RENEWABLE MATERIALS CONFERENCE 2024

11–13 June • Siegburg/Cologne

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WiFi • Free Access

Network ID nova-Conference

#2024RMC #2024RMC

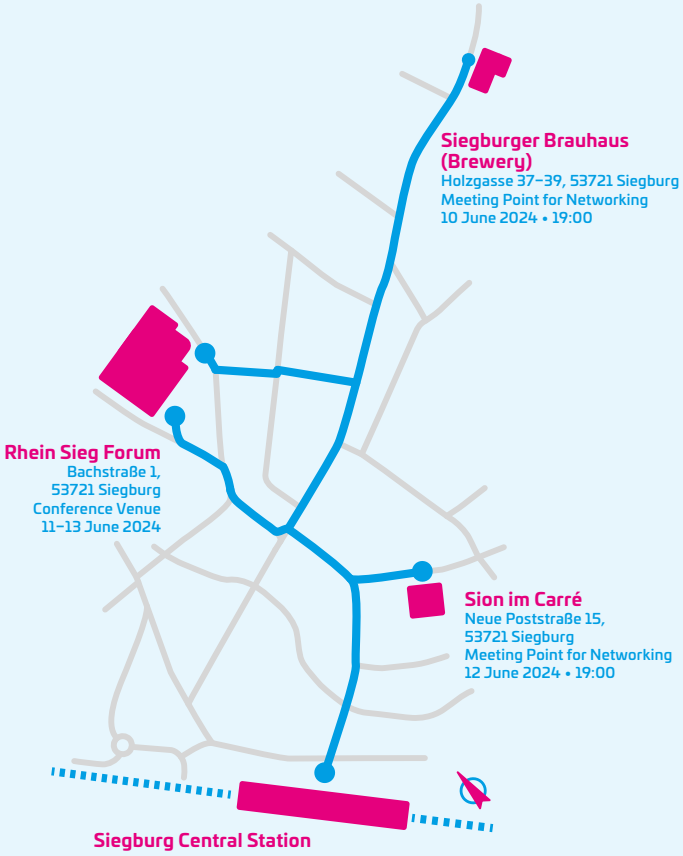
How to get to the Venue

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).

By Car: Car park next to the venue.

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, 10 June 2024 • 19:00
Siegburger Brauhaus (Brewery)
Holzgasse 37–39, 53721 Siegburg

Program

Day 1 • 11 June 2024
8:50–18:00 (CET)

P. 18

Main Session
Future of Chemical & Plastic Industry

Main Session
Circular Economy & Renewable Carbon

Parallel Session
Fine Chemicals & Functional Applications

Parallel Session
Adhesives & Coating

Main Session
Bio-based Economy in China

Workshop and Panel Discussion
Future of Chemical Industry and LowPCF Products

Day 2 • 12 June 2024
9:00–18:00 (CET)

P. 26

Main Session
Building Blocks & Polymers

Parallel Session
Mechanical, Physical & Chemical Recycling

Main Session
Innovation Award for the "Renewable Material of the Year 2024"

P. 34

Day 3 • 13 June 2024
9:00–15:30 (CET)

P. 44

Main Session
Consumer Perspective & Certification

Parallel Session
Biodegradation

Main Session
Policy Perspective

Parallel Session
Recyclability of Biopolymers, Focus: PHA

Main Session
Sustainability & Life Cycle Assessment

Parallel Workshops

P. 11

19:30 • Dinner Buffet
in the Conference Centre

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

Join at sli.do
for real time questions and comments

Main Sessions
Grand Hall
#2024RMC

Parallel Sessions
Small Hall
#2024RMC-2

Zoom Events
We sent you the link to Zoom Events.

All details:
Please see page 12.

Welcome to our 500 Participants

Dear participant, dear speaker, dear sponsor and partner,

The defossilisation of the chemicals and materials sector is a Herculean task for the coming decades. On the one hand, there is no modern life with all comforts we are accustomed to without a strong and innovative chemicals and materials sector; on the other hand, the chemicals and plastics industry is more dependent on fossil raw materials than almost any other sector. Globally, 88% and in Europe as much as 93% of the carbon feedstock for the chemicals and plastics sector comes from fossil resources, mainly crude oil, and natural gas and coal. Globally, only 8% comes from biomass and 4% from recycling. And the total carbon demand of the chemicals sector will double by 2050.

The only way to tackle Scope 3 emissions from chemicals and plastics is to replace fossil carbon from below ground with carbon from above: biomass, CO_2 and recycling. This is a tough nut to crack, requiring innovation, new strategies, huge investments, market demand and the right policy framework to make it all happen. And it will require collaboration across the value chain.

The Renewable Materials Conference offers the perfect platform for networking across sectors and thus supports the establishment and maintenance of collaborations. With 80 presentations, 10 workshops, 40 exhibitors and over 500 delegates, plus excellent networking opportunities during the day and three evening social events, the Renewable Materials Conference is a unique opportunity. A unique opportunity to see the latest innovations, visions and strategies from leading companies and start-ups from around the world, to learn how the policy framework will change over the next few years and to meet brands to get an insight into their thinking.

