



RENEWABLE MATERIALS CONFERENCE 2023

23–25 May • Siegburg/Cologne (Germany)



Conference **JOURNAL**

Organiser



Contact

Dominik Vogt
Conference Manager
+49 151-19 52 47 30
dominik.vogt@nova-institut.de



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Enabling a sustainable future

plasticseurope.org



renewable-carbon-initiative.com



zenit.de

Table of Contents

Introduction	6
Conference Team, Venue & Accommodation, Entrance Fee	7
Floor Plan, Exhibition and Poster Session	8
RMC Networking and Streaming Platform	10
Program Day 1, 23 May 2023	14
RCI Carbon Flows Report	20
Program Day 2, 24 May 2023	27
Nominees of the Innovation Award 2023	34
Winners of the Innovation Award 2022	38
Program Day 3, 25 May 2023	41
Valuable Quotes from the Speakers	47
Renewable Carbon Initiative	54
Save the Date: nova Conferences 2023 & 2024	56



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Network ID
Password

nova-Conference
#2023RMC



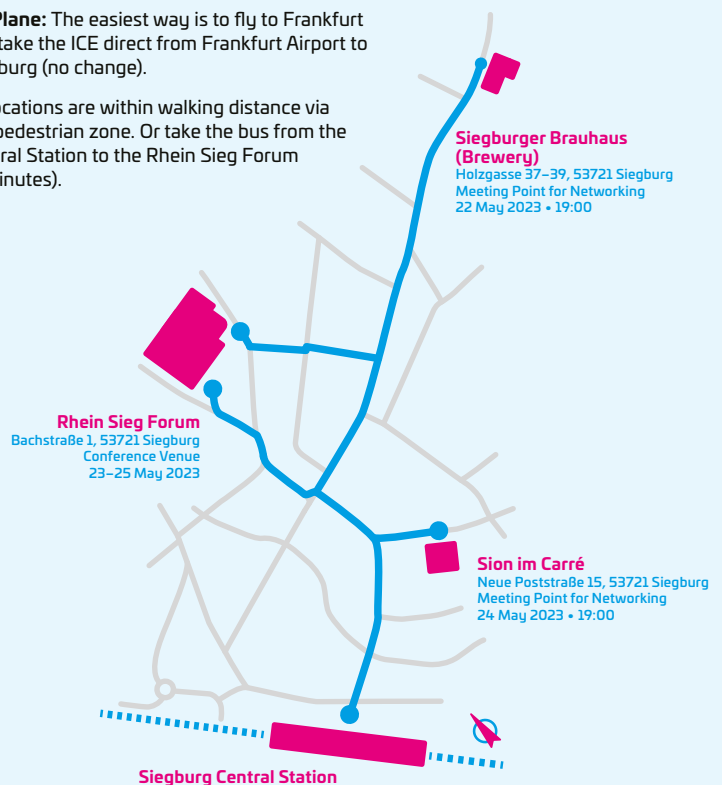
Twitter
#2023RMC

How to get to the Venue

By Train: Direct high speed train connections from Brussels, Amsterdam, Cologne, Frankfurt, Berlin, Munich to Siegburg – without changing trains or with a maximum of one change at Cologne Central Station.

By Plane: The easiest way is to fly to Frankfurt and take the ICE direct from Frankfurt Airport to Siegburg (no change).

All locations are within walking distance via the pedestrian zone. Or take the bus from the Central Station to the Rhein Sieg Forum (3 minutes).



Meeting Point for Networking
Evening before the Conference, 22 May 2023 • 19:00
Siegburger Brauhaus (Brewery)
Holzgasse 37–39, 53721 Siegburg

Conference Program

Day 1 • 23 May 2023
8:50–18:00 (CET)

P.14

Session 1
Future of the Chemical Industry

Session 2
Renewable Refineries

Parallel Session
Carbon Flows and Carbon Management

Session 3
Circularity and Chemical Recycling

Parallel Session
PHA Deep Dive: Circularity in the Biosphere

Session 4
Renewable Carbon: New Label, Product Environmental Footprint (PEF) and Mass Balance

Parallel Session
Meet & Discuss “Biodegradable Plastics – Opportunities and Challenges”

19:30, Dinner Buffet
in the Conference Centre

Day 2 • 24 May 2023
9:00–18:00 (CET)

P.27

Session 1
Renewable Chemicals and Building Blocks

Parallel Session
PLA, PBAT, PBS and PHA

Session 2
Renewable Polymers and Plastics

Session 3
Fine Chemicals

Parallel Session
PEF / FDCA / Furanics

Session 4
Innovation Award
“Renewable Material of the Year 2023”

P.33

19:00, Meeting Point for Networking
Sion im Carré, Neue Poststraße 15,
53721 Siegburg

Day 3 • 25 May 2023
9:00–16:00 (CET)

P.41

Session 1
Latest nova Research

Parallel Session
New Technologies for Efficient Renewable Processes

Session 2
The Policy and Brands View

Session 3
Renewable Plastics and Composites

Parallel Session
Transition Pathways for the Chemical Industry

Session 4
Biodegradation,
Custom-Made Biomaterials
and Certification

Join at sli.do
for real time questions and comments



Main Sessions
Grand Hall

#2023RMC



Parallel Sessions
Conference Room 1

#2023RMC-2

Zoom Events
We sent you the link to Zoom Events.

All details: please see page 10.

RENEWABLE
MATERIALS
CONFERENCE 2023

23–25 May
Siegburg/Cologne
(Germany)



Michael Carus
CEO of nova-Institute

Welcome to our 500 participants

The next three days will be packed with presentations and discussions on how we can defossilise the chemicals and materials industry by 2050. This is a challenging target as the chemical and plastics industry will need to replace 1 Gt of fossil carbon per year with renewable carbon from biomass, CO₂ and recycling to achieve net-zero in 2050. Although experts project lower growth rates for the chemical and plastics industries in the coming decades, global demand for embedded carbon – the carbon in molecules – is expected to increase significantly to 1.15 Gt of carbon per year by 2050. Today, approximately 88% of embedded carbon comes from fossil feedstocks, including oil, natural gas and coal. To achieve a fully defossilised economy, this demand must be met exclusively by renewable carbon sources. And there only are three sources of renewable carbon: biomass, the direct use of CO₂ and the recycling of carbon already in our technosphere.

The Renewable Materials Conference promises to be a one-of-a-kind event that provides a platform for showcasing the impressive achievements in the field of renewable materials. The conference will bring together leading experts, stakeholders, and industry leaders to discuss latest developments and share their visions and strategies for the future.

With the unique concept of uniting all renewable materials solutions at one event hits the mark: The Renewable Materials Conference has established itself as one of the most important conferences for renewable materials worldwide. We are proud to bring together global leaders in industry, science, and politics to shape the future of renewable materials and create a more sustainable world for generations to come.

With a focus on collaborative efforts and knowledge-sharing, the conference will provide a platform for attendees to engage in productive discussions and forge new partnerships. Participants will leave with a better understanding of the current state of renewable materials and a clear sense of the exciting possibilities that lie ahead. A matchmaking area throughout the three days, long lunch breaks and three evening meeting points guarantee comprehensive and effective networking. Online networking via Zoom Event has already started two weeks before the event.

We wish you an exciting and in-depth experience that will inspire new ideas, strengthen existing contacts and expand your network.

Enjoy the fun, as we say in the Rhineland :)

Michael Carus and the nova team

Your Conference Team



Michael Carus
CEO
michael.carus@nova-institut.de



Dominik Vogt
Conference Manager
+49 151 – 19 52 47 30
dominik.vogt@nova-institut.de



Vanessa Kleinpeter
Contact & Registration
+49 2233 – 460 14 00 • +49 170 – 595 96 47
vanessa.kleinpeter@nova-institut.de



Guido Müller
Sponsoring
+49 151 – 41 42 30 19
guido.mueller@nova-institut.de



Jutta Millich
Media & Partnerships
+49 561 – 50 35 80 44
jutta.millich@nova-institut.de



Dušica Banduka
Zoom & Speaker Management
+49 173 – 899 39 47
dusica.banduka@nova-institut.de



Brigitte Hellwig
Representative of the
nova-Institute at booth no. 5
brigitte.hellwig@nova-institut.de



Registration

renewable-materials.eu/registration

Venue & Accommodation



Rhein Sieg Forum
Bachstraße 1
53721 Siegburg
Germany

Phone: +49 (0) 2241 - 1027100
info@rhein-sieg-forum.de
www.rhein-sieg-forum.de

Recommended Hotels
www.renewable-materials.eu/venue

Entrance Fee

3 Days • 23–25 May 2023
Ticket for on site (and online) attendance
incl. dinner buffet on the first day
1395 €

Day 1 • 23 May 2023
Ticket for on site (and online) attendance
incl. dinner buffet
745 €

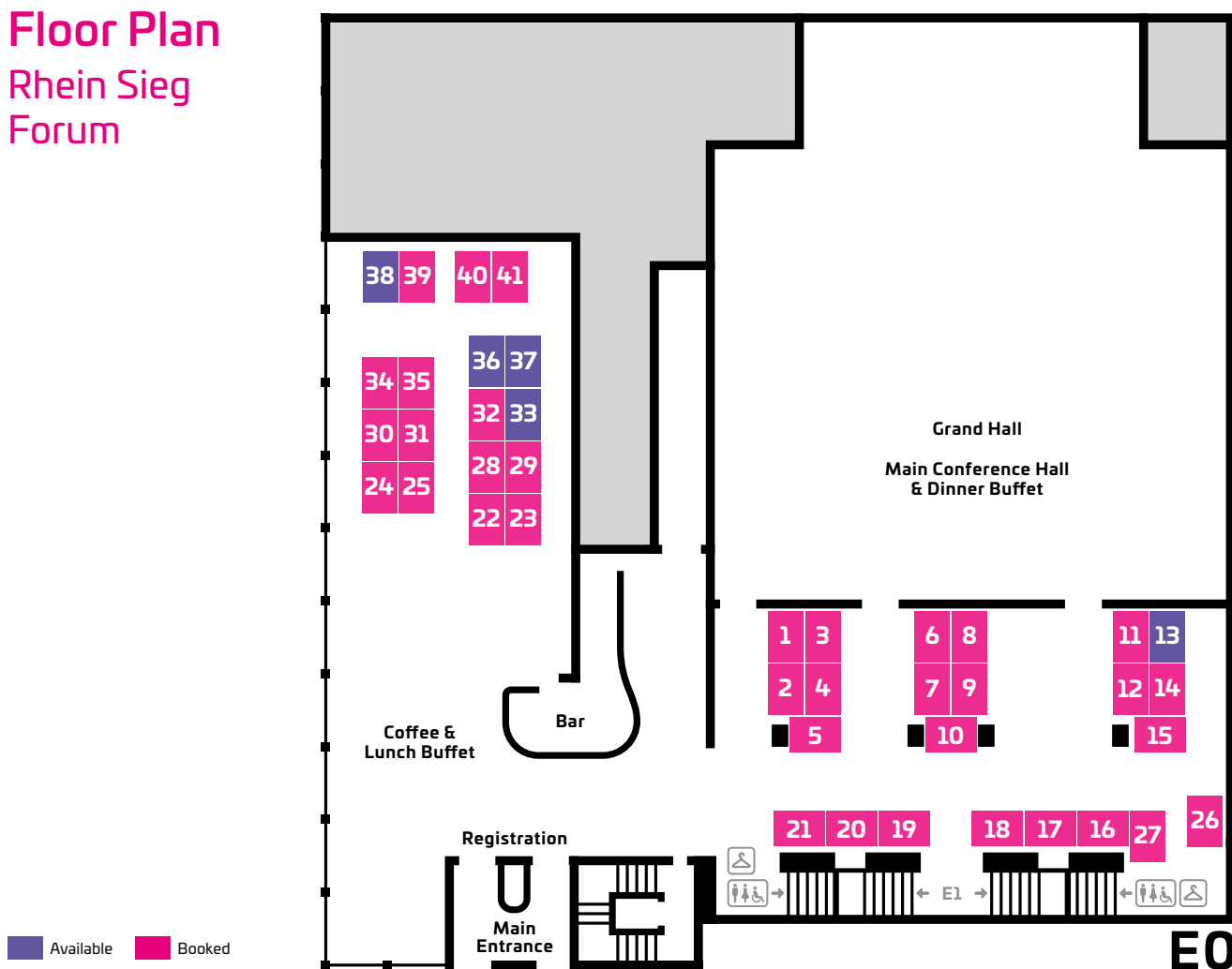
Day 2 • 24 May 2023
Ticket for on site (and online) attendance
695 €

