Conference on CO_2-based Fuels & Chemicals 2022

23 – 24 March • Hybrid Event

Conference Journal

CO_2 as chemical feedstock – a challenge for sustainable chemistry

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co2value.eu

Organiser

nova Institute for Ecology and Innovation

nova-institute.eu

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co2-chemistry.eu

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Dear participants,

Welcome to the 10th edition of our "Conference on CO_2-based Fuels and Chemicals". Due to the recent political developments and the ongoing COVID pandemic, we are all facing numerous changes and experiencing challenging times. Additionally, the industrial transition efforts in order to fade out of CO_2-emitting energy production like coal-firing power plants to avoid greenhouse gas emissions and limit the effects of human-made climate change are progressing.

The use of alternative feedstock sources other than fossil carbon is a top goal on the agendas of many industrial players. This includes all big industries and especially the organic chemistry industry, where most processes depend on carbon. The objective to avoid the use of virgin fossil-based carbon leaves the industry with only three options: biomass, recycling of already existing materials and the use of CO_2 from the atmosphere or from industrial off gas point sources.

We at nova refer to this approach as "renewable carbon". To highlight the importance of finding the suitable feedstock solutions for a sustainable future of the chemical industry we have successfully started our "Renewable Carbon Initiative". But what would a renewable carbon refinery of the future look like and what are the most suitable technologies?

CO_2 as a feedstock, forms one of the most interesting options and is establishing itself with increasing visibility in the public eye. Especially synthetic fuels for aviation represent one of the key future technologies for the reduction of fuel-caused emissions. Several industrial players already offer and use effective solutions for the replacement of fossil-based chemicals and materials through CO_2-made products. Especially times in which the industry suffers from lock-down restrictions and worldwide scarcity of raw-materials and products motivate all industrial sectors to discuss the topic of future sustainability and alternative carbon sources. The expansion of the availability of renewable energy combined with big plans for green hydrogen production and grids are both providing strong tailwind for Carbon Capture & Utilisation (CCU) as well as Power-to-X technologies. The current market already offers numerous technologies for the production of CO_2-based fuels and chemicals and renewable energy. Meanwhile an increasing number of players display their interest of getting involved in this field.

Established pioneers are increasingly demanding political support in order to realise the full potential of these technologies and supportive political framework conditions such as a fossil carbon taxes or binding quotas, for e.g. CO_2-based kerosene and needed chemicals. Can we expect this supporting framework in the near future in order to face the challenges of this transformation process? This two-day hybrid event is one of the oldest and most established conference on carbon technologies worldwide and has developed into a unique meeting and networking ground for the entire CCU- and Power-to-X industry and its customers. New and leading players will showcase novel and improved applications and developments based on carbon capture, green hydrogen production as well as the use of CO_2 as a feedstock. Learn more about the latest technical and political developments and discuss future strategies in numerous panel discussions.

It's all about communication and networking! We wish all our participants new insights, great ideas and a lot of inspiration. The future belongs to the use of CO_2 and we have the chance to actively shape this path together.

Your nova team

Achim Raschka
Program
Carbon Capture & Utilisation (CCU)
Chemicals, Building Blocks & Polymers
Biotechnology

Pia Skoczinski
Program & Innovation Award
Carbon Capture & Utilisation (CCU)
Chemicals, Building Blocks & Polymers
Biotechnology

Michael Carus
Managing Director

Message from the Minister

Professor Dr. Andreas Pinkwart
Minister of Economic Affairs,
Innovation, Digitalization and Energy
of the State of North Rhine-Westphalia

On the path towards a climate-neutral future with a globally competitive industry sector, a key role is set aside for carbon-based fuels and chemicals. Only by combining carbon capture, utilisation and storage with efforts to replace fossil fuels with biomass and a switch to the use of recycled resources will we be able to achieve the net-zero targets. The need for transformation poses a particular challenge to the chemical industry.

Alternative resources are needed for the production of polymers, plastics and man-made textile fibres in order to put chemical value chains on a sustainable footing. This provides great business opportunities. By reacting early to the growing demand for sustainable products and to regulatory and economic climate incentives and by developing climate technologies for worldwide customers, North Rhine-Westphalia and its diverse chemical sector can be a trailblazer.

With this in mind, we must put in place the proper framework conditions and funding schemes for transformation, and streamline our licensing and approval regime. With the State Government Carbon Management Strategy, we have adopted guidelines for the sustainable handling of carbon. A variety of measures, such as the 'CCU-Model Regions in NRW' grant competition, is designed to assist the transformation towards low carbon industry. Our 'Synthetic Fuels' action programme highlights the significance of synthetic fuels and chemicals en route to climate neutrality and the good prospects this entails for our role as a refinery and industry hub.

We are keen to implement these ideas and would like to invite you to join us in the quest for a climate-neutral future. After all, it is our intention to turn North Rhine-Westphalia into Europe's most modern and climate-friendly centre of industry. For this, we need investment and innovation, exchange and cooperation. On that note, let me wish all those who take part in the Conference on CO_2-based Fuels and Chemicals some new and inspiring insight as well as many interesting encounters.