We are all needed to make the transition to a strong, innovative and sustainable chemicals and materials industry, fully defossilised, based on biomass, CCU and recycling.

Enjoy the conference and meet lots of new experts.

Kind regards

Michael Carus

Michael Carus
Managing Director

Your Conference Team

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Brigitte Hellwig
Representative of the nova-Institute at Booth No. 3
brigitte.hellwig@nova-institut.de

Registration

renewable-materials.eu/registration

Venue & Accommodation

Rhein Sieg Forum
Bachstraße 1
53721 Siegburg
Germany

Phone: +49 2241 – 102 71 00
info@rhein-sieg-forum.de
www.rhein-sieg-forum.de

Recommended Hotels
www.renewable-materials.eu/venue

Entrance Fee

3 Days • 11–13 June 2024
Ticket for on site (and online) attendance
incl. dinner buffet on the first day
1495 €

Day 1 • 11 June 2024
Ticket for on site (and online) attendance
incl. dinner buffet
745 €

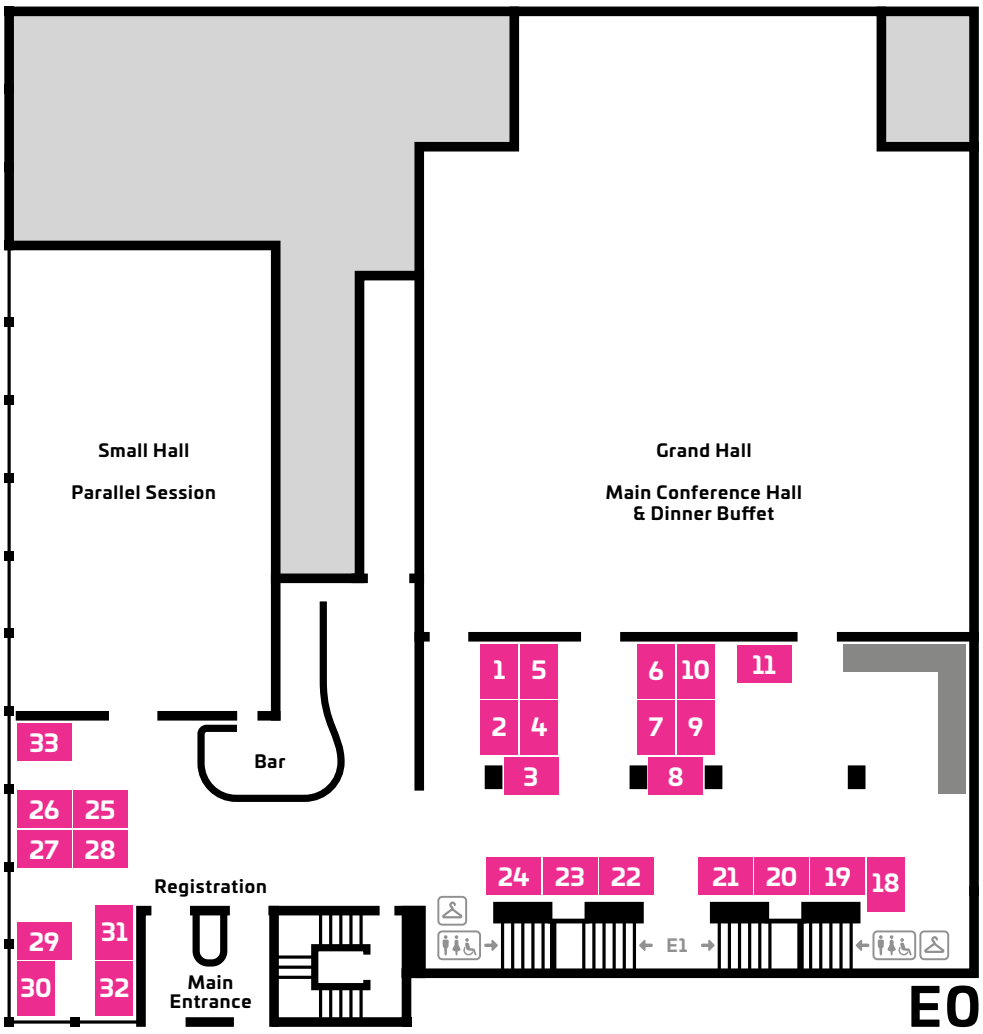
Day 2 • 12 June 2024
Ticket for on site (and online) attendance
695 €

Day 3 • 13 June 2024
Ticket for on site (and online) attendance
695 €

3 Days Online Ticket • 11–13 June 2024
Ticket for virtual attendance only
895 €

3 Days Student Ticket • 11–13 June 2024
Ticket for on site (and online) attendance
incl. dinner buffet on the first day
350 €

Floor Plan



List of Exhibitors

01 Aduro Clean Technologies (CA)

02 BPC Instruments (SE)

03 nova-Institute (DE)

