residues (APCr), which are hazardous residue nowadays stored after treatment, for the fabrication of carbon negative aggregates. For more information

Project information

Acronym	Project ID
AGGREGACO2	**101038931**
Start date	End date
01 April 2021	**31 December 2027**

Coordinated by
PETROLEOS DEL NORTE SA

Funded under
Innovation Fund (InnovFund)

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101037009.

Kairos-at-C

The main objective of the Kairos@C project is to create the first and largest cross-border carbon capture and storage (CCS) value chain to capture, liquefy, ship and permanently store CO2. Located in the Port of Antwerp, Kairos@C will establish a regional hub for innovative energy and carbon value chains. Kairos@C will develop a full industrial-scale CCS project that will encompass the CO2 capture from various industrial sources on the Zandvliet industrial platform, the CO2 transport by pipeline to the liquefaction and export terminal located in the same port, the shipping towards CO2 subsea storages in the North Sea and the permanent sequestration of the CO2 in these storages. For more information

Project information

Acronym	Project ID
Kairos-at-C	**101051344**
Start date	End date
01 November 2020	**31 July 2035**

Coordinated by
AIR LIQUIDE LARGE INDUSTRY

Funded under
Innovation Fund (InnovFund)

Beccs Stockholm

The Beccs Stockholm project will create a world-class, full-scale Bio-Energy Carbon Capture and Storage (BECCS) facility at its existing heat and power biomass plant in Stockholm. The project will combine CO2 capture with heat recovery, making the process much more energy-efficient than the process in a usual CCS plant. It will capture and permanently store large quantities of CO2 from biological sources, leading to carbon removals from the atmosphere, also called negative emissions. For more information

Project information

Acronym	Project ID
Beccs Stockholm	**101051202**
Start date	End date
01 July 2021	**31 August 2036**

Coordinated by
STOCKHOLM EXERGI AB

Funded under
Innovation Fund (InnovFund)

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101037009.

Project Syverstone

Project Silverstone offers permanent CO2 capture and mineral storage (CCMS) through a safer and more economical technology than provided by alternative Carbon Capture and Storage (CCS) solutions. The Carbfix technology imitates and accelerates geological processes that nature has applied for millions of years to regulate long-term CO2 levels in the atmosphere, turning CO2 into solid carbonate minerals underground. The project will deploy full-scale CCMS at one of the largest geothermal power plants in the world, reaching a near-zero carbon footprint. The technology is proven at the project site to be safe, efficient, and environmentally friendly For more information

Project information

Acronym	Project ID
Silverstone	**101038888**
Start date	End date
01 December 2021	**31 December 2030**

Coordinated by
CARBFIX OHF

Funded under
Innovation Fund (InnovFund)

CCGeo (Closed Carbon Geothermal Energy)

Continental Croatia has vast geothermal potential; however, only a negligible share of it is exploited for energy generation. The proposed Project, located in north-west Croatia, aims to make a difference in the geothermal sector and support Croatia on an energy transition pathway. The objective of the Project is to implement one line for the production of power and heat from the gas dissolved in the geothermal water using the internalization of carbon compounds. The proposed Action is a part of a fully planned advanced geothermal power plant using the internalization of carbon compounds (ICC), which would result in nearly zero GHG emissions throughout the Project lifetime and add to the net-carbon removal efforts. For more information

Project information

Acronym	Project ID
CCGeo	**101038843**
Start date	End date
01 January 2022	**31 March 2026**

Coordinated by
AAT GEOTHERMAE DOO

Funded under
Innovation Fund (InnovFund)

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101037009.

SHARC

The SHARC (Sustainable Hydrogen and Recovery of Carbon) project will reduce emissions at the Porvoo oil refinery in Finland, by moving away from the production of grey (fossil-fuel based) hydrogen towards both green hydrogen production (through the introduction of electrolysis facilities) and blue hydrogen production (by applying carbon capture technology). Combined with the offshore storage of carbon dioxide (CO2), this project will maximize the environmental impact and development of a strong supply chain covering the oil refinery, the CO2 capture and transport facilities and the storage site. It will also lay the foundation for a European hub for renewable hydrogen and CO2 utilization. For more information

Project information

Acronym	Project ID
SHARC	**101051125**
Start date	End date
01 March 2022	**31 July 2035**

Coordinated by
NESTE OYJ

Funded under
Innovation Fund (InnovFund)

CCU ONGOING PROJECTS - *FRANCE*

CO2 capture by accelerated carbonation of recycled concrete aggregates – Co2ncrete – ANR

The CO2NCRETE project focuses on CO2 sequestration through accelerated carbonation of recycled aggregates with industrial gases. Recent literature reviews show that this approach is the most promising of the strategies being considered to reduce the carbon footprint of concrete construction. Most studies also show that carbonation improves the properties of crushed aggregates and thus their recyclability. Carbonation of crushed aggregates is therefore a step towards the circular and carbon-neutral economy that Europe has been calling for. For more information