Entrance Fee

2 Days (23–24 March 2022) **945 €**
"Live" in-person event incl. dinner buffet
& "Virtual" online component

1 Day (1st Day, 23 March 2022) **640 €**
"Live" in-person event incl. dinner buffet
& "Virtual" online component

1 Day (2nd Day, 24 March 2022) **580 €**
"Live" in-person event
& "Virtual" online component

"Virtual" Online Conference (23–24 March 2022) **450 €**

2 Days – Students (23–24 March 2022) **350 €**
"Live" in-person event incl. dinner buffet
& "Virtual" online component

Registration
co2-chemistry.eu/registration

The Venue

Maternushaus
Kardinal-Frings-Str. 1–3
50668 Köln (Cologne)
Germany
Phone: +49 (0)221 1631-0
Keyword: nova
frontoffice@maternushaus.de
www.maternushaus.de

Corona Information

The conference will be hosted in hybrid mode with a focus on physical attendance – of course under strict Corona regulations: Admission only for vaccinated or recovered persons (certificate with QR code) or with a current negative rapid test certificate (max. 24 hours old). On-site, distance rules and masks are compulsory except at the place of sitting or during meals.

Nearby Test Centres

corona19-test.de
Marzellenstr. 3–5,
50667 Köln (Cologne)
Opening Hours: 8:00 – 20:00 (CET)

amdom.buerger-schnelltest.de
Marzellenstr. 10,
50667 Köln (Cologne)
Opening Hours: 9:00 – 20:00 (CET)

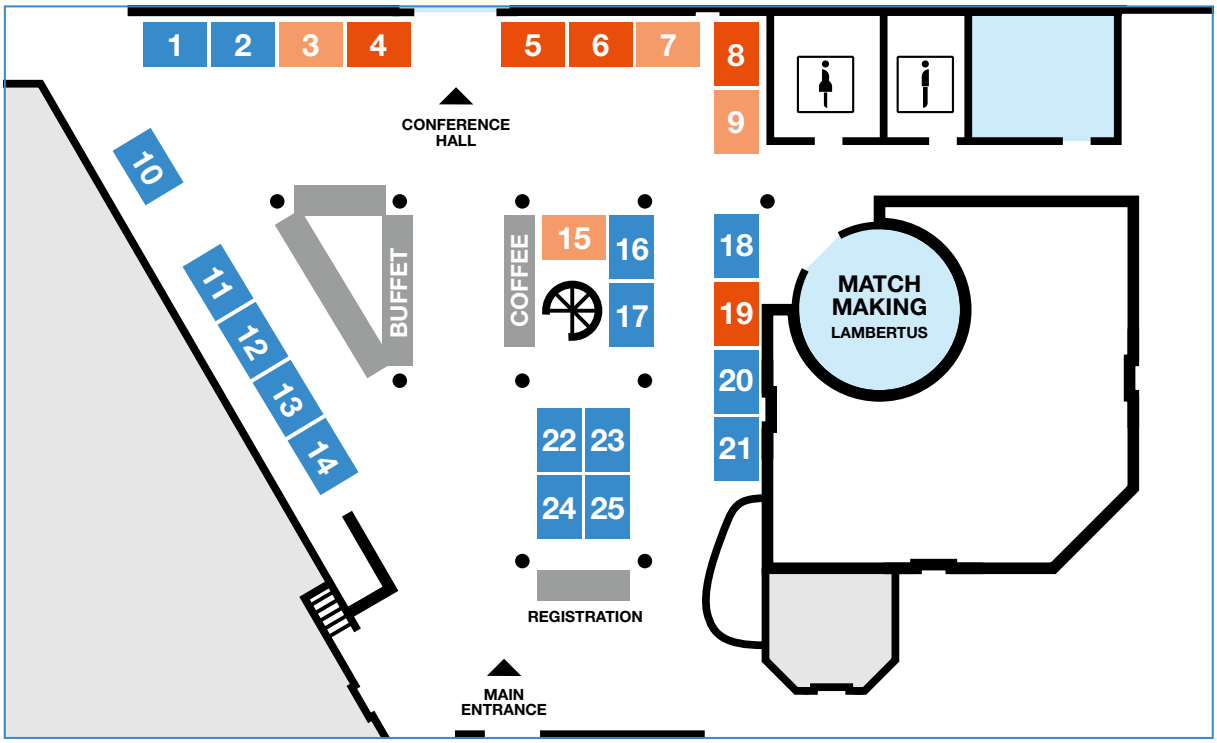
buergertest-koeln.de
Komödienstr. 2,
50667 Köln (Cologne)
Opening Hours: 9:00 – 18:00 (CET)

Information on entering Germany: **https://www.auswaertiges-amt.de/en/coronavirus/2317268** or **https://www.bundesgesundheitsministerium.de/en/coronavirus/infos-reisende/faq-tests-einreisende.html**