04 Renolit & Photanol (DE)

05 Innovation Award “Renewable Material of the Year 2024”

06 Empa (CH)

07 NESTE (FI)

08 TÜV Austria Belgium (BE)

09 CJ Europe (DE)

10 Media Table

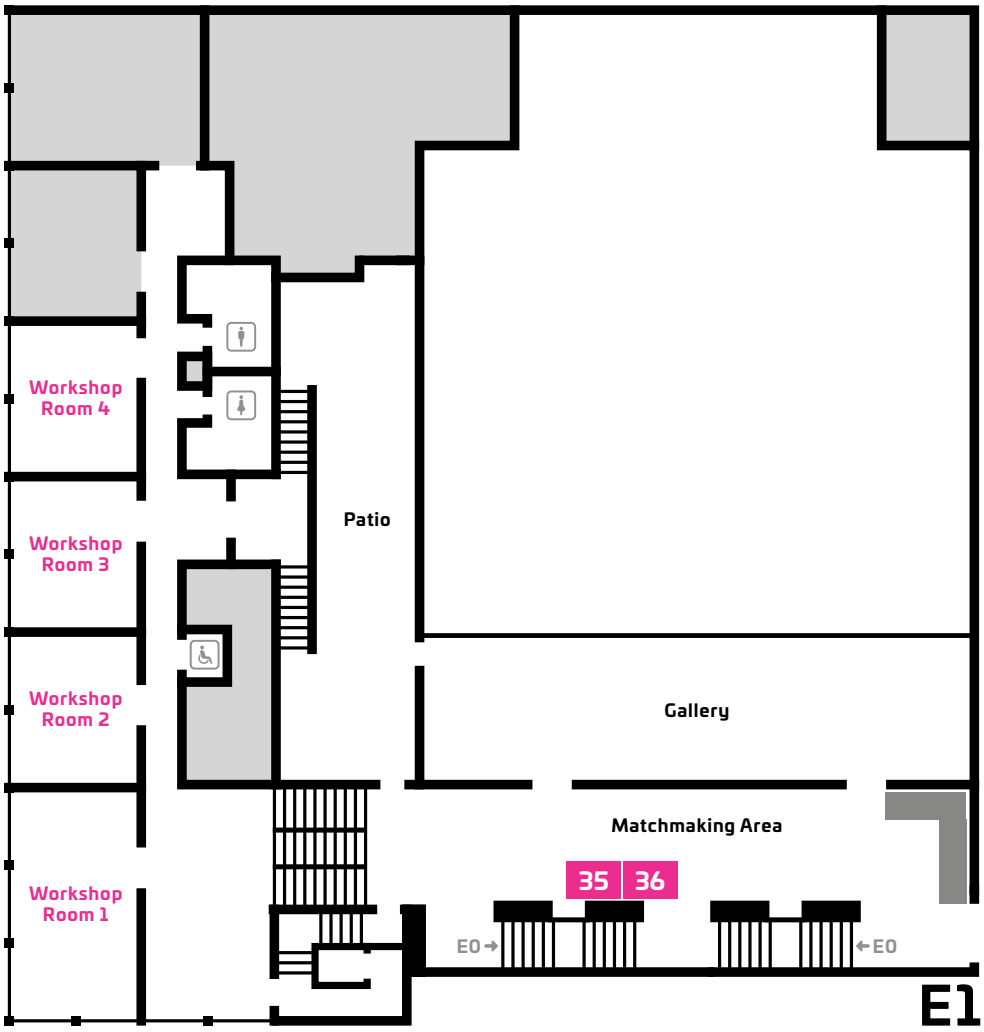
11 AllocNow (DE)

19 European Bioplastics (DE)

20 PEFerence & PERFECOAT (EU-Projects)

21 Zhongke Guosheng Technology (CN)

22 REDcert (DE)



23 Sugar Energy (CN)

24 Alfa Laval (SE)

25 Covestro (DE)

26 B4Plastics (BE)

27 Renewable Carbon Initiative (RCI) (DE)

28 Total Corbion (NL)

29 Renewable Carbon Plastics Magazine (DE)

30 Institut für Textiltechnik of RWTH Aachen University (ITA) (DE)

31 UPM (DE/FI)

32 UPM (DE/FI)

33 IFF (US)

35 Poster Session

36 Poster Session

Book your Booth!

renewable-materials.eu/exhibition-booking

Poster Session

The poster session will take place at the 1st floor (booths 35 and 36) during the beer-on-tap session on the 1st day (18:30 CET) and during the lunch break of the 2nd day – starting at 13:00 (CET).

Apeiron Synthesis S.A. (PL)
Cengiz Azap
Novel Highly Efficient Catalysts for Ethenolysis

Fraunhofer CBP (DE)
Ulrike Junghans
Isolation of Lauric Acid from the Maggot Fat of Black Soldier Fly

hte GmbH - the high throughput experimentation company (DE)
Matthias Stehle
Conversion of bio-based Levulinic acid to Pyrrolidones: High Throughput Screening and Reaction Network Analysis

HYDRA Marine Sciences GmbH (DE)
Miriam Weber
Environmental biodegradation performance of plastic polymers in the open environment – Towards a catalogue of biodegradable materials in relevant conditions

PALOTA Környezetvédelmi Kft.
(Palota Environmental Protection Ltd) (HU)
Tamás Korányi
Use of waste tire pyrolysis oils for the production of special oil products