Day 3 • 25 May 2023
Ticket for on site (and online) attendance
695 €

3 Days Online Only Ticket • 23–25 May 2023
Ticket for virtual attendance only
895 €

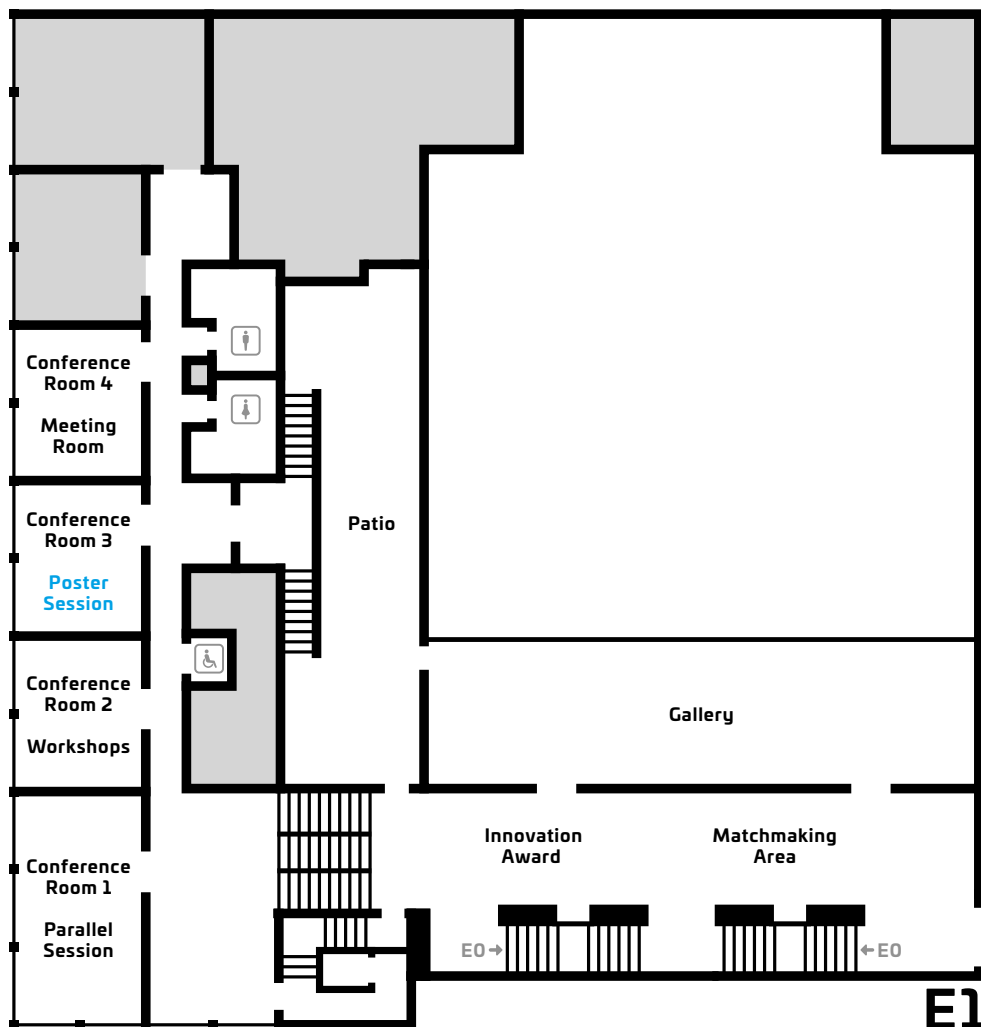
3 Days Student Ticket • 23–25 May 2023
Ticket for on site (and online) attendance
incl. dinner buffet on the first day
350 €

Floor Plan Rhein Sieg Forum



Exhibitor

- | | | |
|--|---------------------------------------|---|
| 01 Sulzer (CH) | 14 ANiMOX (DE) | 27 European Bioplastics (DE) |
| 02 Borealis (AT) | 15 Media Table | 28 IFF (US) |
| 03 Columbus Instruments Europe | 16 J. Rettenmaier & Soehne (JRS) (DE) | 29 DIN CERTCO (DE) |
| 04 Otto A. Müller Recycling (DE) | 17 Zhongke Guosheng Technology (CN) | 30 Plantics (NL) |
| 05 nova-Institute (DE) | 18 Sappi (NL/ZA) | 31 GEA (DE) |
| 06 FKuR Kunststoff (DE) | 19 Alfa Laval (SE) | 32 Schrödinger (US) |
| 07 Photanol (NL) | 20 Sugar Energy (CN) | 34 PEFerence & PERFECOAT |
| 08 Echo Instruments (SI) | 21 CovationBio (US) | 35 Renewable Carbon Initiative (RCI) |
| 09 NESTE (FI) | 22 Heraeus Deutschland (DE) | 39 B4Plastics (BE) |
| 10 TÜV Austria Belgium (BE) | 23 CO ₂ Value Europe | 40 bioplastics Magazine & Renewable Carbon Plastics Magazine (DE) |
| 11 Fachagentur Nachwachsende Rohstoffe e.V. (DE) | 24 UPM (DE/FI) | 41 Charging station for Smartphones and laptops |
| 12 BlackIP (DE) | 25 UPM (DE/FI) | |
| | 26 REDcert (DE) | |



Poster Session

Each conference day, a poster session will take place at the beginning of the lunch break (Conference Room 3). Further information at www.renewable-materials.eu/poster-session

FORTAN® for Textiles: A biobased plastic solution combating microplastic accumulation, B4Plastics (BE)

Green anti-cellulite textile fibres and structures with trapped or incorporated essential oils in porous (nona)structures, CeNTI (PT)

Electron beam induced compatibilization of PLA/PBAT blends in presence of epoxidized soybean oil, Fraunhofer Institute for Environmental, Safety and Energy Technology (DE)

Biodegradability trials of cellulose filled PLA, J. Rettenmaier & Soehne (JRS) (DE)

Durable and resource-saving composite structural components based on newly pre-treated and processed native bast fibers, nova-Institute (DE)

Introducing the CHAMPION project, nova-Institute (DE)

Biobased Cork-Polymer Composites, ESAN – University of Aveiro (PT)

Biobased graphene composites for the automotive industry, ESAN – University of Aveiro (PT)

Recycling of polyurethane foams via acidolysis, University of Aveiro (PT)

Bio-polymer Formulation with Molecular Analysis: Case Study of Poly(lactic acid), Cellulose and Chitin Blends, Schrodinger (DE)

Flue2Chem: building the flue gas to consumer goods supply chain, Unilever (UK)

RMC Networking and Streaming Platform (at Zoom Events)

Zoom Events offers all participants, speakers, exhibitors and sponsors the opportunity to network and chat.

How to enter

- 1 The use **does not** require a Zoom-account. You can also register with a valid email address.

Use the link in your participation confirmation email to register to the Zoom Events platform. There, you can get in contact with other participants, speakers, exhibitors and sponsors.

May 23 - 25 · Starts in 20 days
Renewable Materials Conference 2023
 Organized by nova-Institut GmbH
 nova-Institut GmbH's Hub
 Join this event via the Zoom client, web browser or phone. Not sure if your device is compatible with this event? [Test My Device](#)
 Only users located on this [list of countries and regions](#) can register for this event.
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 Register with Zoom Account
 Register with Email **NEW**
 Registered with email but lost the ticket? [Resend guest ticket](#)

The Future Sustainable Chemical and Materials Industry will be Based Entirely on Recycling, Biomass and CO₂

This event may be recorded **LIVE** This event may be livestreamed

- 2 If you have a Zoom account, please use it to login. Otherwise please login with your email account, a verification code will be sent to you via email.

Your registration is complete
 An email with this ticket has been sent to dusica.banduka@nova-institut.de

Renewable Materials Conference 2023
 May 23, 2023 8:00AM - May 25, 2023 5:00PM CEST
 Organized by nova-Institut GmbH
 1 Ticket
 Add to Calendar

Free
 My ticket

Set up your Zoom Events Profile & increase the chances of a connection!
 Edit My Profile

Clara Arelleno
 Designer at Globotech
 ...hold
 Manager at Globotech

- 3 After registration, you will then receive a second email which contains a "Join" button.

Please use this way to (re)enter throughout all three conference days.

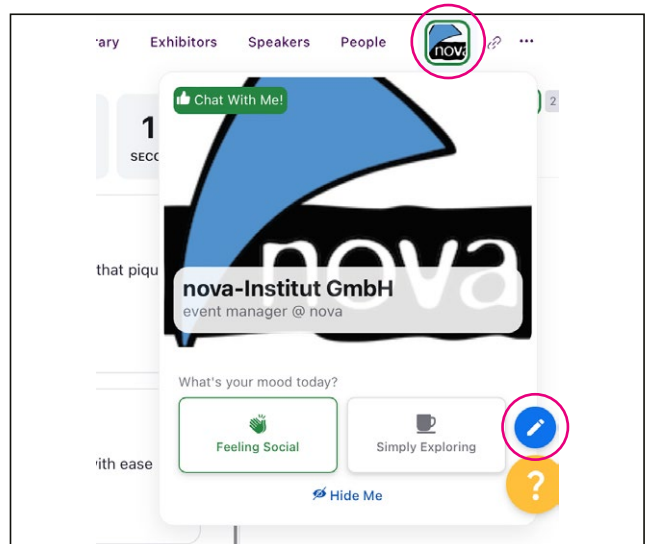
Renewable Materials Conference 2023
 View Event
 May 23, 2023 8:00 AM - May 25, 2023 5:00 PM CEST
 Organized by nova-Institut GmbH
 1 Ticket
 Join

This event is open to users located in [this list of countries or regions](#). Users located outside of these countries or regions will not be able to join this event. [Zoom Events Privacy Statement](#) · [Zoom Events Terms of Use](#)

Your profile

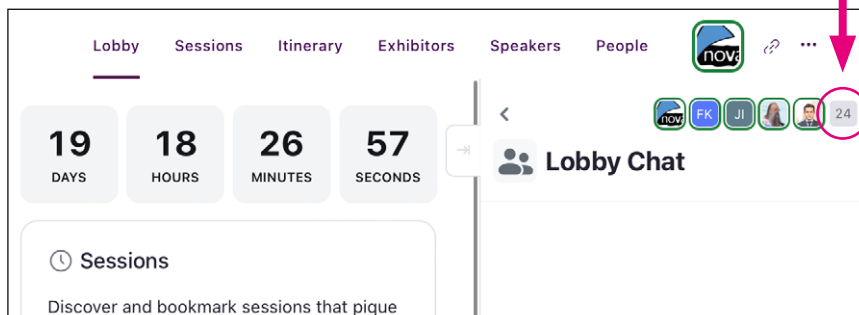
Adding more information allows others to find and contact you, by entering for example key words.

To edit your profile, click on the icon in the upper right corner.

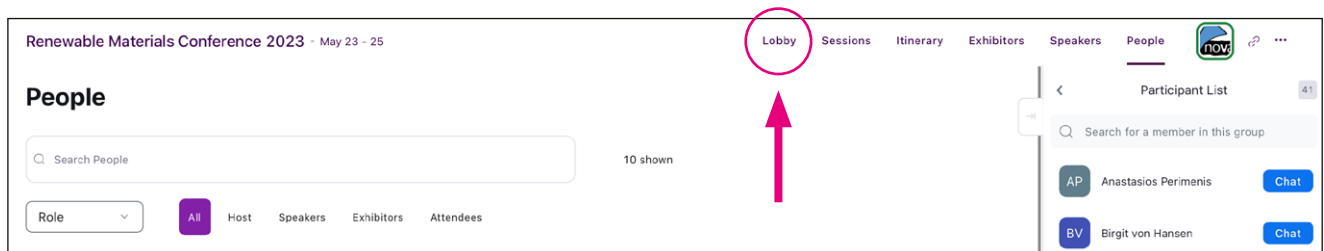
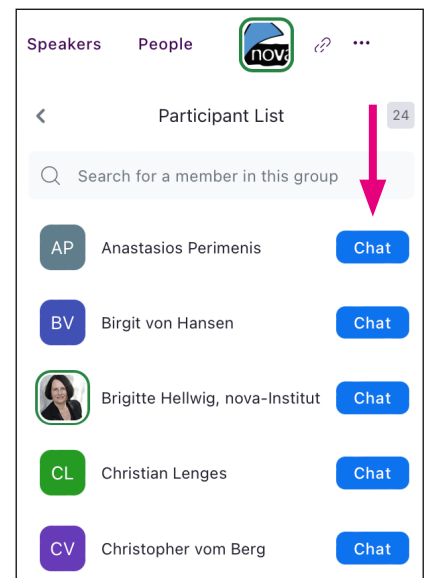


How to chat

1 By clicking on the little grey number you will get an overview of all participants and have the option to chat with them.



2 Just click on the chat button on the right handside.



To follow the livestream and see the session overview, go back to the "Lobby".

The RMC Networking Platform will open in early May and remain open till 24 June 2023.

UPM BioPura™ MEG and UPM BioMotion™ RFF

UPM BIOCHEMICALS – TRANSFORMING INDUSTRIES TOWARDS RENEWABLE CIRCULARITY

UPM BioPura™ MEG

Features and benefits:

- 100% renewable carbon
- low MEG carbon footprint
- drop-in solution
- raw material wood is in no food conflict
- non-GMO & vegan



selected applications



Battery coolants



PET packaging



Footwear



Textile

LET'S
GET IN
TOUCH!