Re-open EU **https://reopen.europa.eu** provides information on the various measures in place, including on quarantine and testing requirements for travellers, the EU Digital COVID certificate to help you exercise your right to free movement, and mobile coronavirus contact tracing and warning apps.
Here you can find the corona rules for travelers, also transit rules e.g. a trip from Belgium through Germany to Austria: **https://reopen.europa.eu/de/from-to/BEL/AUT/DEU**

Exhibiton

Free Reserved for sponsors (Become a sponsor) Booked



List of Exhibitors

Booth 04 | **Covestro (DE)**
Booth 05 | **Yncoris (DE)**
Booth 06 | **nova-Institute (DE)**
Booth 08 | **Media Table**
Booth 19 | **Innovation Award "Best CO_2 Utilisation 2022"**

Status: 15 March 2022 – more exhibitors expected.
co2-chemistry.eu/exhibition-booking

nova-Institute for Ecology and Innovation

Technology & Markets

- Market Research
- Innovation & Technology Scouting
- Trend & Competitive Analysis
- Supply & Demand Analysis
- Feasibility & Potential Studies
- Customised Expert Workshops

Communication

- Comprehensive Communication & Dissemination in Research Projects
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- Targeted Newsletters for 19 Specialty Areas of the Industry
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- In-depth B2C Research

Sustainability

- Tailor-made Life Cycle Assessments
- Customised Carbon Footprint Calculation Tools
- Social Impact Assessment & Social Acceptance
- Comprehensive Sustainability Assessments
- Sustainability Integrated Technology Development (SUITED)
- Critical Reviews

Economy & Policy

- Micro- and Macroeconomics
- Techno-Economic Evaluation (TEE) for Low & High TRL
- Target Price Analysis for Feedstock & Products
- Strategic Consulting for Industry, Policy & NGO's
- Political Framework, Measures & Instruments
- Standards, Certification & Labelling

nova-Institute is a private and independent research institute, founded in 1994; nova offers research and consultancy with a focus on the transition of the chemical and material industry to renewable carbon.
What are future challenges, environmental benefits and successful strategies to substitute fossil carbon with biomass, direct CO_2 utilisation and recycling? What are the most promising concepts and applications? We offer our unique understanding to support the transition of your business into a climate neutral future.

Our subjects include feedstock, technologies and markets, economy and policy, sustainability, communication and strategy development. nova-Institute has 40 employees.

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www.renewable-carbon.eu

THE RENEWABLE CARBON INITIATIVE

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RENEWABLE CARBON INITIATIVE

Bio-based | CO_2-based | Recycling

Circular Economy

Renewable Carbon Initiative (RCI) was founded in September 2020. RCI members are committed to create a sustainable, fossil-free future for the chemical and material industry.

WHY JOIN RCI?

RCI is an organization for all companies working in and on sustainable chemicals and materials – renewable chemicals, plastics, composites, fibres and other products can be produced either from biomass, directly via CO_2 utilisation, or recycling.

RCI members profit from a unique network of pioneers in the sustainable chemical industry.

RCI OFFERS ITS MEMBERS

- A common voice for the renewable carbon economy.
- Increased visibility of their individual renewable carbon solutions.
- Collective advocacy work to create a supportive regulatory and economic framework.
- Support in finding solutions for your specific problems on the way to your renewable carbon goals.

MEMBERS

ALPLA, avantium, BASF, Beiersdorf, BioBTX, CLARIANT, clariter, Cosun Beet Company, covestro, DUPONT, Firmenich, FKuR, Givaudan, Henkel, IBB Network GmbH, iff, IKT Kunststoff Technik Stuttgart, LanzaTech, Leibniz-Institut für Verbundwerkstoffe, Lenzing, MANE, NESTE, nova, PCC, reckitt, SHV ENERGY, sphera, SULZER, SUNCOAL, TTC, TripleW, TÜV AUSTRIA, Unilever, uniper, UPM BIOFORE BEYOND FOSSILS, VAUDE, WACKER

PARTNERS

CO_2 VALUE EUROPE, ECBF, Global CO_2 Initiative, GO!PHA, TextileExchange, WWF

JOIN NOW

Become a part of the Renewable Carbon Community (RCC) and shape the future of the chemical and material industry
www.renewable-carbon-initiative.com/membership/application

More members, partners and information
www.renewable-carbon-initiative.com
Contact: **dominik.vogt@nova-institut.de**
#renewablecarbon

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Day 1
23 March 2022
10:00 – 19:00, CET

10:00 **Michael Carus**
nova-Institute (DE)
Conference Opening

10:10 **Minister Andreas Pinkwart**
Ministry of Economic Affairs, Innovation, Digitalization and Energy of the State of North Rhine-Westphalia (DE)
Industrial Transformation – GameChanger for NRW

Innovation & Strategy

Chairperson
Michael Carus
nova-Institute (DE)

10:15 **Anastasios Perimenis**
CO_2 Value Europe (EU)
Development of CCU in Europe: Projects and Policies

10:35 **Nina Kolbe**
Thyssenkrupp Steel Europe (DE)
Carbon2Chem – using CO_2 in a Cross-industrial Network