TECNALIA RESEARCH & INNOVATION (ES)
Pablo Ortiz
Lignin Polyols For Polyurethane Coatings

Universiteit van Amsterdam (NL)
Anna Kenbeek
From cotton waste-derived platform chemical 5-(chloromethyl) furfural to monomer for bio-based plastic

University of Amsterdam (NL)
Angus McLuskie
Scaling up PLGA-Type Polymers from CO_2- and Bio-Based Monomers

University of Aveiro (PT)
Jéssica D. C. Santos
Repurposing potato starch-rich effluents and pine nut peel for bioplastic footwear

UvA (NL)
Marian Blom
2,3-Butanediol based polyesters

renewable-materials.eu/posters

Workshops



Day 1
11 June 2024

12:30 (CET)
Room 1

Christopher vom Berg
nova-Institute/RCI (DE)
Presentation and Discussion of Instruments and Measures to Help Achieve Relevant Levels of Renewable Carbon in Chemicals and Materials in the EU within a Relatively Short Period of Time.

15:00 (CET)
Room 1

Nils Freiberg
Federal Ministry for Economic Affairs and Climate Action (DE)
Lara Dammer
nova-Institute (DE)
Status of the German National Biomass Strategy – Towards Climate Action and Sustainable Value Creation

16:40 (CET)
Small Hall

Algreit Dume & Maarit Nyman
DG Grow, European Commission (EU)
Workshop on the Transition Pathway for the Chemical Industry

Day 2
12 June 2024

11:00 (CET)
Room 1

Lara Dammer & Michael Carus
nova-Institute (DE)
Food- and Feed Biomass for the Industry – Conflicts with Food Security?

Room 2

Gillian Tweedle
Stripe Consulting (BE)
Alternative Naphtha – replacing fossil based feedstocks for refineries and naphtha crackers

13:00 (CET)
Room 1

Dušica Banduka, Stefanie Fulda & Guido Müller
nova-Institute (DE)
Get your message through: How to support your business with nova's communications tools and expertise

Room 2

Michael Carus & Project Team
nova-Institute/RCI (DE)
RCI/BIC Project on Global and European Availability of Biomass from Agriculture and Forestry in 2050

Day 3
13 June 2024

11:00 (CET)
Room 1

Olaf Porc, nova-Institute (DE)
Jurjen Spekreijse, BTG (NL)
Myrna van Leeuwen, WECR (NL)
The Role of Certification in Global Trade Flows in Bio-based Value Chains

13:00 (CET)
Room 1

Chairperson: Christopher vom Berg, nova-Institute (DE)
Mauro Cordella
DG Env, European Commission (EU)
Matthias Stratmann & Ángel Puente
nova-Institute (DE)
Workshop on LCA Methodology for Bio-based, CCU and Recycling

Room 2

Miriam Weber & Christian Lott
Hydra Marine Sciences (DE)
The Science behind Biodegradation – Implications for Testing, Certification, Policy, and Communication

No online streaming from the workshop rooms
(only from small and grand hall).

renewable-materials.eu/workshops

Networking and Streaming Platform

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

How to enter

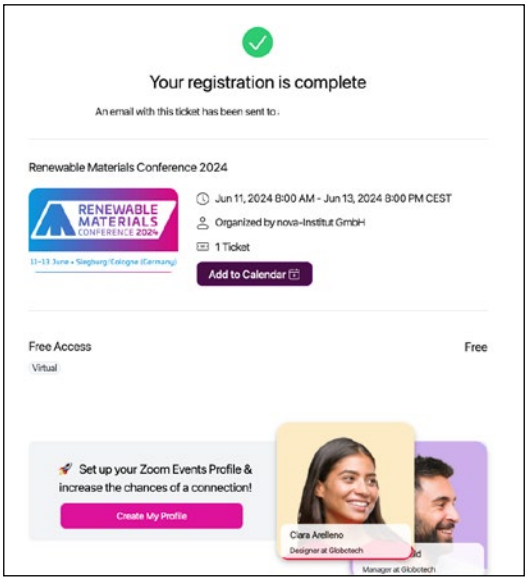
1 **The use does not require a Zoom account. Register either with your Zoom account or with your email address.**

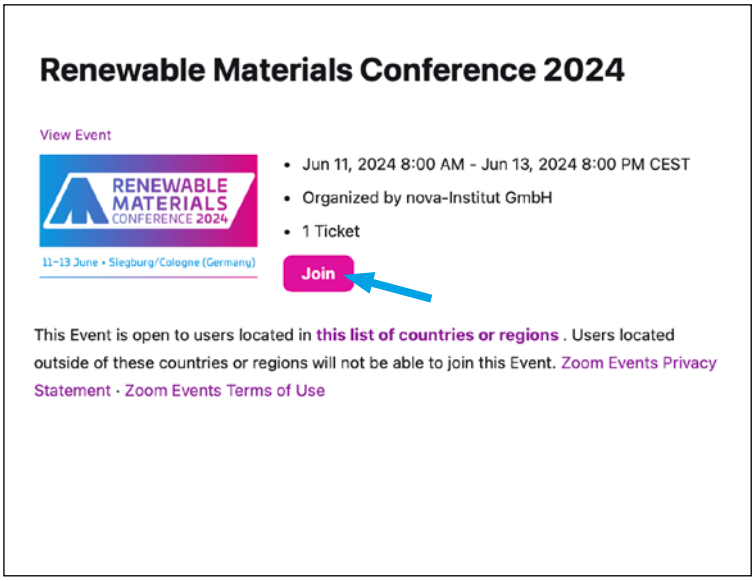
Use the link in your participation confirmation email to register to the Zoom Events platform.
There, you can get in contact with other participants, speakers, exhibitors and sponsors.