E-MAIL:
biochemicals@upm.com
PHONE:
+49 (0) 3461 5195 001

UPM BioMotion™ RFF

Features and benefits:

- 94% renewable carbon
- > 90% reduced carbon footprint compared to average carbon black
- reinforcing filler with low material density enabling light-weight applications
- high purity by absence of hazardous PAHs
- natural black coloring allowing for NIR-sorting and thus recycling of plastics



selected applications



Rubber profiles



Precision seals



Hoses



Black plastics

UPM Biochemicals GmbH
Am Haupttor, Bau 4614
06237 Leuna
Germany



**Visit our booth at the
Renewable Materials
Conference!**



Day 1 • 23 May 2023 • 8:50–18:00 (CET)

Stefan Rosemann
 Mayor of the City of Siegburg (DE)
 Welcome to all participants



9:00

8:50 Michael Carus
 nova-Institute (DE)
 Conference Opening

9:10 – 10:50

Main Session Future of the Chemical Industry Grand Hall

Chairpersons: Lara Dammer & Achim Raschka
 nova-Institute (DE)

9:10



Jennifer Lovell
 New Normal (CH/GB)
 The Future of the European Petrochemical Industry

9:30



Peter Nieuwenhuizen
 GC3 – Green Chemistry & Commerce Council (NL/US)
 Elements of a Roadmap to Transition the Chemical Industry
 Toward Sustainable Chemicals and Materials

9:50



Rafael Cayuela
 DOW (CH/US)
 Path To Zero – A Massive Growth Opportunity

10:10



Michael Carus
 nova-Institute (DE)
 The Vision of the Renewable Carbon Initiative

10:30

Panel Discussion with all Session Speakers

10:50
 Coffee Break

11:20 – 13:00

Main Session Renewable Refineries

Grand Hall

Chairpersons: Achim Raschka & Lars Krause
nova-Institute (DE)

11:20



Lars Börger

Neste Germany (DE/FI)

Towards the Fossil-Free Future – The Neste Way

11:40



Marvin Strüfing

UPM Biochemicals (DE/FI)

UPM BioPura Glycol: Enabling Packaging,
Fashion, Automotive and Other Industries to
Achieve Carbon Footprint Goals

12:00



Jo-Ann Innerlohinger

Lenzing (AT)

Circularity – The View and Approach of a
Cellulose Fibre Producer

12:20



Peep Pitk

Fibenol (EE)

Fibenol Journey Towards Realising the Industry
Dream of Lignocellulosics Derived Biomaterials and
Biochemicals Production

12:40

Panel Discussion with all Session Speakers

13:00

Lunch Break

A poster session will take place at the beginning of the lunch break
(Conference Room 3)

11:20 – 13:00

Parallel Session Carbon Flows and Carbon Management

Conference Room 1

Chairpersons: Olaf Porc &
Nicolas Hark, nova-Institute (DE)

11:20



Ferdinand Kähler

nova-Institute (DE)

Comprehensive Assessment of Global
and European Carbon Flows

11:50



Ronja Hermanns

Carbon Minds (DE)

Climate-Positive Chemistry –
Strategies for Minimising CO₂ Emissions
and Maximising Carbon Stocks in the
Chemical Value Chain

12:15



Christopher vom Berg

nova-Institute (DE)

Biomass Utilisation Factor (BUF) –
New Metric for Circular Economy

12:40

Panel Discussion with all
Session Speakers

13:00 – 14:30

Workshop Conference Room 2



Karin Öhgren Gredegård

Alfa Laval (SE)

The Net-zero City 2050 –
Disruptive Industrial
Transformation towards a
Defossilized Future

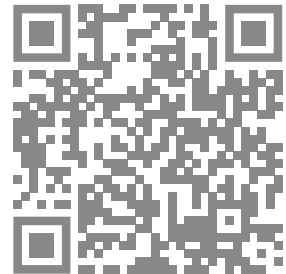


Towards a sustainable future together

We build partnerships and enable the value chain. Together we can create a future where all plastics and chemicals are made of renewable and recycled materials, replacing fossil resources.

Visit us at Renewable Materials Conference, Booth 9.

Learn more about us



[neste.com](https://www.neste.com)

NESTE

14:30 – 16:10

Main Session Circularity and Chemical Recycling

Grand Hall

Chairpersons: Christopher vom Berg &
Lars Krause, nova-Institute (DE)

14:30



Christian Krüger

BASF (DE)

Chemical Recycling & Life Cycle Assessment:
Open Questions Addressed by Meta Study

14:50



Floris Buijzen

Borealis (AT)

Circular Polyolefins – It Starts with ABC

15:10



Frank Riedewald

Composite Recycling (IE)

Lower OPEX and CAPEX Waste Plastic Chemical
Recycling Facilities with Molten Metals

15:30



Sandra Weinmann

Institut für Kunststofftechnik,

University of Stuttgart (DE)

Recycling of PA66/Silicone-Wastes

15:50

Panel Discussion with all Session Speakers

16:10


 Coffee Break

14:30 – 16:10

Parallel Session PHA Deep Dive: Circularity in the Biosphere

Conference Room 1

Chairpersons: Jan Ravenstijn, GO!PHA (NL) &
Pia Skoczinski, nova-Institute (DE)

14:30



Rick Passenier

GO!PHA (NL)

The Importance of Biodegradable Materials
in a Circular Economy

14:50



Christian Lott

HYDRA Marine Sciences (DE)

Biodegradation of PHAs in Open Environment

15:10



Marcus Eriksen

5Gyres (US)

A Field Study of the Fragmentation of Biodegradable
Packaging in Six Different Environments

15:30



Linda Amaral-Zettler

NIOZ (NL)

Biodegradation and the Plastisphere Community of
Biodegradable Substrates in a Marine Environment

15:50

Panel Discussion with all Session Speakers

16:40 – 18:00

**Main Session
Renewable Carbon:
New Label, Product
Environmental Footprint (PEF)
and Mass Balance**

Grand Hall

Chairpersons: Christopher vom Berg & Ferdinand Kähler, nova-Institute (DE)

16:40



Michael Carus & Philippe Dewolfs
nova-Institute (DE) & TÜV Austria (BE)
Renewable Carbon Share Certificate and Label

17:00



Jenny Reuber & Jan Schoeneboom
BASF (DE)
Mass Balance – The Chemical Industry’s
Transition to Circular Economy

17:20



Benjamin Nummert & Ivana Krkljus
BASF (DE)
Substantiating Green Claims in a Meaningful
Way – the Challenge of PEF

17:40

Panel Discussion with all Session Speakers

18:00

Networking and Beer on Tap
(sponsored by Borealis)

19:30

Dinner Buffet in the Conference Centre

21:00



Sigvald Harryson
iKNOW-WHO (CH)
The Winner Takes It All Is Music From The Past –
Now, the Winners Make it All

16:40 – 18:00

**Parallel Session
Meet & Discuss
“Biodegradable Plastics –
Opportunities and Challenges”**

Conference Room 1

16:40



Chairpersons
Miriam Weber & Christian Lott
HYDRA Marine Sciences (DE)

- State of the Art of Biodegradable Plastics
- Sustainability Value
- Standardisation, Certification and Regulation
- Bioplastics – a Communication Maze

**20:00 – 22:00
Paula Naumann
plays Harp**



Paula Naumann
harfenistin

End the cycle of “take, make, waste”

Moving away from today's linear economy toward one where we reduce, reuse and recycle waste, using our natural resources in the most efficient way, will create many new possibilities.

- Improve your environmental footprint
- Dramatically cut costs in your operation
- Create profitable new revenue streams



Learn how to accelerate your transition to the circular economy at www.alfalaval.com/sustainablesolutions

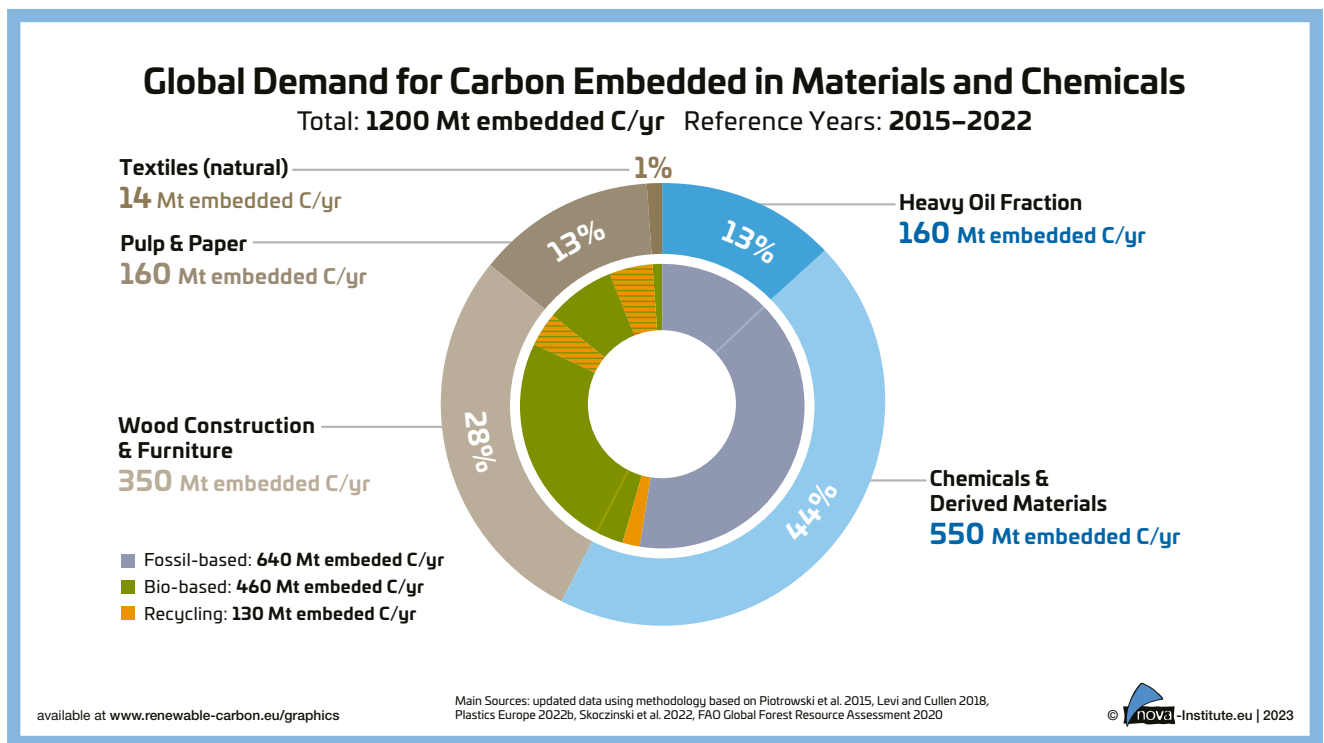
RCI Carbon Flows Report: Compilation of supply and demand of fossil and renewable carbon on a global and European level

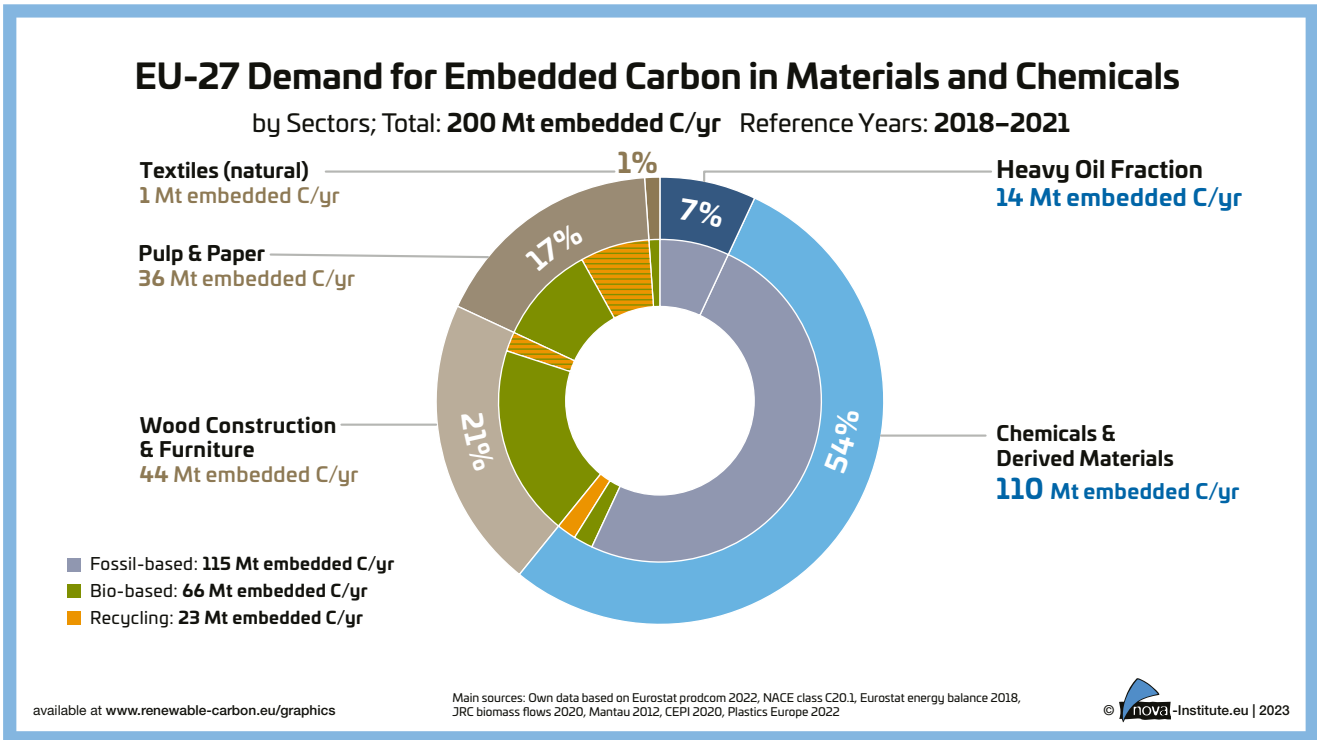
The new report provides a comprehensive understanding of today’s carbon flows and what it means to replace fossil carbon with renewable carbon in the materials and chemicals sector.