10:55 **Sarah Endres**
EEW Energy from Waste (DE)
Carbon Reduction Strategies for Waste to Energy

11:15 **Daniel Marenne**
ENGIE (BE)
How to Implement the Circular Economy of CO_2

Day 1 **23 March 2022** (10:00–19:00, CET)

11:35 **Bjorn Heijstra**
LanzaTech (US/BE)
Widening the Feedstock Pool: Creating a Circular Carbon Economy

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11:55 **Discussion with all Speakers of the Session**

12:20 **Lunch & Networking**

Green Hydrogen Production and Power-to-Fuels

Chairperson
Achim Raschka
nova-Institute (DE)

13:50 **Maximilian Pfennig**
Fraunhofer IEE (DE)
The Global PtX Atlas – Global Potentials for Power-to-X

14:10 **Werner Diwald**
Deutscher Wasserstoff- und Brennstoffzellen Verband (DE)
H2Europe – Starter for a European Green Hydrogen Union

14:30 **Sebastian Dinh**
NOW Nationale Organisation Wasserstoff- und Brennstoffzellentechnologie (DE)
BMDV Funding Activities for Renewable Fuels

14:50 **Maartje Feenstra**
TNO (NL)
TAKE-OFF – CO_2-based Methanol to Olefins to Jet Fuel

15:10 **Discussion with all Speakers of the Session**

15:30 **Coffee Break & Networking**

Day 1 **23 March 2022** (10:00–19:00, CET)

Sustainability and Economics

Chairperson
Christopher vom Berg
nova-Institute (DE)


16:00 **Michael Carus & Ferdinand Kähler**
nova-Institute (DE)
The Importance and GHG Reduction Potential of CCU for the Future of Chemistry


16:30 **Alba Soler & Victor Gordillo Zavaleta**
Concawe (BE) & Aramco Overseas Company (FR)
E-Fuel: A Techno-economic Assessment of European Domestic Production and Imports towards 2050


16:50 **Dennis Krämer & Christian Goroncy**
DECHEMA (DE) & DIN (DE)
CO_2 as Sustainable Carbon Source – how Standards Can Lead the Pathway to Industrial Applications

17:10 **Discussion with all Speakers of the Session**

Presentations of the Nominees for the "Best CO_2 Utilisation 2022"


Chairpersons
Michael Carus and Asta Partanen
nova-Institute (DE)

17:30 **Michael Carus**
nova-Institute (DE)
Innovation Award Introduction

17:40 **Anastasios Perimenis**
CO_2 Value Europe (EU)
Innovating to Make CCU Products Part of our Everyday Life

Day 1 — **23 March 2022** (10:00–19:00, CET)

17:50 **Martin Kavšček**
Acies Bio (SI)
OneCarbonBio

18:00 **Stafford Sheehan**
Air Company (US)
Air Eau de Parfum

18:10 **Stijn Boeren**
Avecom (BE)
Power To Protein

18:20 **Jaeson Cardiff**
CleanO_2 Carbon Capture Technologies (CA)
CleanO_2 Soap

18:30 **Leonardo Castaneda**
Fraunhofer IGB (DE)
eBioCO_2n Technology

18:40 **Gunnar Holen**
Nordic Electrofuel (NO)
E-Fuel 1

18:50 **Online Voting**

19:00 **Martin Lindmeyer**
Yncoris (DE)
Innovation Award Ceremony

19:00 **Networking with Local Beer**

20:00 **Gala Dinner**

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Conference on CO_2-based Fuels & Chemicals 2023

co2-chemistry.eu

19 – 20 April 2023

Save the Date

Day 2
24 March 2022
9:00 – 17:30, CET

9:00 **Achim Raschka**
nova-Institute (DE)
Conference Opening

Carbon Capture & Utilisation

Chairperson
Achim Raschka
nova-Institute (DE)

9:10 **Amy Ruddock**
Carbon Engineering (GB)
E-fuels from DAC and Green Hydrogen at Industrial Scale

9:30 **Christian Schweitzer**
bse Methanol (DE)
Circular CO_2 Capture and Utilisation as H_2 Carrier

9:50 **Moritz Wendt & Ramona Götz**
Yncoris (DE)
Flexible Power-To-X Networks Operation by a Digital Twin based Energy Management System

10:10 **Laura Gómez Alonso**
Instituto de Carboquímica (ES)
Production of High Purity Methane through a Sorption Enhanced Methanation Process

10:30 **Discussion with all Speakers of the Session**

10:45 **Coffee Break & Networking**

Day 2 **24 March 2022** (9:00 – 17:30, CET)

11:00 **Ivan Merino Garcia**
Universidad de Cantabria (ES)
Microreactors Combined with Innovative Metal-organic Aerogels for an Efficient CO_2 Photoreduction with Visible Light

11:20 **Ken Omersa**
Omnagen (GB)
Electrochemical Reaction between Carbon Dioxide, Methane and Air to Produce Syngas

11:40 **Gunnar Holen**
Nordic Electrofuel (NO)
A Novel POX-r-WGS Reactor for E-Fuel Production