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.

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

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



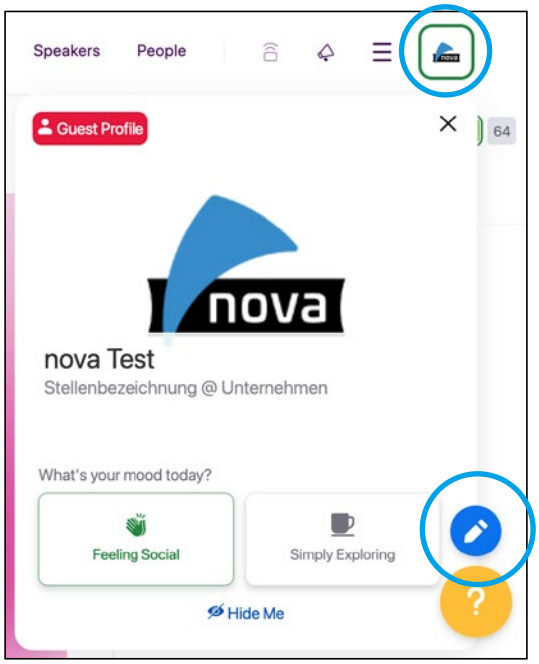


Your profile

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

Make sure to activate the “Feeling Social” function. This way, all participants can network and arrange meetings via this platform.

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

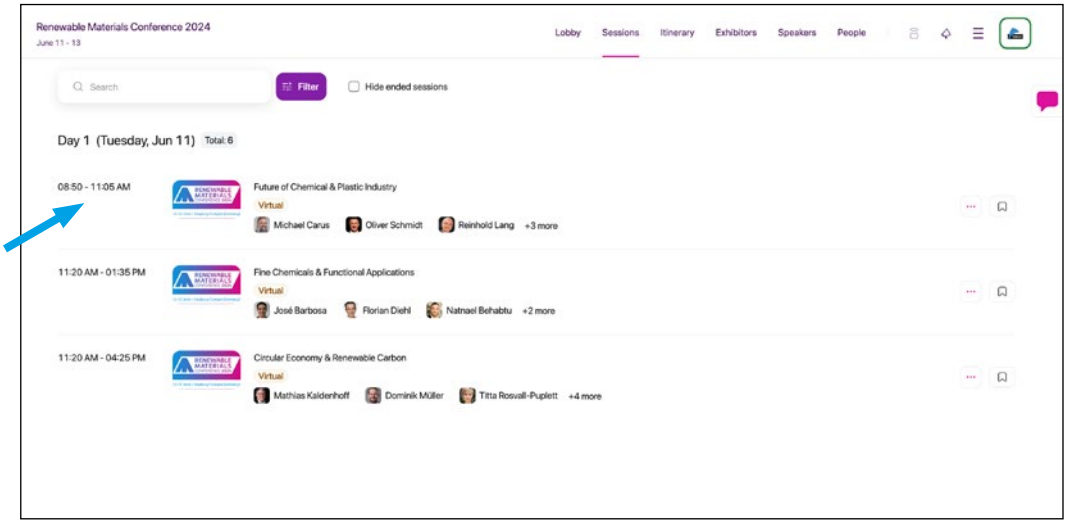


Elevate Your Networking Game

Make connections by clicking on “people”, schedule meetings and stay in touch with people you meet.

How to follow the livestream

Sessions in the main event hall will be streamed in the lobby, but you can have a larger screen by clicking on “sessions” and entering the individual session.



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Bright Future for CCU – Promising Future Policy Framework in the European Union

Authors:
Michael Carus and Christopher vom Berg,
nova-Institute and RCI

For a long time, the political and economic conditions for CCU in Europe have been (and still are) unfavourable, and people looked enviously at the US, where the Biden administration massively promoted the storage (CCS) and use (CCU) of CO_2 with tax credits. In the future, however, the situation in the EU is going to change significantly.

On the one hand, this is due to the massive information work of stakeholders like CO_2 Value Europe (CVE) and the Renewable Carbon Initiative (RCI), which have comprehensively highlighted the importance of CCU as a key technology for a sustainable net-zero future.

On the other hand, the European Commission (EC) has started to acknowledge that CCU will be required for the defossilisation of fuels, chemicals and materials – and for sustainable carbon cycles.

In addition, the Commission has also increasingly recognised that CCU is needed to reduce demand for overall limited sustainable biomass. Below is a brief overview of current policies and regulations from Brussels that now include CCU in targets and strategies for the first time.