In the last five years, the mindset around carbon has changed fundamentally. Of course, there is no way around the fact that the rising concentration of carbon dioxide in the atmosphere pose an existential threat to life on Earth. But at the same time, carbon is the main component of our food, the basis of all organic chemicals and plastics, and the backbone of life on Earth.

When it comes to carbon, the focus has long been on achieving a zero-carbon, decarbonised energy system wherever possible to avoid CO₂ emissions. This is crucial and more urgent than ever to achieve net zero emissions by 2050. However, it is now becoming clear that other large volume sectors such as food and feed, but also all organic chemistry, plastics and significant parts of the materials sector are fundamentally and increasingly dependent on carbon. In the chemicals and plastics sectors in particular, almost 90 % of the carbon used as feedstock is fossil carbon. This fossil carbon must be replaced by renewable carbon from recycling, biomass and CO₂ by 2050 to avoid a further influx of fossil carbon into our technosphere and atmosphere.

Policy-makers today are talking about “sustainable carbon cycles”, “defossilisation” and above all “carbon management”: which sectors should be supplied by which carbon sources in the future?





To answer such complex questions and develop realistic targets and strategies, a resilient and comprehensive data basis on the carbon flows of all sectors, both globally and in Europe, has been missing until now.

The Renewable Carbon Initiative (RCI) has commissioned a study from the nova-Institute to fill this gap as best as possible. It builds on the nova-Institute’s long-standing work on biomass and carbon flows over the past 10 years and takes it to the next level. The result is a comprehensive, detailed and updated carbon flow data basis that significantly surpasses previous publications. All data have been corroborated as best as currently possible by scientific publications, feedback from experts and additional research. Remaining gaps and differences are transparently depicted and explained as well as possible.

The nova experts assessed data from a multitude of sources. A wide range of data on material flow are used to compile a comprehensive inventory of carbon stocks and flows. The sectors covered include all applications of organic carbon from fossil resources and biomass production, from raw materials through utilisation to final end-of-life. This includes use of carbon for feed and food, for materials, for energy and for fuels. A special focus is put on the carbon demand in the chemical and plastic industry today and tomorrow, with several figures specifically zooming into this sector and including scenarios for a full defossilisation by 2050.

If you have read previous reports on carbon flows and shares, you will find a number of data in this new report that differ from previous publications – ours or those of other authors.

For example, the share of biomass in chemical feedstocks is lower than in previous publications. The figures have changed mainly because nova experts were able to gain particularly deep insights into the data and because we consulted many experts and associations for their input and feedback – thankfully possible due to the financial budget of the Renewable Carbon Initiative (RCI). One central aim was to generate a data basis as uniform and transparent as possible, so that it can then be used and shared by industry, associations and politicians alike.

The Carbon Flows report is designed to be a living document that we would like to update every one to two years if possible. This also means that we look forward to your feedback, additional input, new data and suggestions from any interested party.

The RCI commissioned a study from nova-Institute to compile a comprehensive inventory of carbon stocks and flows. All sources of organic carbon used in economic activities and all sectors where resources containing organic carbon are used are covered. The sources of carbon include the fossil resources, oil, gas and coal, as well as renewable carbon sources, namely biomass, recycling and CO₂, where already in use. The report determines the share of fossil carbon at 63%, while biomass contributes 35% and recycling 2% to the entire global supply of organic carbon. In Europe, the fossil share is even higher with 67%. Sectors that rely on organic carbon include food and feed, the material and chemical sector and energy and transport. The report presents material flow data for all these manifold sectors and determines the corresponding flows of carbon.

Carbon can be used in fundamentally different ways. On the one hand, it is used as energy carrier where the energy stored in the molecules of hydrocarbons is released in combustion processes for power generation or for transport. On the other hand, there are applications where carbon is embedded in the final product as a fundamental part. These include food and feed as well as the material and chemical sectors, where hydrocarbons are used or converted to form often complex chemical molecules. The material sector includes wood for construction and furniture, paper, cotton for textiles, and fossil and renewable carbon for a wide range of chemicals and plastics.

While the energy and transport sector can and should be decarbonised using renewable energy, electrification and hydrogen, carbon cannot be replaced in food and material applications. The material sector can only be defossilised, meaning a shift from fossil to renewable carbon sources.

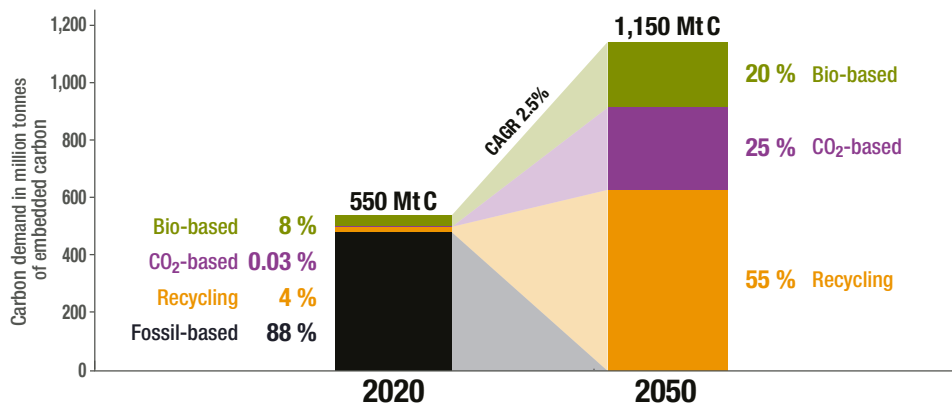
In the report, the renewable carbon share of carbon embedded in materials and chemicals is calculated to a remarkably high figure of 48% (37% from primary biomass, 11% from recycling) at world level and 4% at the European level (see figure 1 & 2). The material use of renewable carbon is dominated by wood for construction and furniture as well as pulp and paper. These two sectors are large and consume significant amounts of carbon in form of primary biomass but also non-negligible shares of recycled bio-based products. On the other hand, the chemical industry uses only small shares of biogenic carbon and carbon from recycling (6 and 3% globally and 4 and 3% in the EU).

Zooming in on the chemical industry, it still strongly depends on fossil carbon as raw material feedstock with more than 90% fossil carbon share, both globally and in the EU. When compared to other statistics, this figure is surprisingly high, but in the RCI’s report the heavy oil fraction (mainly bitumen) is included for the first time – an application sector exclusively consuming fossil carbon so far.

In the report, comprehensive depictions of current supply of carbon are drawn. An in-depth analysis is carried out for the chemical sector. Next to the carbon contained in energy carriers that is used in the chemical industry, an additional annual demand of 710 megatons of carbon (Mt C) is embedded in feedstock used for material purposes. The sub-sector of chemicals and derived materials currently uses 88% fossil feedstock.

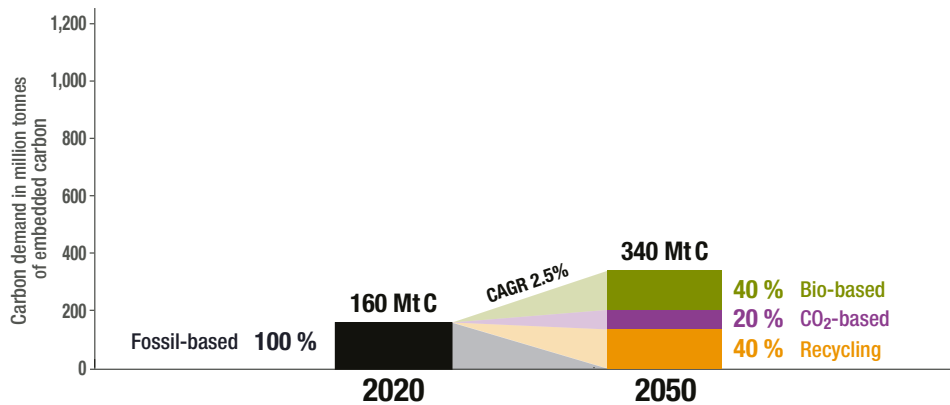
From this point, the authors outline an explorative scenario for 2050 that considers a growing demand due to rising consumption of chemicals and plastics and rising demand for road infrastructure on the one hand. On the other hand, the scenario is based on a complete phase-out of fossil feedstock and a shift to renewable sources of carbon. For chemicals and derived materials, a share of 55% is assumed based on ambitious exploitation of both mechanical and advanced recycling. But recycling alone cannot completely close the carbon cycle, additional carbon must be fed into the circular carbon flow. In the explorative scenario, biomass is required to meet the demand for chemicals and derived materials but the share is limited to 20% due to constrained limited availability of agricultural and forestry areas as well as biodiversity loss. The remaining share of 25% is provided by Carbon Capture and Utilisation (CCU) technologies, using CO₂ emissions from fossil and biogenic point sources and direct air capture.

Carbon Embedded in Chemicals and Derived Materials



available at www.renewable-carbon.eu/graphics

Carbon Embedded in the Heavy Oil Fraction (Bitumen, Lubricants, Paraffin Waxes)



available at www.renewable-carbon.eu/graphics

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The collected data emphasise the dependence of the energy and transport sector on fossil sources of carbon. Furthermore, the data can be used as a basis for the material sector to phase out fossil carbon, a process referred to as defossilisation. The information can set the basis to shape the future distribution of renewable carbon sources for the feed and food, material and chemical and energy and transport sectors: a comprehensive carbon management across all sectors.

About RCI

RCI members are a diverse group of companies, institutions and associations addressing the challenges of the transition to renewable carbon with different approaches. The opinions expressed in this press release may not necessarily reflect the policies and views of all RCI members. The RCI is not responsible for any use that may be made of the information it contains. The Renewable Carbon Initiative (RCI) was founded in September 2020 by eleven leading companies from six countries under the leadership of nova-Institute (Germany). The aim of the initiative is to support and speed up the transition from fossil carbon to renewable carbon for all organic chemicals and materials.

Contact

Please directly contact the main author of the study for this:

ferdinand.kaehler@nova-institut.de

The report contains in total 80 pages with more than 35 graphics and tables plus corresponding descriptions of methodology, source material and data as well as five pages of literature sources. The format of the report allows to easily present the graphics to any audience.

You can download the full report free of charge including all visuals here: <https://renewable-carbon.eu/publications/product/the-renewable-carbon-initiatives-carbon-flows-report-pdf>

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SULZER

Driving innovation and sustainability with PLA

Sulzer Chemtech is a technology leader in chemical separation and polymer production for a wide range of applications, with over 40 years of experience in the sector and 188 years in the industry. With the fast-growing demand on bioplastics, Sulzer Chemtech delivers world-scale, innovative, fully integrated solutions for the production of PLA and its intermediates, helping you in every step along your bioplastics journey.

For more information: sulzer.com/chemtech





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How about your authentic
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The easy-going pen is made from textile waste and bioresin.
Unique in every millimeter. With refill.
Customizable. Social. Circular. ♡



together.
turning textile waste into beauty.
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manaomea

Day 2 • 24 May 2023 • 9:00–18:00 (CET)

9:00 **Michael Carus**, nova-Institute (DE)
Conference Opening

9:10 – 10:50

Main Session Renewable Chemicals and Building Blocks

Grand Hall

Chairpersons: Pauline Ruiz & Achim Raschka
nova-Institute (DE)

9:10



Patrick van Waes
CovationBio (US)
Regenerative Farming of Industrial Corn as
Feedstock for the Production of 100 % Bio-based
Susterra 1,3-propanediol

9:30



Keith Wiggins
Econic Technologies (GB)
Application of CO₂ Containing Polyols

9:50



Johann Kirchner
bse Methanol (DE)
Direct Conversion of CO₂ to Renewable Methanol
by Standardised Synthesis Modules

10:10



Doris De Guzman
Tecnon OrbiChem (US)
Renewable Chemicals 2023 Update: Building Blocks
and Intermediates Comeback

10:30

Panel Discussion with all Session Speakers

10:50

☑ **Coffee Break**

9:10 – 10:50

Parallel Session PLA, PBAT, PBS and PHA

Conference Room 1

Chairpersons:
Gillian Tweddle, Stripe Consulting (BE) &
Pia Skoczinski, nova-Institute (DE)

9:10



Geoffroy Delvinquier
Futero (BE)
PLA and Chemical Recycling

9:30



Harris Luk
Sulzer Chemtech (CH)
Moving a Step Forward from
Poly(lactic acid) to Bio-Copolymers

9:50



Willi Smolan
T.EN Zimmer (DE)
Biodegradable Polyester and Bio-based
Monomer Technologies

10:10



Phasanti Boonsuit
PTT MCC (TH)
A Journey of High Performance of
Home Compostable Films for Flexible
Packaging: BOPBSA