12:00 **Bart van den Bosch**
Avantium (NL)
Electrochemical CO_2 Reduction to Formic Acid in the Heart of an Urban Biorefinery

12:20 **Discussion with all Speakers of the Session**

12:40 **Lunch & Networking**

Day 2 **24 March 2022** (9:00 – 17:30, CET)

Power-to-Chemicals / Power-to-Fuels

Chairperson
Achim Raschka
nova-Institute (DE)

13:40 **Thomas Haas**
Evonik (DE)
The Rheticus Project

14:00 **Michael Kember**
Econic Technologies (GB)
Econic Technologies – Turning CO_2 into Endless Value

14:20 **Ouda Salem**
Fraunhofer ISE (DE)
Process Dynamic Operational Strategies und Intensification as Key "Enablers" for PtX Technologies Realization and Achieving Sustainable Society Goals: Examples Power-to-Methanol and -Ammonia

14:40 **Doreen Kaiser**
TU Bergakademie Freiberg (DE)
Direct Synthesis of Methyl Formate from Hydrogen and CO_2

15:00 **Discussion with all Speakers of the Session**

15:20 **Coffee Break**

Day 2 **24 March 2022** (9:00 – 17:30, CET)

15:40 **Martin Kavšček**
Acies Bio (SI)
One Carbon Bio Platform for Sustainable Industrial Chemicals

16:00 **Heleen De Wever**
VITO (BE)
BioRECO₂VER – Biological Routes for CO_2 Conversion into Chemical Building Blocks

16:20 **Sarah Refai & Markus Müller**
CLIB – Cluster Industrielle Biotechnologie (DE)
BioCOnversion – From Steel Offgases to Valuable Molecules

16:40 **Stijn Boeren**
Avecom (BE)
Power to Protein: What if We Could Sustainably Create Food out of Green Energy?

17:00 **Yufeng Jiang**
University of Denmark (DK)
Microbial Conversion of Syngas to Single Cell Protein Using Hydrogen-oxidizing Bacteria: the Role of Carbon Monoxide

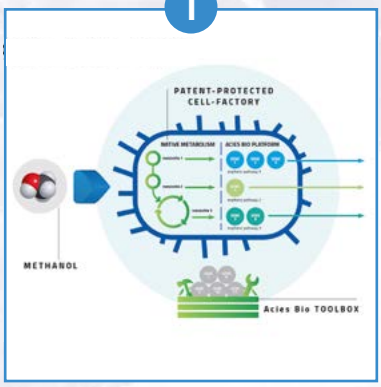
17:20 **Discussion with all Speakers of the Session**

Closing Remarks

17:30 **Networking**

Nominees of the Innovation Award Best CO_2 Utilisation 2022

1



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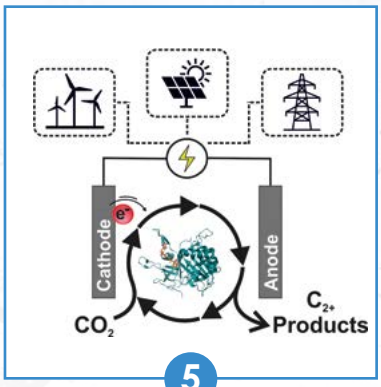

5

6

Organiser

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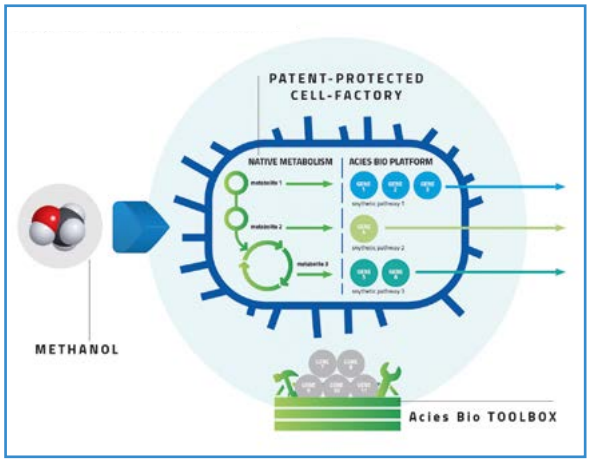
What you can expect – the "Top 6" candidates in detail

1

OneCarbonBio

Acies Bio (SI)



A fossil-fuel-based economy emits 1 billion tons of CO_2 annually to produce industrial chemicals. To achieve net-zero goals by 2050 and limit the global temperature rise to 1.5 °C, the way we produce our raw materials must be redefined. OneCarbonBio uses power of synthetic biology to improve and leverage microbes' ability to convert CO_2 derived feedstock, methanol, into value added chemicals, such as plastic monomers or amino-acids.
Using C1 feedstock we can achieve a significant reduction of carbon emissions and arable land usage for production of industrial chemicals. OneCarbonBio consists of patented chassis strains, industrial fermentation solutions and a powerful synthetic biology toolbox to generate strains capable of production of different classes of biological molecules in a rapid manner.