EU 2040 Climate Target

In February 2024, the EC presented its assessment for a 2040 climate target for the EU. Overall, the Commission recommends a 90% GHG emission reduction target by 2040 to put Europe on course for climate neutrality by 2050. Carbon Capture and Utilisation (CCU) is recognised as part of the low carbon energy solutions needed to decarbonise the energy system by 2040, as is the development of CCU to increase the uptake of non-fossil feedstocks to replace fossil fuels in carbon-based products.

Find out more at: https://climate.ec.europa.eu/eu-action/climate-strategies-targets/2040-climate-target_en.

Industrial Carbon Management Communication

Published together with the 2040 climate target recommendation, the Industrial Carbon Management Communication assigns a critical role to CCU as an essential and innovative aspect of an industrial carbon management value chain. The document clearly stresses the importance of CCU to produce advanced synthetic fuels, chemicals, polymers or minerals ("Capturing CO_2 and recycling it to produce advanced synthetic fuels, chemicals, polymers or minerals is another important and innovative aspect of an industrial carbon management value chain"). As a result of modelling, it is highlighted that up to a third of captured CO_2 could be used in 2040 – and up to 45% in 2050 (equivalent to up to 200 Mt CO_2).

Find out more at: https://ec.europa.eu/commission/presscorner/detail/en/IP_24_585.

Boosting Biotechnology and Biomanufacturing in the EU

Mid of March 2024, the EC published a series of targeted actions to boost biotechnology and biomanufacturing in the EU. While the Communication naturally focuses on bio-based, it also paints a more comprehensive picture for non-fossil feedstock supply and stresses that alternative feedstocks such as sustainable biomass, recycled waste and CO_2 captured from biogenic sources could be used to produce polymers, plastics, solvents, paints, detergents, cosmetics and pharmaceuticals. Critically highlighted is that, while demand for biomass is growing, the supply of sustainable biomass is estimated to be 40–70% below projected demand by 2050. This will require the use of additional renewable carbon sources such as recycled waste or captured carbon.

Find out more at: https://ec.europa.eu/commission/presscorner/detail/en/ip_24_1570.

Net-Zero Industry Act

In February, the European parliament and the Council of the European Union agreed to include CCU as an eligible strategic net zero technology in the Net-Zero Industry Act (NZIA). Proposed by the Commission in 2023, this act aims to strengthen the European manufacturing capacity of net-zero technologies and overcome barriers to scaling up these capacities in Europe. Within the NZIA, CCU is defined as a net zero technology and as an eligible strategic

technology under the recently agreed Net Zero Industry Act (NZIA). The role of CCU in meeting the EU's climate change targets is recognised, where CO_2 use can now be referred to as net zero in national clean technology policies and as strategic by national governments.

Find out more at: https://single-market-economy.ec.europa.eu/industry/sustainability/net-zero-industry-act_en.

Carbon Removal Certification

End of February 2024, EU legislators reached a political agreement on a world's first carbon removal certification scheme. The EU carbon removal certification framework aims to scale up carbon removal activities and fight greenwashing by empowering. Businesses to show their action in this field. CCU can obtain a certificate for carbon removal in long-term applications (> 35 years), which is defined and explained as "Binding carbon in long-lasting products and materials, such as wood-based construction materials or biochar." It is expected that other long-term applications such as CO_2- and bio-based plastics in construction may be accepted in the future too.

Find out more at: https://climate.ec.europa.eu/eu-action/sustainable-carbon-cycles/carbon-removal-certification_en.

ReFuelEU Aviation

Adopted in October 2023, the ReFuelEU Aviation initiative has the aim to increase demand for and supply of sustainable aviation fuels (SAF). This includes binding quotas, both for SAFs in general, which shall be at 70% in 2050, and for synthetic aviation fuels, which shall be at least 35% of all aviation fuels in the EU by 2050. Some experts expect a much higher share of up to 60% for the synthetic aviation fuels in reality – and that for a total of 50 million ton oil equivalent (Mtoe) of kerosene. Additional demand for CCU will also come from road and marine fuels. At the same time, by-products of synthetic fuel production, such as naphtha, could be used in the chemical industry.

Find out more at: https://www.consilium.europa.eu/en/press/press-releases/2023/10/09/refueleu-aviation-initiative-council-adopts-new-law-to-decarbonise-the-aviation-sector/.

EU ETS Delegated Act on Long Time Storage of CO_2 (not published yet)

The EU Emission Trading System is a cornerstone of the EU's policy to combat climate change and a key tool for reducing greenhouse emissions. Currently, the Commission is working on a delegated act to update rules that enable deduction of emissions if these have been permanently stored via CCU, and are considering the inclusion of products from chemical and plastics industries for the upcoming 2026 review – with potential exemptions for products derived from CO_2 emissions.

Transition Pathway Chemical Industry

In 2023, the EC published the transition pathway for the chemical industry, an actionable plan co-developed by the Commission with EU countries, chemical undustry stakeholders, NGOs and other interested parties. Key target of the transition pathway is achieving a green and digital transition of the chemical industry that also improves resilience. The co-implementaton of the pathway is ongoing, and the action items include a separate topic with targets for the development of CO_2 as an alternative feedstock for the chemical industry.