10:30

Panel Discussion with all
Session Speakers

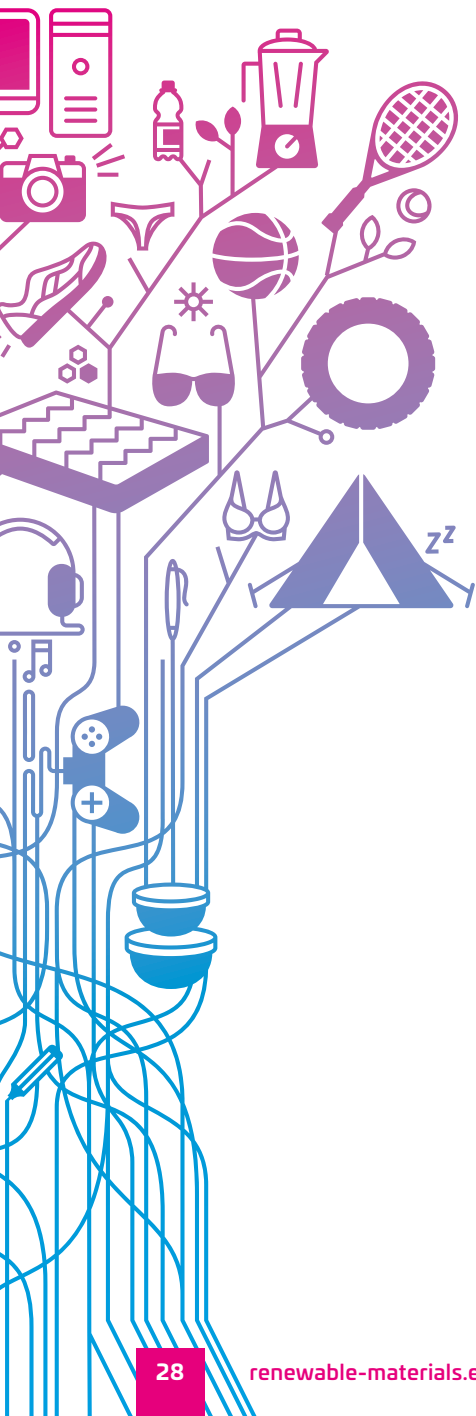
11:00 – 12:30

Workshop

Conference Room 2



Dominik Müller
UPM Biochemicals (DE/FI)
What Role Must
Bio-based Feedstock Play
in the Chemical Sector of
the Future?



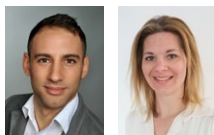
11:20 – 13:20

**Main Session
Renewable Polymers
and Plastics**

Grand Hall

Chairpersons: Pia Skoczinski & Pauline Ruiz
nova-Institute (DE)

11:20



Ángel Puente & Ingrid Goumans
nova-Institute (DE) & Avantium (NL)
PEF – A Circular Bio-Based Plastic with Improved
Properties. Life Cycle Assessment

11:40



Jean-Jacques Flat
ARKEMA (FR)
World’s Biggest Integrated Bio-Factory Dedicated to
High Performance Bio-Based Polyamides

12:00



Martin Clemesha
Braskem Netherlands (NL/BR)
Bio-based PE and its Contribution to a Net-Zero
Circular Economy

12:20



Mariana Paredinha Araujo
Avantium Chemicals (NL)
Turning CO₂ Into High-Performing and Biodegradable
Plastic Materials with Tunable Properties

12:40



Christian Lenges
International Flavors & Fragrances (IFF) (US)
Sustainable Material Innovation: Designed
Enzymatic Biomaterials

13:00

Panel Discussion with all Session Speakers

13:20

Lunch Break

A poster session will take place at the beginning of the lunch break
(Conference Room 3)

Focus on Exploring Greater Potentials of HMF/FDCA

Strategic allocation on the whole industry chain of furans bio-based materials

In the industrial chain of HMF, not only FDCA can be applied on a large scale, the potential value and future market capacity of other derivatives such as THFDM and BAMF are immeasurable. The integration of the industrial chain and the synergistic combination & complementarity of various derivatives can create more possibilities for the future and market development.

Zhongke Guosheng (Hangzhou) Technology Co., Ltd, was founded in July 2021, is a high-tech enterprise specialized in the design and development of furans bio-based materials. Core team members graduated from the Dalian Institute of Chemical Physics, Chinese Academy of Sciences, who have 20+ years of research foundation and industrialization experience in the field of biomass catalytic conversion and furan-based material design and development.

We successfully pioneered the HMF continuous production process globally, developed the process package of specific catalysts and solvent system and achieved the high-efficiency & low-cost production of HMF. We also solved the bottleneck hurdle of HMF downstream applications, and gone through the entire industry chain from upstream core monomers to end market applications.

We innovatively introduce artificial intelligence and high-throughput automatic synthesis technology into the development of downstream derivatives, efficiently and accurately expands the product pipeline of downstream derivatives of HMF. At present, the company's bio-based products have been verified and applied in the fields of functional polyesters, surfactants and feed additives. The market is revealing significant potential.

Build a full chain technology platform for bio-based new material development from Idea to industrialization



Headquarter (Hangzhou)
Continuous out put of innovative ideas



R&D (Ningbo)
Continuous optimization of production process



Pilot Plant (Lishui)
Consolidate technical chain barriers



Industrialization Facility (Taixing)
Industrialization demonstration base

Solid data authentication of various downstream applications



· Polyester bottle



· Fiber



· Multilayer biaxially oriented film



· Aramid fiber



· Surfactant

Contact information

- Contact | Zhang Yu
- Mobile | +86 139 4264 9359
- Mailbox | sales@guoshengtech.com
- Website | <http://guoshengtech.com>
- Address | Floor 4, Building B, No.19 Jugong Road, Xixing Street, Binjiang District, Hangzhou City, Zhejiang Province, China



14:20 – 16:00

**Main Session
Fine Chemicals**

Grand Hall

Chairpersons: Nadja Wulff & Achim Raschka
nova-Institute (DE)

14:20



Adeline Grevillot
L'Oréal (FR)
How can the Circular Economy Contribute to
Develop More Sustainable Cosmetic Ingredients?

14:40



Adrian Brandt
Henkel (DE)
Transformation to Renewable Carbon –
Henkel Adhesive Technologies

15:00



Dirk Leinweber
Clariant Produkte Deutschland (DE/CH)
Performance and Sustainability Without
Compromise: Innovative Surfactant Solutions

15:20



Sasha Calder
Geno (US)
The Materials Transition at Scale

15:40

Panel Discussion with all Session Speakers

16:00

↓ **Coffee Break**

14:20 – 16:00

**Parallel Session
PEF / FDCA / Furanics**

Conference Room 1

Chairpersons: Pia Skoczinski &
Ángel Puente, nova-Institute (DE)

14:20



Jean-Paul Lange
Shell Global Solutions (NL)
Furfural Manufacture at High Yield

14:40



Jian Zhang
Sugar Energy Technology (CN)
Developing Industrial Strategy to
Establish a HMF Family

15:00



John Zhang
Zhongke Guosheng (Hangzhou)
Technology (CN)
Recent Progress on Bio-based HMF's
New Materials in China

15:20



Tom Claessen
Avantium Renewable Polymers (NL)
Biorefinery Derived Furanic Humins
as Basis for Sustainable Thermosets
and Adhesives

15:40

Panel Discussion with all
Session Speakers

15:00 – 16:30

**Workshop
Conference Room 2**

Renewable Materials
Require Novel Co-Creation
Models



**Liza Shvyndikova
& Rob Kirschbaum**
iKNOW-WHO (CH)



Andreas Künkel
BASF (DE)

16:30 – 18:00

Innovation Award “Renewable Material of the Year 2023”

Grand Hall

Chairpersons: Asta Partanen & Michael Carus
nova-Institute (DE)

16:30

Michael Carus
nova-Institute (DE)
Innovation Award Introduction

16:40

Sheila Khodadadi
Avantium (NL)
Monolayer PEF Bottle: a High-quality and Sustainable Packaging Material

16:50

Philipp Arbter
COLIPI (DE)
Carbon-Light Yeast Oil

17:00

Hao Ding
CovationBio (US)
CovationBio™ Sorona® for faux fur

17:10

Christian Goldhahn
KUORI (CH)
KUORI – Bio-based and Biodegradable Elastic Materials

17:20

Norbert Baum
Qore (US)
QIRA – The Next Generation of Bio-based 1,4-Butanediol (BDO)

17:30

Jakob Röskamp
traceless Materials (DE)
traceless® – Plastic-Free Natural Polymer

17:40 Voting**17:50**

Christoph Gürtler
Covestro Deutschland (DE)
Innovation Award Ceremony

18:00 Networking**18:00 – 19:00**

Members Meeting
Renewable Carbon Initiative
(closed event)
Patio (of the Conference Centre)

19:00 • Meeting Point for Networking
Sion im Carré, Neue Poststraße 15,
53721 Siegburg



How unlearning sparks **innovation in polymer recycling.**



Six Materials are Nominated for the Innovation Award “Renewable Material of the Year 2023”

These new materials that will enable sustainable product realisations in areas such as textiles, cosmetics, packaging, as well as elastic and biodegradable materials for a variety of applications. Participants at the “Renewable Materials Conference” will vote for the winners.

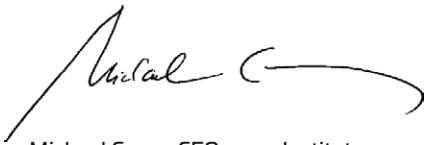
One way to overcome the chemical industry’s dependence on fossil fuels is to replace oil and gas with renewable carbon within the existing structures of the chemical industry. But it also requires innovation, the development of new processes, building blocks and materials. This requires a new way of thinking about chemistry and materials. Ready-to-use, fossil-free, sustainable material solutions with a low carbon footprint are in fast-growing demand. Innovative brand owners are on the lookout for such solutions, especially those that will soon become mainstream.

With the innovation award “Renewable Material of the Year 2023”, nova-Institute (organiser) and Covestro (sponsor) would like to recognise three particularly exciting and promising solutions that contribute to replacing fossil carbon from the ground. Our call for submissions was answered by 30 companies. The advisory board and the nova experts had a hard time choosing the six most exciting and nominating them for the award.

On the second day of the “Renewable Materials Conference”, 23-25 May in Siegburg/Cologne (Germany), the nominated companies will present their products and all 500+ conference participants will vote for the three winners on site and online. An exciting competition in which you can participate. All information about the nominated materials can be found on the next three pages.

All information and registration for the event is available at: renewable-materials.eu

See you in Siegburg
Kind regards



Michael Carus, CEO nova-Institute

Organiser



Award
Sponsor



Conference Advisory Board

We would like to thank the experts of the conference advisory board for their great help in selecting the best submitted papers and innovations.



Lars Börger
Neste Germany (DE)



Ludo Diels
VITO (BE)



Jörg Müssig
Hochschule Bremen –
University of Applied
Sciences (DE)



Gudbrand Rødsrud
Borregaard AS (NO)



Christiaan Bolck
Long-time bioeconomy
expert (NL)



Reinier Grimbergen
TNO Voltachem (NL)



Peter Orth
OPC – Orth Plastics
Consulting (DE)



Alastair Sanderson
Unilever Research and
Development (UK)



Michael Costello
Stahl Holding B.V. (NL)



Christian Lenges
IFF (US)



Jan Ravenstijn
Jan Ravenstijn Consulting
(NL)



Jan Schoeneboom
BASF (DE)



Doris de Guzman
Tecnon OrbiChem (US)



Christophe Luguel
IAR Association
Industries (FR)



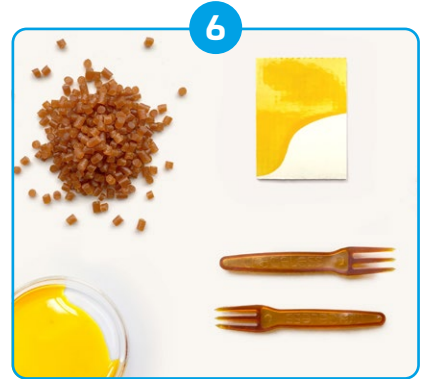
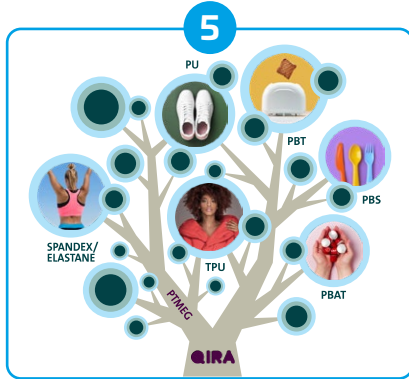
Sarah Refai
CLIB – Cluster Industrielle
Biotechnologie (DE)



Haralabos Zorbas
IBB Netzwerk (DE)

Nominees of the Innovation Award

“Renewable Material of the Year 2023”



Organiser



Innovation Award
Sponsor

1

Monolayer PEF Bottle: a High-Quality and Sustainable Packaging Material

Avantium Renewable Polymers (NL)



Avantium's PEF bottle offers a powerful combination of environmental features and superior functionality compared to conventional plastics. Due to its superior performance, PEF can also replace glass bottles, aluminium cans and multilayer bottles.

Avantium has developed a technology to convert plant-based sugars into FDCA, the building block of PEF: a plant-based, fully recyclable plastic with superior performance. The improved barrier properties lead to a longer shelf life of packaged products.