More information: **www.aciesbio.com**

2

Air Eau de Parfum

Air Company (US)

Air Eau de Parfum is the world's first fragrance made from air. Inspired by the earth's most abundant and vital elements of air, water and sun, it's a genderless fragrance designed to be as unconventional as possible. Each bottle created prevents 0.036kg of CO_2 from being released into the atmosphere.
Using 100% renewable energy, the ethanol base, which is the most prominent alcohol used in fragrance, was created using the company's proprietary Carbon Conversion Reactor technology which mimics photosynthesis by using air (CO_2), water and sun (solar energy) to transform CO_2 into impurity-free alcohols. This results in a carbon-negative formula. The ethanol is then formulated with water and their curated sequence of notes to create the scent and final fragrance which is uniquely fresh and citrusy with top notes of fig leaf and orange peel, heart notes of jasmine, violet and sweetwater and base notes of powdery musk and tobacco.

More information: **www.aircompany.com**

What you can expect – the "Top 6" candidates in detail

3

Power To Protein

Avecom (BE)

Power to Protein covers the sustainable production of protein-rich ingredients for human consumption. Avecom makes use of single cell micro-organisms or bacteria that naturally consume hydrogen gas and oxygen gas, both derived from green electricity by means of electrolysis, and a third gas – the greenhouse gas carbon dioxide – to produce a biomass rich in protein and vitamin B12. Further drying of the biomass will produce a powder that can be further applied as food ingredient. The Power to Protein process uses its additional resources like nitrogen without any loss to the environment, and is a net consumer, not an emitter, of carbon dioxide.

More information: **www.avecom.be**

4

CleanO₂ Soap

CleanO₂ Carbon Capture Technologies (CA)

CleanO₂® makes a revolutionary soap the old-fashioned way. Using 5,000-year-old know-how, the company makes premium natural cold-processed soap that contains captured carbon. The captured carbon, in the form of potassium carbonate, gives the soap a luxurious silky lather. What's more, even after the soap is used, the carbon remains sequestered.

But that's not the whole innovation. The sale of CleanO₂ soaps helps fund the research, manufacture and installation of CarbinX™ carbon-capture units. This creates a virtuous business cycle.

As for the approach to carbon capture, CarbinX units are attached to the flues of natural gas heating appliances in commercial buildings. They convert the waste CO_2 into potassium carbonate, before the carbon enters the atmosphere, using a patented process.

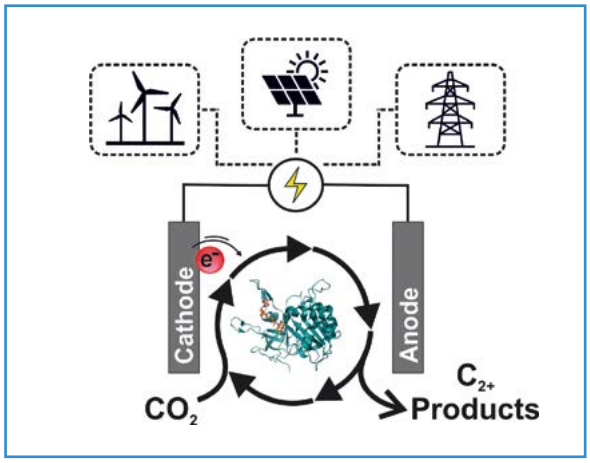
More information: **www.cleano2.ca**

What you can expect – the "Top 6" candidates in detail

5

eBioCO₂n Technology

Fraunhofer IGB, MPI Marburg, TUM Campus Straubing (DE)



The eBioCO₂n technology developed among Fraunhofer IGB, MPI Marburg and TUM Campus Straubing powers for the first time the selective incorporation of CO_2 into highly complex molecules using green electricity. Its potential relies on the replacement of petrochemical based processes to directly build molecules using electrolyzers for CO_2 reduction. The bioinspired system is fed with electrons transferred through a viologen-based redox polymer into Ferredoxin-$NADP^+$ reductase which converts the electrical energy into chemical energy in the form of NADPH used by crotonyl-CoA carboxylase/reductase to fixate CO_2 into crotonyl CoA at rates of 1.6 ± 0.4 µmol cm^{-2} h^{-1} with 92 ± 6 % faradaic efficiency. eBioCO₂n is a step towards achieving an energy and resource efficient circular carbon economy.

More information: **www.igb.fraunhofer.de**

6

E-Fuel 1

Nordic Electrofuel (NO)

In E-fuel 1, the innovative set-up of the technology elements will be demonstrated for the first time at an industrial scale, located near to a CO/CO_2 waste gas emitting plant and using ~ 12 % of their unavoidable emissions to produce synthetic crude. In E-fuel 2, all (100 %) of the furnace gas will be used, reducing GHG emissions with 480 000 tons/year. The pilot plant is expected to prove the calculated emission reductions during the project lifetime of 10 years. During this time, the upscaling will be realized at the same location, and the demonstration plant will be operated in parallel to prove further efficiency gains.