Find out more at: https://single-market-economy.ec.europa.eu/sectors/chemicals/transition-pathway_en.

Sustainable Carbon Cycles

The Sustainable Carbon Cycles Communication was published at the end of 2021 based on the understanding that for achieving climate neutrality, Europe will have to develop sustainable carbon cycles. The communication includes an aspirational 20% non-fossil carbon target for chemicals and plastics that also directly refers to CCU: "We need to recycle carbon from waste streams, from sustainable sources of biomass or directly from the atmosphere, to use it in place of fossil carbon in the sectors of the economy that will inevitably remain carbon dependent. The circular economy and the sustainable bioeconomy sectors can address this objective and should promote technological solutions for carbon capture and use (CCU) and the production of sustainable synthetic fuels or other non-fossil based carbon products."

Find out more at: https://climate.ec.europa.eu/eu-action/sustainable-carbon-cycles/overview_en.

The above regulatory items show that Europe has picked up pace when it comes to carbon capture and utilisation, and has started to consider the technology as a critical pillar to achieve net-zero targets and sustainable carbon cycles. How quickly and comprehensively these promising policy approaches for integrating and supporting CCU will be implemented, depends largely on the next European Commission – which will take office after the summer break. It is expected that industrial policy might play a stronger role again, based on the increasing recognition that the Green Deal can only be implemented with a strong European industry and investments in innovative technologies. This would certainly benefit the implementation of the CCU.

Day 1 • 11 June 2024 • 8:50–18:00 (CET)

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

Oliver Schmidt 9:00
Deputy Mayor of the City of Siegburg (DE)
Welcome to All Participants

9:10 – 10:50

Main Session
Future of Chemical & Plastic Industry
Grand Hall

Chairpersons: Christopher vom Berg & Lara Dammer, nova-Institute (DE)

9:10

Reinhold Lang
Johannes Kepler University Linz / Institute of Polymeric Materials and Testing (AT)
Perspectives for an 'All-Circular' Plastics & Carbon Economy – CO_2 as Renewable Feedstock & New Industrial Commodity

9:30

Hans Rovers
New Normal Consulting (CH)
The Future of the European Petrochemical Industry

9:50

Ivana Krkljus
BASF (DE)
The Net-Zero Chemical Industry of the Future meets Transformation: Discussion and Opening of New Perspectives

10:10

Lars Börger
Industry Insider (DE)
On the Chemical Industry of the Future and Why it has Already Begun – an Expert View

10:30
Panel Discussion with all Session Speakers

10:50 • Coffee Break

11:20 – 13:00

Main Session
Circular Economy & Renewable Carbon

Grand Hall

Chairpersons: Michael Carus & Matthias Stratmann, nova-Institute (DE)

11:20

Mathias Kaldenhoff
SAP (DE)
From Design to Reverse – a Digital 360° View on Supply Chain

11:40

Dominik Müller
UPM Biorefining (DE/FI)
Working Towards a Net Zero Circular Economy for the Fashion and Sporting Goods Industry

12:00

Titta Rosvall-Puplett
SYENSQO (BE)
Accelerating SYENSQO's Sustainable Renewable Carbon Strategy

12:20

Patrick Glöckner
Evonik Operations (DE)
Collaboration now! Towards a Circular Economy

12:40

Panel Discussion with all Session Speakers

13:00 • Lunch Break

11:20 – 13:00

Parallel Session
Fine Chemicals & Functional Applications

Small Hall

Chairpersons: Nadja Wulff & Ángel Puente, nova-Institute (DE)

11:20

José Barbosa
CeNTI – Centre for Nanotechnology and Smart Materials (PT)
Blue Economy Synergy: Transforming Marine Resources into Sustainable Fashion Solutions

11:40

Christian Hübsch
UPM Biochemicals (DE/FI)
UPM BioMotion Renewable Functional Fillers (RFF): A New and Innovative Material Class Designed to Increase Sustainability of Rubber and Plastic End-use Applications

12:00

Natnael Behabtu
IFF (US)
Sustainable Solutions that Transform Consumers' Lives and Experiences: Material Innovation, Designed Enzymatic Biomaterials Examples

12:20

Saugata Nad
Dow (BE/US)
Defining Future of Cleaning in Home Care – New Surfactants Enabling Lower Carbon Footprint of Cleaning Products

12:40

Alastair Sanderson
Unilever (UK)
Flue2Chem: Is CCU working?

13:00

Panel Discussion with all Session Speakers

12:30 – 14:00

Workshop

Room 1

Christopher vom Berg
nova-Institute/RCI (DE)
Presentation and Discussion of Instruments and Measures to Help Achieve Relevant Levels of Renewable Carbon in Chemicals and Materials in the EU within a Relatively Short Period of Time.