Développement de matériaux catalytiques à double fonction pour le captage et la conversion intégrés du CO2 – DuCaCO2 (ANR)

Carbon capture and storage (CCS) or utilization (CCU) technologies have the potential to mitigate the anthropogenic CO2 emissions, largely responsible for climate change. In this project we aim an integrated CO2 capture and utilization (ICCU) process, by which CO2 is first captured and then converted to a chemical commodity or fuel in a single fixed bed reactor under isothermal conditions. For this reason a dual functional material will be developed, which exhibit at the same time considerable CO2 capture capacity and favorable catalytic properties for CO2 conversion. The objective is to combine clay mineral as CO2 sorbent with metal-doped ceria nanoparticles (NPs) as effective catalysts for CO2 hydrogenation to CH4. The consortium will bring together their competences with a purpose to formulate a new class of dual functional solids and demonstrate their feasibility for CO2 capture and conversion in medium-term application in the energy sector. For more information

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101037009.

UPCOMING EVENTS

COP 27
6 - 18 November , 2022, Egypt
https://www.cop27.eg/

Science has established beyond doubt that the window for action is closing rapidly. In November 2022, Egypt will host the 27th Conference of the Parties of the UNFCCC (COP27) in Sharm El-Sheikh, with a view to building on previous successes and paving the way for future ambition. A golden opportunity for all stakeholders to rise to the occasion and tackle effectively the global challenge of climate change facilitated by Egypt on the African continent.

ACI's European E-Fuels Conference 2022
9-10 November 2022, Hamburg, Germany
Website ACI's European E-Fuels Conference 2022

The 3rd Edition of ACI's European E-Fuels Conference will take place in Hamburg from 9-10 November 2022.The 2022 edition of the conference will bring together key industry stakeholders from the renewables, fuels, energy, and oil & gas industry: including car manufacturers, e-fuel producers, technology providers, consultants, and policy advisors.

ECOMONDO 2022
8-11 November 2022, Hamburg, Rimini, Italy
https://www.ecomondo.com/

Ecomondo is the leading event in Europe for the new models of circular economy. The event is an international exhibition with an innovative format that brings together all sectors of the circular economy in a single platform: from material and energy recovery to sustainable development.

Stakeholder Consultation Workshop - Competitive Bidding in the Innovation Fund
21 November 2022 - Brussels (BE)
CO2 Value Europe

The Directorate-General for Climate Action of the European Commission will hold a Stakeholder Consultation Workshops on the Design of a Competitive Bidding Mechanism under the Innovation Fund. The proposed revision of the ETS Directive and the RePowerEU Plan foresees auctioning financial support of the Innovation Fund to successful projects. At present, the Commission is considering potential design options for EU-wide auctions for Contracts for Difference (CfD) focusing on hydrogen supply and for Carbon Contracts for Difference (CCfD) focusing on hydrogen demand sectors. This workshop's objective is to discuss and collect feedback on these two types of auctions and their possible design aspects.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101037009.

Conference on CO2-based Fuels and Chemicals
19-20 April 2023 - Maternushaus, Cologne (Germany)
Website Conference on CO2-based Fuels and Chemicals

The nova “Conference on CO2-based Fuels and Chemicals” is one of the most established worldwide and has developed into a unique meeting and networking place for the entire Carbon Capture & Utilisation (CCU) and Power-to-X industry and its customers. The upcoming 10th edition of this conference again will continue with this success and will showcase again the newest and most important developments in the fast growing field of CO2 capture and utilisation.

CO2 Capture, Storage & Reuse 2023
16-17 may , Copenhagen, Denmark
Website CO2 Capture, Storage & Reuse 2023

The event will focus on utilisation of captured CO2 and its use for production of building materials like cement, concrete, steel, but also production of advanced fuels that will contribute to further decarbonization of other sectors. Also, as 2022 was a breakthrough year in terms of policies and regulations for green technologies we will be discussing the influence of legislation on the state of carbon capture and utilization technologies.

INTERESTING SITES

PYROCO2 Project - https://www.pyroco2.eu/

CO2 Value Europe - https://www.co2value.eu/

CO2 Value Europe database - https://database.co2value.eu/

Club CO2 - https://www.club-co2.fr/fr

International Energy Agency - https://www.iea.org/

Zero Emission Platform - https://zeroemissionsplatform.eu/

Strategy CCUS - https://www.strategyccus.eu/

Global CCS Institute - https://www.globalccsinstitute.com

France Hydrogen - https://www.france-hydrogene.org/

GreenH2Atlantic Project - https://www.greenh2atlantic.com/

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 101037009.