More information: **www.nordicelectrofuel.no**

Valuable Quotes: Conference on CO_2-based Fuels and Chemicals

Martin Kavšček
Acies Bio (SI)
"A missing link in the development of sustainable fermentations based on CO_2 derived feedstock for efficient production of biochemicals."

Victor Gordillo Zavaleta & Alba Soler
Aramco Overseas Company (FR) & Concawe (BE)
"E-fuels produced in the EU or imported from MENA show up to 96% GHG reduction potential at costs mainly influenced by the electricity, in the range of 1.0-2.6 €/Ldiesel-eq by 2050."

Bart van den Bosch
Avantium (NL)
"Electrocatalytic CO_2 reduction and hydrogen production can become economically more viable when paired with valuable oxidation reactions."

Stijn Boeren
Avencom (BE)
"Power to Protein: What if bacteria could sustainably create food ingredients out of green energy?"

Anastasios Perimenis
CO_2 Value Europe (EU)
"The inclusion of CCU in EU policy and the increasing number of CCU projects highlight the positive momentum for CCU and the need to scale CCU technologies at industrial levels."

Christian Goroncy
DIN (DE)
"Biorizon established three bio-based technology platforms towards renewable aromatic building blocks: discover why, how and what's next!"

Michael Kember
Econic Technologies (UK)
"The presentation will highlight Econic's innovative catalyst technology that enables existing polyol manufacturers to incorporate captured CO_2 into essential products."

Sarah Endres
EEW Energy from Waste (DE)
"The presentation will highlight EEW's activities to achieve carbon neutrality by 2030."

Ouda Salem
Fraunhofer Institut (DE)
"Hydrogen & PtX technologies as matchmakers for the energy transition. Insights with focus on process intensification strategies for PtX value chain enhancements will be presented."

Maximilian Pfennig
Fraunhofer IEE (DE)
"The Global PtX Atlas – overview of the global potential for the production of green hydrogen and electricity-based fuels."

Thomas Haas
Evonik (DE)
"Artificial photosynthesis enables us to turn CO_2 into valuable chemicals. At the same time it increases the energy efficiency compared to natural photosynthesis."

Laura Gómez Alonso
Instituo de Carboquimica (ES)
"Sorption enhanced CO_2 methanation from the production of pure CH_4."

Babette Pettersen
LanzaTech (US/BE)
"Creating Value from Waste by Capturing Carbon from Industrial Emissions to produce Sustainable Fuels & Chemicals."

Ken Omersa
OMNAGEN (UK)
"The self-powered CO_2 converter, a route to renewable fuels, without the need for external energy."

Maartje Feenstra
TNO (NL)
"Sustainable aviation fuel from CO_2."

Nina Kolbe
ThyssenKrupp (DE)
"In the Carbon2Chem® project, we are working on cross-industrial CCU solutions that combine steel industry with chemical industry and are expanding these to CO_2-sources like lime kilns and waste incineration plants."

Doreen Kaiser
TU Bergakademie Freiberg (DE)
"The presentation shows an efficient and elegant way to use the greenhouse gas CO_2 sensibly for the production of the low-emission fuel methyl formate."

Ivan Merino Garcia
Universidad de Cantabria (ES)
"Continuous CO_2 photoreduction (artificial photosynthesis) under visible light using a planar optofluidic microreactor and novel metal-organic aerogels."

Yufeng Jiang
University of Denmark (DK)
"A study demonstrated the microbial conversion of syngas into single-cell protein using hydrogen-oxidizing bacteria."

Heleen De Wever
VITO (BE)
"Unique equipment, approaches and expertise were developed for biotechnological capture and conversion of CO_2 in the BioRECO$_2$VER project."

Moritz Wendt & Ramona Götz
Yncoris (DE)
"Real-time optimisation is proposed to tackle the challenge of dynamic operation of a power-to-gas network under fluctuating boundary conditions."

RENEWABLE MATERIALS CONFERENCE 2022

10-12 May – Cologne, Germany

renewable-materials.eu

The stars of Renewable Materials meet in Cologne

The unique concept of presenting all renewable material solutions at one event hits the mark: bio-based, CO_2-based and recycled are the only alternatives to fossil-based chemicals and materials. Preliminary program available.

RENEWABLE MATERIAL OF THE YEAR 2022 1 INNOVATION AWARD
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First day

- Bio- and CO_2-based Refineries
- Chemical Industry, New Refinery Concepts
- Chemical Recycling

Second day

- Renewable Chemicals and Building Blocks
- Renewable Polymers and Plastics – Technology and Markets
- Fine Chemicals (parallel session)
- Innovation Award

Third day

- Latest nova Research
- The Policy & Brands View on Renewable Materials
- Biodegradation
- Renewable Plastics and Composites

Call for Innovation
Vote for the "Renewable Material of the Year 2022" at the Event

Organiser: nova Institute
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CLIB has brought together more than 50 experts to gather knowledge on a circular economy based on C1 carbon sources in a specialist book. This book introduces the material use of carbon-containing gas flows, describes the basics of chemical and biotechnological processes for the conversion of CO and CO2, and explains the entry into a circular carbon economy.