An ISO-certified LCA indicates a significant improvement in carbon footprint compared to the incumbent fossil-based PET bottle. Avantium FDCA Flagship plant, the world's first commercial FDCA facility, will be operational in 2024 with 5kt/a production capacity for commercial applications of PEF.

More information: www.avantium.com

2

Carbon-Light Yeast Oil

COLIPI (DE)



COLIPI develops innovative bioprocesses for the transformation of CO₂ to sustainable carbon-light alternatives to plant oils like palm oil. The core innovation and enabler is a patented gas fermentation bioreactor that safely unlocks world's fastest CO₂ utilizing microorganisms which turn off-gasses containing CO₂ (directly), H₂ and O₂ to carbohydrate rich biomass. These biomass and/or industrial organic side streams serve as feedstock for heterotrophic fermentations, e.g. yeast oil fermentation.

Certain yeast strains have the strength of feedstock agnosticism: a vast variety of different feedstocks can serve as carbon source, among others C5 sugars, C6 sugars, volatile fatty acids, and fat residues. Colipi is actively engaged in joint research and development with large corporations which provide potential feedstocks whereas Colipi tests them for purpose fit. The product consists of triacylglycerides, in composition equivalent to those of plants e.g. oil palm, mainly consisting of C16:0, C18:0 and C18:1 fatty acids. Further valuable molecules like antioxidative vitamins namely astaxanthin, tocopherols, and other carotenoids are produced.

Life cycle assessments and techno economic analyses were conducted expressing both: unparalleled low CO₂ footprints of the products and economic viability. The fermentation with two separate process steps will in future be simplified to a one step process.

More information: www.colipi.com

3

CovationBio™ Sorona® for faux fur
CovationBio (US)



Sorona® for faux fur is one of the first commercially available faux furs using plant-based ingredients. Made with 70–100% Sorona® polymer fibres, the partially bio-based faux fur was introduced in 2020 in a wide range of styles, lengths, and textures from classic mink to plush teddy-styles.

It provides limitless solutions for fashion apparel such as jacket lining, or the trim on a collar, as well as footwear and accessories including fur-lined shoes, earmuffs, and more.

Sorona® for faux fur is an exceptionally soft, natural feeling animal fur alternative providing warmth, design flexibility, dyeability, and uncompromising durability. Sorona® for faux fur pushes the boundaries of sustainability in fashion while providing consumers with an elegant, ethical option that is better for the planet.

More information: www.covationbio.com

4

KUORI – Bio-based and Biodegradable Elastic Materials
KUORI (CH)



We are developing and producing bio-based and biodegradable elastic materials based on food waste such as banana peels and nut shells. They are sustainable alternatives for conventional elastic materials in various applications.

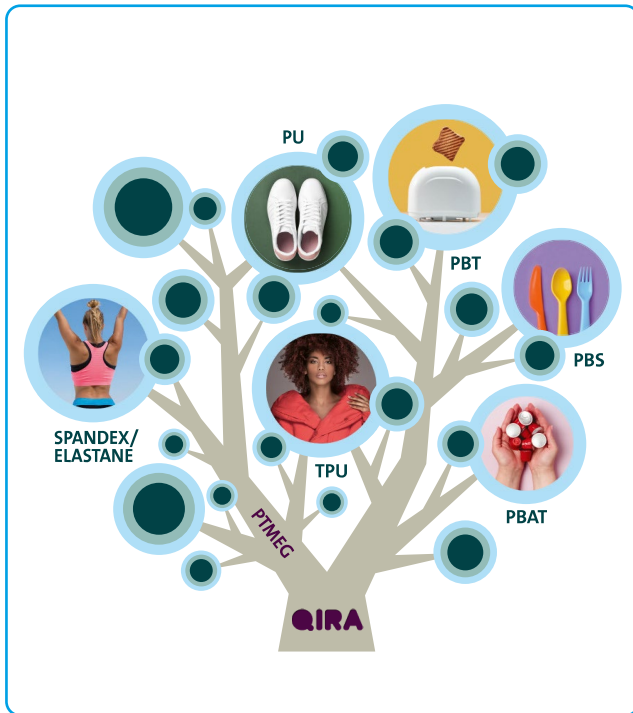
Our first use case are shoe soles. We are working together with shoe producers who make soles from our materials. This avoids the accumulation of persistent microplastics and offers an ecologic end of life perspective for the product.

Our materials can be fully reintegrated into the biological cycle by industrial composting. Hence, our materials enable a circular business model for shoe producers and other manufacturers of goods.

More information: www.kuori-materials.com

5

QIRA – the Next Generation of Bio-Based 1,4-butanediol (BDO)
Qore (US)



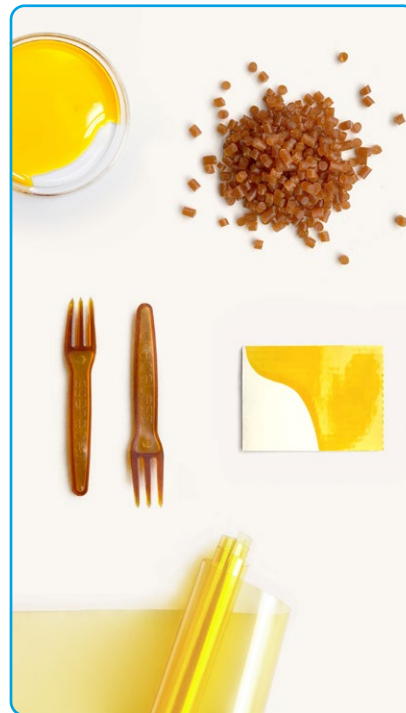
QIRA is the next generation of 1,4-butanediol (BDO) – an easy-to-implement, bio-based BDO made from annually renewable feedstocks that can reduce CO₂ emissions compared to materials using fossil-fuel based BDO. QIRA uses field corn which is grown and harvested in close proximity to its manufacturing site which broke ground in 2021 and is scheduled to start production 2024 in Eddyville, Iowa (USA).

As a key platform chemical, QIRA can be used as a drop-in solution in a wide variety of applications, including spandex fibers, bio-based plastics and polyurethanes and serves a multitude of industries such as fashion, automotive, packaging and electronics. QIRA can be used the same way as its fossil-based chemical counterpart but with better sustainability performance and without altering existing downstream manufacturing processes.

More information: www.myqira.com

6

traceless® – Plastic-Free Natural Polymer
traceless materials (DE)



traceless® is part of a new generation of plastic-free natural polymer materials that go beyond bio-based or biodegradable plastics. The material is based on plant residues of the agricultural industry and contains 100 % bio-based carbon content – hereby supporting the transition from fossils to renewables, while additionally avoiding direct food conflict. Furthermore traceless® is a toxic-free and climate friendly solution, as the production and disposal emit up to 95 % less CO₂ compared to conventional plastics. The patent-pending production technology is scalable and efficient, saving by average 83 % of fossil energy demand during production. And even though traceless® looks and feels like plastic, the material is certified plastic- and microplastic-free and fully bio-circular – designed to leave no trace.

The start-up produces traceless® as a base material in granulate form. The plastics- and packaging industry can further process this granulate to rigid applications, flexible films, coatings or adhesives, using standard converting technologies. This way, traceless® can be used in a wide variety of end products – from single-use products over rigid and flexible packaging to products with high abrasion and coating & adhesive solutions.

More information: www.traceless.eu

Winners of the Innovation Award

“Renewable Material of the Year 2022”



Electrochemical CO₂ Transformation to Chemicals and Materials

Twelve Benefit Corporation (US)



Plastic Free Paper™ with CareTips® – a Natural Polymer to Rethink Plastic

Lactips (FR)



Material-to-Material Molecular Recycling Technologies

Eastman (US)

Cellulose fibre masterbatch that lowers your footprint

Reinforcing plastics more sustainably

Sappi Symbio is an eco-responsible solution, which improves the life cycle analyses of products, compared to fossil-based, conventional materials. Our wood-based cellulose originates from regional European forest plantations which are responsibly managed and are controlled through FSC™ certification (FSC-Co15022)

Reinforcing polymers with Symbio will increase material stiffness compared to unfilled plastic. Due to the low specific gravity of cellulose, incorporating it into a plastic will retain the low weight feature of the matrix material.

KEY BENEFITS

- ✓ Reduction of carbon footprint
- ✓ Provides weight reduction
- ✓ Enhances stiffness
- ✓ Meets stringent odour requirements
- ✓ Natural look and feel

Our Symbio ED90-PP product is an easy to handle cellulose fibre masterbatch containing 90% cellulosic fibres. It is suited for dilution into polypropylene and offers full design freedom.

Please visit our stand or for more information contact:
Francoise.Accou@sappi.com or visit www.sappi.com/symbio





Warning, we have moved!

New address : Wingepark 41, 3110 Rotselaar, Belgium

Day 3 • 25 May 2023 • 9:00–16:00 (CET)

9:00 **Michael Carus**, nova-Institute (DE)
Conference Opening

9:10 – 10:30

Main Session Latest nova Research Grand Hall

Chairpersons: Ángel Puente & Nicolas Hark
nova-Institute (DE)

9:10



Pia Skoczinski
nova-Institute (DE)
Market Update on Bio-based Polymers:
Global Capacities, Production and Trends
2022–2027

9:20



Pauline Ruiz
nova-Institute (DE)
Status and Outlook for CO₂-based
Building Blocks and Polymers

9:30



Lara Dammer
nova-Institute (DE)
Policy Updates – how will PPWR,
ESPR and Green Claims Initiative Impact
Renewable Materials?

9:40



Lars Krause
nova-Institute (DE)
Tech4Biowaste – A Dynamic Database
of Technologies for Biowaste Utilisation

9:50



Matthias Stratmann
nova-Institute (DE)
Peer-reviewed Case Studies on
Renewable Materials

10:00



Christopher vom Berg
nova-Institute (DE)
Carbon Footprint Fossil vs. Bio-based
Materials

10:10

Panel Discussion with all Session Speakers

10:30

↓ Coffee Break

9:10 – 10:30

Parallel Session New Technologies for Efficient Renewable Processes Conference Room 1

Chairpersons:
Gillian Tweddle, Stripe Consulting (BE) &
Nadja Wulff, nova-Institute (DE)

9:10



Karin Öhgren Gredegård
Alfa Laval (SE)
Smart Water Management in Bio- and
Recycled CO₂ Based Refineries

9:30



Ingo Gräf
Heraeus Deutschland (DE)
Black Powder for Green Chemicals: Precious
Metal Catalysts for the Conversion of Sustainable
Feedstocks

9:50



Tore Hartmann
GEA Westfalia Separator Group (DE)
GEA liquid / Solid Separation with Sedimentation
Centrifuges for Purification Unit Operations in
Biorefineries

10:10

Panel Discussion with all Session Speakers

11:00 – 12:20

Main Session
The Policy and Brands View

Grand Hall

Chairpersons: Matthias Stratmann & Lara Dammer
nova-Institute (DE)

11:00



Algreit Dume
DG Grow, European Commission (Brussels)
Transition Pathway for the Chemical Industry

11:20



Mansuy Rocquin
Decathlon (FR)
Decathlon's Strategy on the Pathway to
Renewable Carbon

11:40



Adeline Grevillot
L'Oréal (FR)
L'Oréal Sustainability Ambition for 2030

12:00



Lee Ellen Drechsler
Procter & Gamble (US)
Creating a Truly Circular Plastics Economy with
Advanced Recycling AND Bio-based Materials,
Supported by Green Energy

12:20

Panel Discussion with all Session Speakers

12:40

Lunch Break

A poster session will take place at the beginning of the lunch break
(Conference Room 3)

11:00 – 12:30

Workshop
Conference Room 2



Fritz Wetzel
BlackIP (DE)
Basics and Importance
of Intellectual Property
Rights



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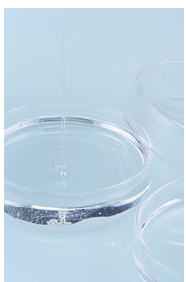
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Sugar Energy Company has rich experience and technical know-how in the design and development of new bio-based furan-derivatives.

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& creativity meet

13:50 – 14:30

Main Session Renewable Plastics and Composites

Grand Hall

Chairpersons: Asta Partanen &
Anke Schwarzenberger, nova-Institute (DE)

13:50



Patrick Zimmermann
FKuR Kunststoff (DE)
Bioplastics in the Context of a Circular
Economy – Different Markets Need
Different Solutions

14:10



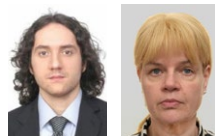
Juul Cuijpers
Sappi Biotech (NL/ZA)
Sappi Symbio – A Natural Inspiration
for Strength

13:50 – 14:30

Parallel Session Transition Pathways for the Chemical Industry

Conference Room 1

13:50



Algreit Dume & Maarit Nyman
DG Grow, European Commission (Brussels)
Workshop

14:30 – 15:50

Main Session Biodegradation, Custom-Made Biomaterials and Certification

Grand Hall

Chairpersons: Asta Partanen &
Anke Schwarzenberger, nova-Institute (DE)

14:30



Miriam Weber
HYDRA Marine Sciences (DE)
How Does Your Biodegradable Plastic
Behave in the Environment?