The utilization of carbon-containing emission and gas streams are reaching industrial practice and will make an important contribution to reduce carbon emissions in Europe and to foster a circular carbon economy.

This book describes processes for converting CO and CO2 to chemicals and fuels, and focuses on the different manufacturing industries, industrial sites and regions:

- Which emission and gas flows offer potential as raw materials?
- Which processes are already being implemented, and developed?
- Which products can be manufactured from gaseous carbon sources?

These and other questions are discussed in this specialist book. Enjoy your reading!

CLIB networking biotechnology creating sustainability

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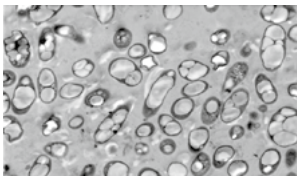
nova Market and Trend Reports on Renewable Carbon

The Best Available on Bio- and CO_2-based Polymers & Building Blocks and Chemical Recycling

Mimicking Nature – The PHA Industry Landscape

Latest trends and 28 producer profiles



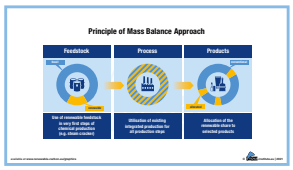
Author: Jan Ravenstijn

March 2022

This and other reports on renewable carbon are available at **www.renewable-carbon.eu/publications**

Bio-based Naphtha and Mass Balance Approach

Status & Outlook, Standards & Certification Schemes



Authors: Michael Carus, Doris de Guzman and Harald Käb

March 2021

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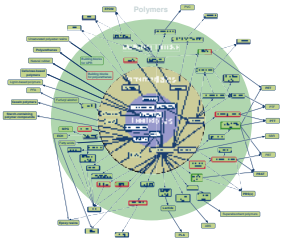
Bio-based Building Blocks and Polymers – Global Capacities, Production and Trends 2020–2025



Authors: Pia Skoczinski, Michael Carus, Doris de Guzman, Harald Käb, Raj Chinthapalli, Jan Ravenstijn, Wolfgang Baltus and Achim Raschka

January 2021

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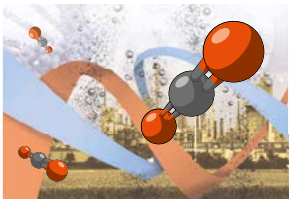
Carbon Dioxide (CO_2) as Chemical Feedstock for Polymers

Technologies, Polymers, Developers and Producers



Authors: Pauline Ruiz, Achim Raschka, Pia Skoczinski, Jan Ravenstijn and Michael Carus, nova-Institut GmbH, Germany

January 2021

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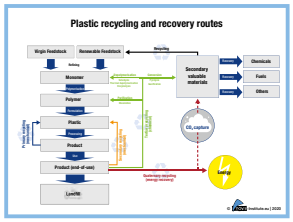
Chemical recycling – Status, Trends and Challenges

Technologies, Sustainability, Policy and Key Players



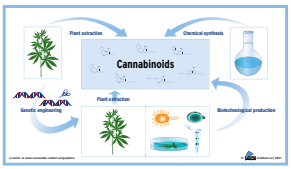
Author: Lars Krause, Florian Dietrich, Pia Skoczinski, Michael Carus, Pauline Ruiz, Lara Dammer, Achim Raschka, nova-Institut GmbH, Germany

November 2020

This and other reports on the bio- and CO_2-based economy are available at **www.renewable-carbon.eu/publications**

Production of Cannabinoids via Extraction, Chemical Synthesis and Especially Biotechnology

Current Technologies, Potential & Drawbacks and Future Development



Authors: Pia Skoczinski, Franjo Grotenhermen, Bernhard Beitzke, Michael Carus and Achim Raschka

January 2021

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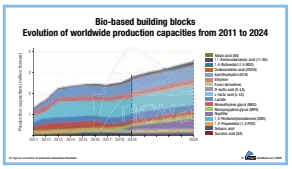
Commercialisation updates on bio-based building blocks



Author:
Doris de Guzman, Tecnon OrbiChem, United Kingdom

Updated Executive Summary and Market Review May 2020 – Originally published February 2020

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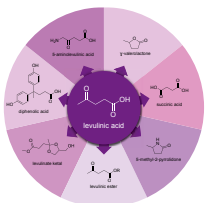
Levulinic acid – A versatile platform chemical for a variety of market applications

Global market dynamics, demand/supply, trends and market potential



Authors: Achim Raschka, Pia Skoczinski, Raj Chinthapalli, Ángel Puente and Michael Carus, nova-Institut GmbH, Germany

October 2019

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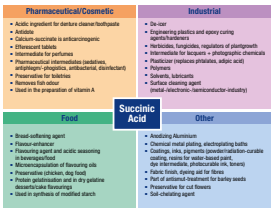
Succinic acid – From a promising building block to a slow seller

What will a realistic future market look like?



Authors: Raj Chinthapalli, Ángel Puente, Pia Skoczinski, Achim Raschka, Michael Carus, nova-Institut GmbH, Germany

October 2019

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