14:50



Stefaan De Wildeman
B4Plastics (BE)
Polymer Architecture Enabling
Custom-Made Biomaterials with Tailored
End-of-Life

15:10



Enrico Miceli
DIN CERTCO (DE)
Marine Biodegradation and Sustainability
Certifications – Recent Developments in
Standards and Certification

15:30

Panel Discussion with all Session Speakers

15:50

Final Get Together

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Leveraging world-class science and engineering, we provide innovative biomaterials that enable performance and sustainability at scale.

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Valuable Quotes from the Speakers

Arkema (FR)

Jean-Jacques Flat

“My presentation will deal with the new ARKEMA world’s biggest integrated bio-factory, dedicated to high performance bio-based polyamides (Rilsan® PA11), in Singapore, and the outstanding performances of this material.”

Avantium (NL)

Tom Claessen

“Furanic humins is a fully biobased aromatic feedstock which will be industrially available as from 2024.”

Avantium Chemicals (NL)

Mariana Paredinha Araujo

“In this talk, we will discuss how Avantium is taking the next step to develop a complete value chain from CO₂ utilization to the production of high-performing, biodegradable CO₂-based plastic materials for packaging applications.”

BASF (DE)

Carolin Deregowski

“As chemical recycling has become a complementary option to mechanical recycling of plastic waste, a growing number of studies on life-cycle assessment (LCA) of chemical recycling has been conducted in the last years, providing transparency about the environmental impact of the technology. We wanted to know: Which research findings can be confirmed through the comparison of different LCA studies and where do differences come from?”

BASF (DE)

Ivana Krkljus

“Achieving more sustainable carbon cycles in EU can only take place if the carbon accountancy is right – we call for accurate accounting of biogenic carbon!”

BASF (DE)

Jenny Reuber & Jan Schoeneboom

“A fast transformation to renewable feedstocks requires methods which deliver impact.”

B4Plastics (BE)

Stefaan De Wildeman

“Why kill the bioplastics revolution with 3 months degradation targets – a banana peel needs 3 years!”

Borealis (AT)

Floris Buijzen

“Borealis will present its circular cascade approach to transform from a linear to a circular economy – just like the alphabet, it all starts with ‘ABC’.”

Braskem (NL)

Martin Clemesha

“This presentation will cover Braskem’s effort to ensure it’s I’m Green™ PE and EVA is recognised by all stakeholders in the value chain as the most sustainable plastics solution available at scale to combat climate change.”

use Methanol (DE)

Johann Kirchner

“Ensuring the strongly increasing renewable methanol demand over the next years by standardized industrial methanol synthesis modules.”

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INSTRUMENTS FOR BIODEGRADATION MEASUREMENTS

SOLID / LIQUID / SEDIMENT

Respirometer is a device that measures respiration of living organisms. Respirometer determines aerobic or anaerobic biodegradability of solid, liquid and algae samples in various applications. The system measures O₂ and CO₂ concentration in flow through the sample under controlled conditions. Flow, Temperature, Pressure, Humidity are also measured continuously. Additional gases can also be measured.

Applications:

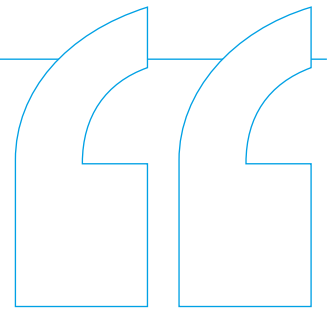
- ISO 14855-1, ASTM D 5338 - Biodegradability of plastics in solid medium;
- ISO 14852 - Biodegradability of plastics in aqueous medium;
- ISO 17556 - Biodegradability of plastic materials in soil;
- ASTM D6691 (marine tests), OECD 301 B, etc;
- Sea and lake sediment biodegradability tests;
- Sludge measurements;
- Organic waste biodegradation measurements;

Advantages

- Modular design (upgradable);
- On-line biodegradation measurements;
- Plug & Play system;
- Aerobic or anaerobic measurements;
- 12 / 24 / 36 / 48 / 60 channel systems;
- Various flow configuration;
- Flow leakage alarm;
- Automatic humidification;
- Multitube cable connections;



ECHO 12 channel Respirometer

**Carbon Minds (DE)**

Ronja Hermanns

“A climate-positive chemistry envisions the inclusion of all sectors that are or will be related to the supply chain of chemical products and, as a result, optimize their integrated carbon balance and includes carbon sinks.”

Clariant (DE)

Dirk Leinweber

“Surfactants’ sustainability transformation needs affordable, high performing solutions.”

Composite Recycling (IE)

Frank Riedewald

“Recycling of plastics and composite plastics with the molten metal reactor.”

CovationBio/ PDO (US)

Patrick Van Waes

“This presentation showcases the opportunity to reduce the dependency from fossil fuel based materials by using regenerative farmed dent corn, turned in 1,3-Propanediol, made available in large quantities in a cost effective way and without compromising final quality.”

DIN CERTCO (DE)

Enrico Miceli

“Recent developments in the certification of compostable materials.”

Econic-Technologies (UK)

Keith Wiggins

“Redeeming CO₂: Building polymers from carbon dioxide and their application in polyurethanes.”

Fibenol (EE)

Peep Pitk

“By offering a sustainable, cost-effective solution to producing lignocellulosic-derived biomaterials, Fibenol’s innovative wood fractionation plant unlocks the path to a fossil-free world.”

FKuR Kunststoff (DE)

Patrick Zimmermann

“The natural carbon loop must be our guidance for our future acting.”

FUTERRO (BE)

Frédéric Van Gansberghe

“PLA is a biopolymer with all the advantages that today and tomorrow’s industry is looking for.”

GEA Westfalia (DE)

Tore Hartmann

“GEA sedimentation centrifuges, such as decanter and disc stack centrifuges, are used in biorefinery processing to isolate valued components and GEA offers joint process development to evaluate this unit operations and ensure your highest production reliability through their variMaster decanter centrifuge technology.”

Geno (US)

Sasha Calder

“This presentation will highlight how Geno brings together industrial-scale performance, advanced bioengineering platforms and sustainability impact to accelerate the Materials Transition.”

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 Engineering
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world.

Our innovation and engineering excellence are shaping the future of the chemical industry.



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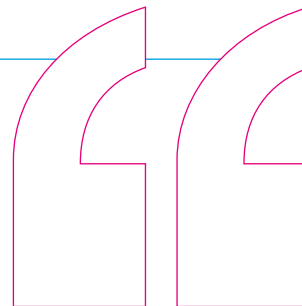




Our raw material solutions – as individual as your product

FKuR works every day to support our customers to meet their product sustainability objectives by creating sustainable resins. Discover our „Plastics care for Future“-portfolio with FKUR’s bioplastics, high-quality recyclates, mass-balance-resins or bio-recyclate hybrids. Are you ready to power up your product?

We make circular plastic products work!

**GO!PHA (NL)****Rick Passenier**

“Nature presents us the circular economy. Biopolymers, such as PHA, offer functional materials that are ultimately biocompatible, biodegradable, and (micro)plastics free.”

GC3, the Green Chemistry & Commerce Coalition (NL)**Peter Nieuwenhuizen**

“In his contribution, Peter will discuss GC3 and the (r)evolution of the European chemical industry.”

5Gyres (US)**Marcus Eriksen**

“22 types of innovative products and packaging made from biomaterials were studied in 6 different environments for 18 months, proving that environmental conditions, like moisture, temperature and microbial activity, provide startling variability in fragmentation rates.”

Henkel (DE)**Adrian Brandt**

“At Henkel Adhesive Technologies we want to transform our raw material portfolio from fossil to renewable carbon to protect the planet but also to improve the performance of our products with novel bio-based building blocks.”

Heraeus (DE)**Ingo Gräf**

“This contribution is highlighting the great potential for the application of recyclable precious metal-based catalysts for the conversion of renewable feedstocks into valuable chemical intermediates.”

HYDRA Marine Sciences (DE)**Christian Lott**

“‘It depends where it ends’ is the motto of (bio-)degradation of plastic polymers in the open environment, and we set out to disentangle this complex topic.”

HYDRA Marine Sciences (DE)**Miriam Weber**

“We explain and discuss how solid baseline data can be provided to answer the title question and to meet the requirements formulated under the EU policy on bio-based, biodegradable and compostable plastics.”

Institut für Kunststofftechnik, University of Stuttgart (DE)**Sandra Weinmann**

“A new recycling strategy was developed for airbag waste by chemical modifying of the PA66/silicone blend in a twin-screw extruder.”

Lenzing (AT)**Jo-Ann Innerlohinger**

“The transition to renewable carbon needs a joint effort – also in the field of fibers, where fossil raw materials are still dominant and recycling is low.”

New Normal (CH/UK)**Jennifer Lovell**

“To remain relevant the European Petrochemical Industry must reinvent itself, by engineering a different supply chain and shaping a different business model.”

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The climate is changing. So are we.

The greatest challenge of the 21st century is here. So, to protect the climate, we're changing. From reducing our emissions to embracing renewable energy; from supporting the circular economy with recycling innovations to helping consumers reduce their own carbon footprints; the changes are reaching deep into our organisation. Our ultimate goal is net zero emissions by 2050.

Find out more at
basf.com/change

■ BASF
We create chemistry

NIOZ (NL)

Linda Amaral-Zettler

"We apply next-generation approaches to understand the fate of next-generation polymers in the aquatic environment."

Sappi (NL)

Juul Cuijers

"Inspired by Nature, Sappi Symbio premium cellulose for reinforcing plastics."

Shell (NL)

Jean-Paul Lange

"Producing Furfural with high efficiency and low energy demand!"

Zhejiang Sugar Energy Technology (CN)

Jian Zhang

"5-Hydroxymethylfurfural as a pivotal platform chemical will open a new horizon to hundreds of new bio-based products after its industrial production being realized from now on."

Sulzer Chemtech (CH)

Harris Luk

"Sulzer is creating a sustainable biopolymers platform, combining advanced research and new pilot facilities: Moving a step forward from poly(lactic acid) to bio-copolymers."

Tecnon OrbiChem (US)

Doris De Guzman

"Fresh perspectives on the market of green hydrocarbons and building blocks as the petrochemical industry gets renewed and electrified with new sustainable technologies."

T.EN Zimmer (DE)

Willi Smolan

"The talk focuses on Technip Energies' proprietary technologies for the production of the biodegradable polyesters PBAT/PBS and the bio-monomer succinic acid."

UPM (DE)

Marvin Strüfing

"UPM BioPura Glycol: The enabler to achieve your sustainability goals."

The Who's Who of Renewable Carbon

Find Sustainable Alternatives for Fossil Based Chemicals and Materials

The business directory "Renewable Carbon Companies (ReCaCo)" has established itself as the primary source of information on renewable and sustainable material solutions. Innovative companies in the field of renewable carbon present their products, intermediates and services. ReCaCo began as a directory for bio-based businesses in 2009, the service provided by nova-Institute has evolved to include CO₂-based and recycling enterprises as well. Today, more than 20,000 company profiles are downloaded every year. They represent large and small corporations, trade associations, agencies, engineering and research institutions as well as certification bodies.

Submit your 2-page company profile free of charge at:
renewable-carbon.eu/companies/join/registration



renewable-carbon.eu/companies



B4PLASTICS

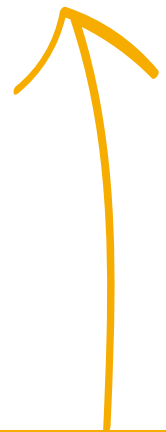
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Refuse.
Rethink.**

Building the **New Plastics Economy**

is a practice best
done **together!**



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Rethink Reshape Reinvent

This is our future-positive revolution.

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As a global leader in advanced and sustainable chemicals and materials solutions, we're helping customers transform to be more circular and climate neutral. Our innovation and partnership means progress for all.



Keep Discovering



Circular Economy

Shape the Future of
the Chemical and Material
Industry

WHY JOIN RCI?

RCI is an organization for all companies working in and on renewable chemicals and materials – plastics, composites, fibres and other products can be produced either from biomass, directly via CO₂ utilisation, or recycling. RCI members profit from a unique network of pioneers in the sustainable chemical industry, creating a common voice for the renewable carbon economy.

To officially represent the RCI in Brussels, the RCI is registered in the EU's transparency register under the number 683033243622-34.

JOIN NOW

Become a part of the Renewable Carbon Initiative (RCI) and shape the future of the chemical and material industry
www.renewable-carbon-initiative.com

LinkedIn:
www.linkedin.com/showcase/renewable-carbon-initiative
[#RenewableCarbon](https://twitter.com/RenewableCarbon)

Executive Managers:
Michael Carus & Christopher vom Berg

Contact: Verena Roberts
verena.roberts@nova-institut.de

MEMBERS OF THE INITIATIVE

LARGE SUPPLIERS



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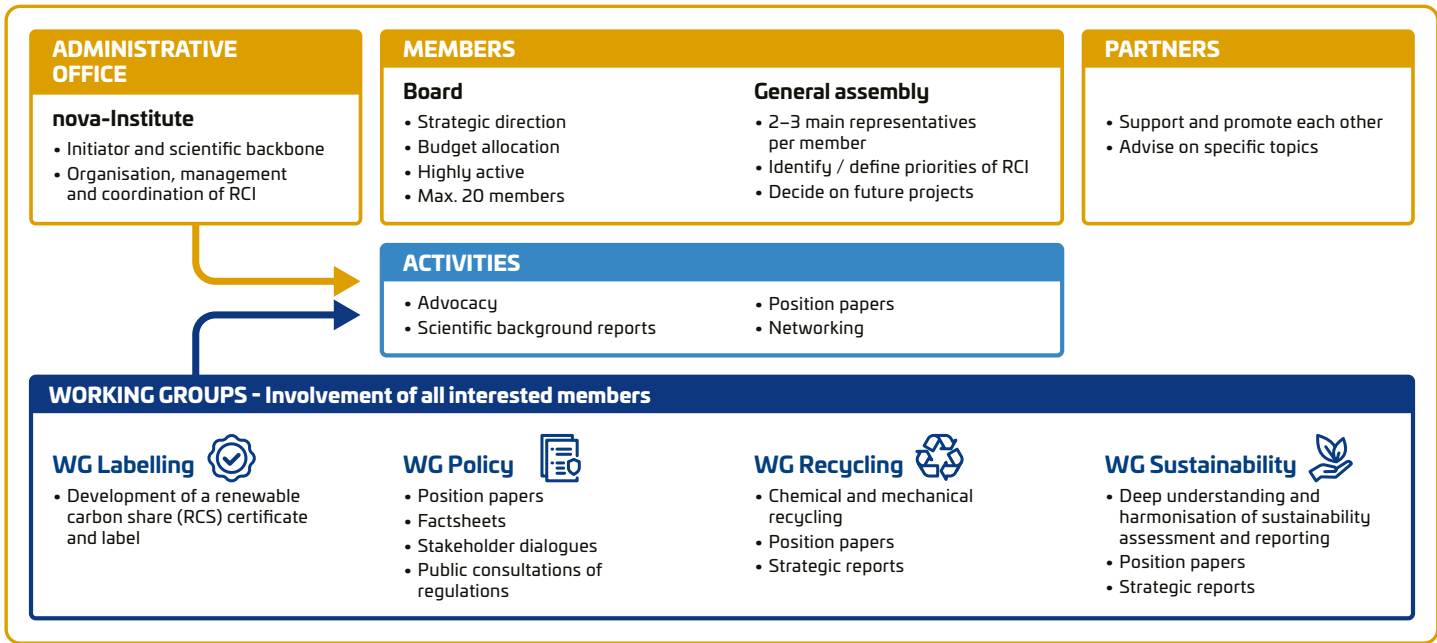
RESEARCH INSTITUTES



* Board Member

PARTNERS





RCI OFFERS ITS MEMBERS



ADVOCACY

RCI drives the message of renewable carbon, prepares position papers on relevant aspects and represents its stakeholders to the public and political decision-makers.



REPORTS AND PAPERS

Science-based reports and papers on the concept of renewable carbon and specific aspects to create solid argumentation in favor of the transformation.



NETWORKING

Nobody can do it alone! Together with other RCI members you will create an eco-system for renewable carbon solutions – the renewable carbon community. All RCI members meet twice a year, once in person, once online.



SHAPING THE INITIATIVE

Members actively shape the direction of the initiative and the renewable carbon strategy.



WORKING GROUPS

Members are actively involved in RCI activities via different working groups. Currently, these are “Policy”, “Labeling”, “Recycling” and “Sustainability”.



VISIBILITY

Members are part of the RCI communication activities and therefore highly visible and convey credibility. Get recognised as a pioneer in the transition to renewable carbon.

THE AIM

The aim of the Renewable Carbon Initiative (RCI) is to support and speed up the transition from fossil carbon to renewable carbon for all organic chemicals and materials.

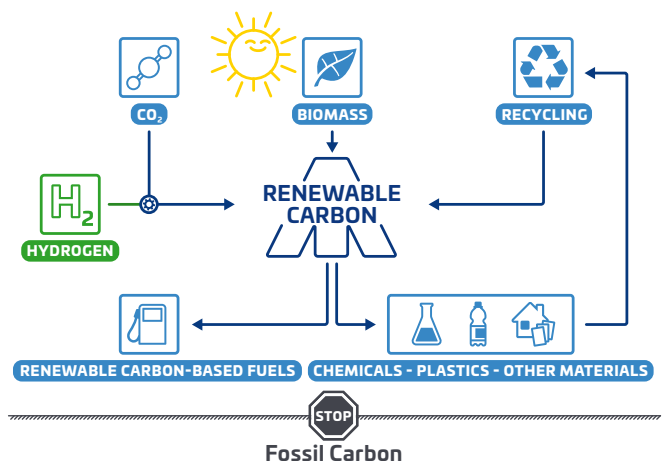
RCI addresses the core problem of climate change, which is extracting and using additional fossil carbon from the ground that will eventually end up in the atmosphere. Companies are encouraged to focus on phasing out fossil resources and to use renewable carbon instead.

The initiative wants to drive this message, initiating further actions by bringing stakeholders together, providing information and shaping policy to strive for a climate-neutral circular economy.

THE VISION

Fossil carbon shall be completely substituted by renewable carbon, which is carbon from alternative sources: biomass, CO₂ and recycling.

RENEWABLE CARBON





**ADVANCED
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Conference 2023

28–29 Nov
2023

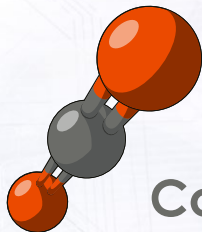
advanced-recycling.eu



**CELLULOSE FIBRES
CONFERENCE 2024**

13–14 March
2024

cellulose-fibres.eu



**CO₂-based Fuels
and Chemicals
Conference 2024**

17–18 April
2024

co2-chemistry.eu



**RENEWABLE
MATERIALS
CONFERENCE 2024**

11–13 June
2024

renewable-materials.eu

Save the
Date

nova Market and Trend Reports on Renewable Carbon

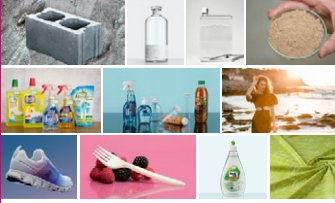
The Best Available on Bio- and CO₂-based Polymers & Building Blocks and Chemical Recycling

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Carbon Dioxide (CO₂) as Feedstock for Chemicals, Advanced Fuels, Polymers, Proteins and Minerals

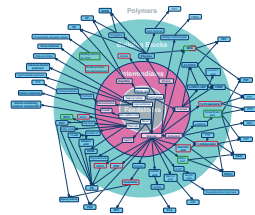
Technologies and Market, Status and Outlook, Company Profiles



Authors: Pauline Ruiz, Pia Skocinski, Achim Raschka, Nicolas Hark, Michael Carus
With the support of: Aylin Ozgen, Jasper Kern, Nico Plum
April 2023
This and other reports on renewable carbon are available at www.renewable-carbon.eu/publications

Bio-based Building Blocks and Polymers

Global Capacities, Production and Trends 2022–2027



Authors: Pia Skocinski, Michael Carus, Gillian Tweedie, Pauline Ruiz, Doris de Guzman, Jan Reinhardt, Harald Kahl, Nicolas Hark, Lars Dammer and Achim Raschka
February 2023
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Mapping of advanced recycling technologies for plastics waste

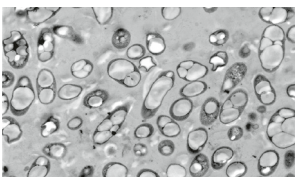
Providers, technologies, and partnerships



Authors: Lars Krause, Michael Carus, Achim Raschka and Nico Plum (all nova-institute)
June 2022
This and other reports on renewable carbon are available at www.renewable-carbon.eu/publications

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

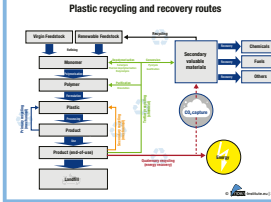
Status & Outlook, Standards & Certification Schemes



Authors: Michael Carus, Doris de Guzman and Harald Kahl
March 2021
This and other reports on renewable carbon are available at www.renewable-carbon.eu/publications

Chemical recycling – Status, Trends and Challenges

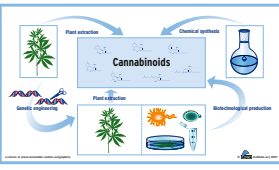
Technologies, Sustainability, Policy and Key Players



Author: Lars Krause, Florian Dietrich, Pia Skocinski, Michael Carus, Pauline Ruiz, Lars Dammer, Achim Raschka, nova-Institut GmbH, Germany
November 2020
This and other reports on the bio- and CO₂-based economy are available at www.renewable-carbon.eu/publications

Production of Cannabinoids via Extraction, Chemical Synthesis and Especially Biotechnology

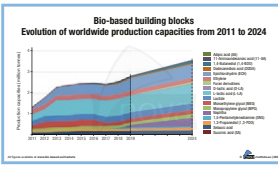
Current Technologies, Potential & Drawbacks and Future Development



Authors: Pia Skocinski, Franjo Grotenhermen, Bernhard Beitzke, Michael Carus and Achim Raschka
January 2021
This and other reports on renewable carbon are available at www.renewable-carbon.eu/publications

Commercialisation updates on bio-based building blocks

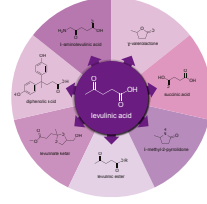
Evolution of worldwide production capacities from 2011 to 2024



Author: Doris de Guzman, Tecnon OxiChem, United Kingdom
Updated Executive Summary and Market Review May 2020 – Originally published February 2020
This and other reports on the bio- and CO₂-based economy are available at www.bio-based.eu/reports

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 Skocinski, Raj Chinnappa, Angel Palma and Michael Carus, nova-institut GmbH, Germany
October 2019
This and other reports on the bio-based economy are available at www.bio-based.eu/reports

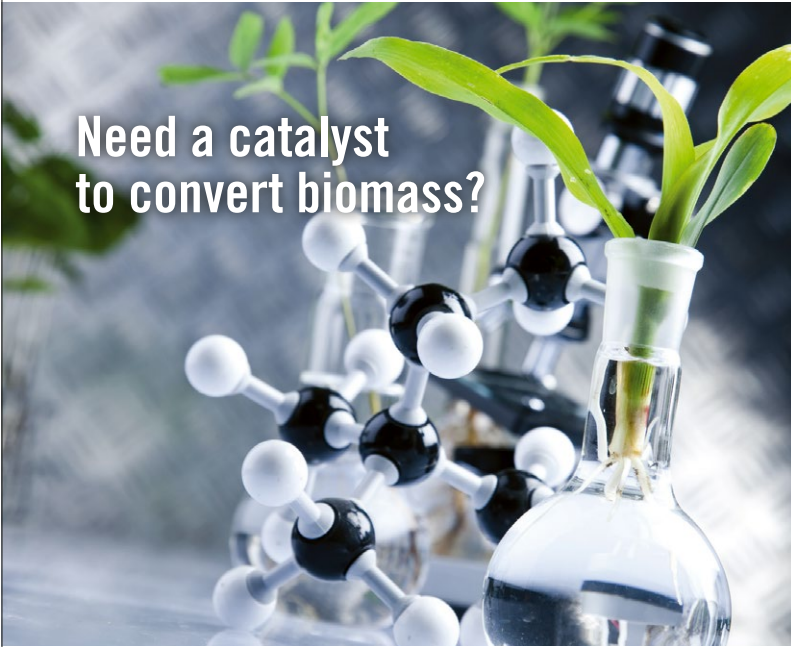


renewable-carbon.eu/publications

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Heraeus

Precious Metals



Biomass as renewable feedstock is an alternative to fossil resources for energy generation and a starting material for industrial chemistry. Precious metal catalysts from Heraeus play a vital role for the conversion of different types of biomass into sustainable platform chemicals.



herae.us/greenchemistry

Meet our experts at booth No. 22

Series of horizontal dotted lines for taking notes.

Series of horizontal dotted lines for taking notes.

Technology & Markets

Achim Raschka (achim.raschka@nova-institut.de)

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

Communication

Linda Engel (linda.engel@nova-institut.de)

- Comprehensive Communication & Dissemination in Research Projects
- Communication & Marketing Support
- Network of 60,000 Contacts to Companies, Associations & Institutes
- Targeted Newsletters for 19 Specialty Areas of the Industry
- Conferences, Workshops & nova Sessions
- In-depth B2C & Social Acceptance Research

Sustainability

Matthias Stratmann (matthias.stratmann@nova-institut.de)

- Life Cycle Assessments (ISO 14040/44, PEF Conform)
- Carbon Footprint Studies & Customised Tools
- Initial Sustainability Screenings & Strategy Consultation
- Holistic Sustainability Assessment (incl. Social and Economic Impacts)
- GHG Accounting Following Recognised Accounting Standards
- Critical Reviews for LCA or Carbon Footprint Reports



Economy & Policy

Lara Dammer (lara.dammer@nova-institut.de)

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

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 CO₂ 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.

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nova-Institut GmbH

Leyboldstraße 16
50354 Hürth, Germany
T +49 2233 - 460 14 00
contact@nova-institut.de

www.nova-institute.eu
www.renewable-carbon.eu
F +49 2233 - 460 14 01

CEO: Michael Carus | COO: Linda Engel