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NESTE

14:30 – 16:20

Main Session
Circular Economy & Renewable Carbon
Grand Hall

Chairpersons: Michael Carus & Matthias Stratmann, nova-Institute (DE)

14:30

Fabien Ramos
DG Clima, European Commission (EU)
European Perspective on Sustainable Carbon Management

14:50

Algreit Dume
DG Grow, European Commission (EU)
Transition Pathway: Towards a Competitive and Resilient EU Chemical Industry

15:10

Michael Carus
nova-Institute/RCI (DE)
Evaluation of Future Scenarios for the Chemical Industry, Biomass Availability and Competition to Sustainable Aviation Fuels

15:30

Philippe Dewolfs
TÜV Austria (BE)
Launch of the OK Renewable Carbon Share Certification Scheme

15:50

Panel Discussion with all Session Speakers

16:10


Philippe Dewolfs, **TÜV Austria (BE)**
Michael Carus, **nova-Institute/RCI (DE)**
Ceremony – First Products Receive the new Renewable Carbon Share Certificate

16:20 • Coffee Break

14:30 – 16:10

Parallel Session
Adhesives & Coating
Small Hall

Chairpersons: Nadja Wulff & Ángel Puente, nova-Institute (DE)

14:30

Adrian Brandt
Henkel (DE)
Progress and Challenges on the Transition Toward Renewable Carbon at Henkel Adhesive Technologies

14:50

Eric Brouwer
Cargill Bioindustrial (NL)
Bio-Based Solutions for High-Performance Coatings and Adhesives

15:10

Jacco van Haveren
Wageningen Food and Biobased Research (NL)
Circular Design of Coatings and Composites

15:30

Thomas Lüder
Beckers-Group (DE)
Sustainable Raw Materials for the Coatings Industry – Opportunities from Segregated Supply Chains Versus Mass Balancing

15:50

Panel Discussion with all Session Speakers

15:00 – 16:30

Workshop
Room 1


Nils Freiberg
Federal Ministry for Economic Affairs and Climate Action (DE)
Lara Dammer
nova-Institute (DE)
Status of the German National Biomass Strategy – Towards Climate Action and Sustainable Value Creation

16:40 – 18:00

Main Session

Bio-based Economy in China

Grand Hall

Chairpersons: Asta Partanen, nova-Institute (DE) & Gillian Tweddle, Stripe Consulting (BE)

16:40

Ann Zhang
nova-Institute (CN/DE)
The Progress and Insights of China's Bio-based Polymer Market

17:00

Bernhard Urwyler
Zhejiang Sugar Energy Technology & Urwyler ChemPro (CN/CH)
What Can we Learn from China to Accelerate the Industrialisation of Bio-based Building Blocks?

17:20

Susan Zhu
Zhongke Guosheng Technology (CN)
Market Applications of Bio-Based Furan Materials

17:40
Panel Discussion with all Session Speakers

18:00
Networking and Beer on Tap
+ Poster Session

16:40 – 19:15

Parallel Session

Future of European Chemical Industry

Small Hall

16:40


Algreit Dume & Maarit Nyman
DG Grow, European Commission (EU)
Workshop on the Transition Pathway for the Chemical Industry

18:00

Ivana Krkljuš
BASF (DE)
Panel Discussion with Ivana Krkljuš, BASF (DE) and five panelists: René Backes, DBFZ (DE), Raoul Meys, carbonminds (DE), Christian Krüger, BASF (DE), Alastair Sanderson, Unilever (UK) and René Bethmann, Vaude (DE): How to Accelerate the Market Penetration of LowPCF Products?

19:30 • Dinner Buffet in the Conference Centre

21:00 • Big Surprise

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SUGAR ENERGY

BIO-BASED PRODUCTS FROM SUGAR ENERGY

PAPER

PEF

WE SEEK PROGRESS IN AGILITY

to enhance our comprehensive production capacity

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

It introduces various functional groups through substitution, addition, hydrogenation, oxidation, polymerisation,and other synthesis steps to offer products with dedicated structures and functionalities, Special chemical building blocks that are applied in many areas of a fast growing, more sustainable economy.

At present, Sugar Energy Technology Co., Ltd. and a well-known environmental protection technology company have set up a joint venture company, and have reached a consensus with well-known international brands, and will launch a series of PEF packaging products in the near future.

HMF

FDCA

FDME

PEF

FDM

THFDM

OBMF

zoe@sugarenergy.com +86 136 1688 0147 www.sugar-energy.com

Urwyler ChemPro GmbH is our mandate holder of market development in the EU

contact@urwylerchempro.ch

Current market study forecasts annual growth of 17% for bio-based polymers between 2023 and 2028. Demand from Asia and the USA in particular is driving growth, Europe is lagging behind

New report released on the global bio-based polymer market 2023 – a deep and comprehensive insight into a dynamically growing market

Source:
nova-Institute, press release, 2024-03-07

The year 2023 was a promising year for bio-based polymers: PLA capacities have been increased by almost 50% and at the same time polyamide capacities are steadily increasing, as well as epoxy resin production. Capacities for 100% bio-based PE have been expanded and PE and PP made from bio-based naphtha are being further established with growing volumes. Current and future expansions for PHAs are still on the horizon.

In 2023, the total production volume of bio-based polymers was 4.4 million tonnes, which is 1% of the total production volume of fossil-based polymers. The CAGR of bio-based polymers is, with 17%, significantly higher than the overall growth of the polymer market (2–3%) – this is expected to continue until 2028 (Figure 1).

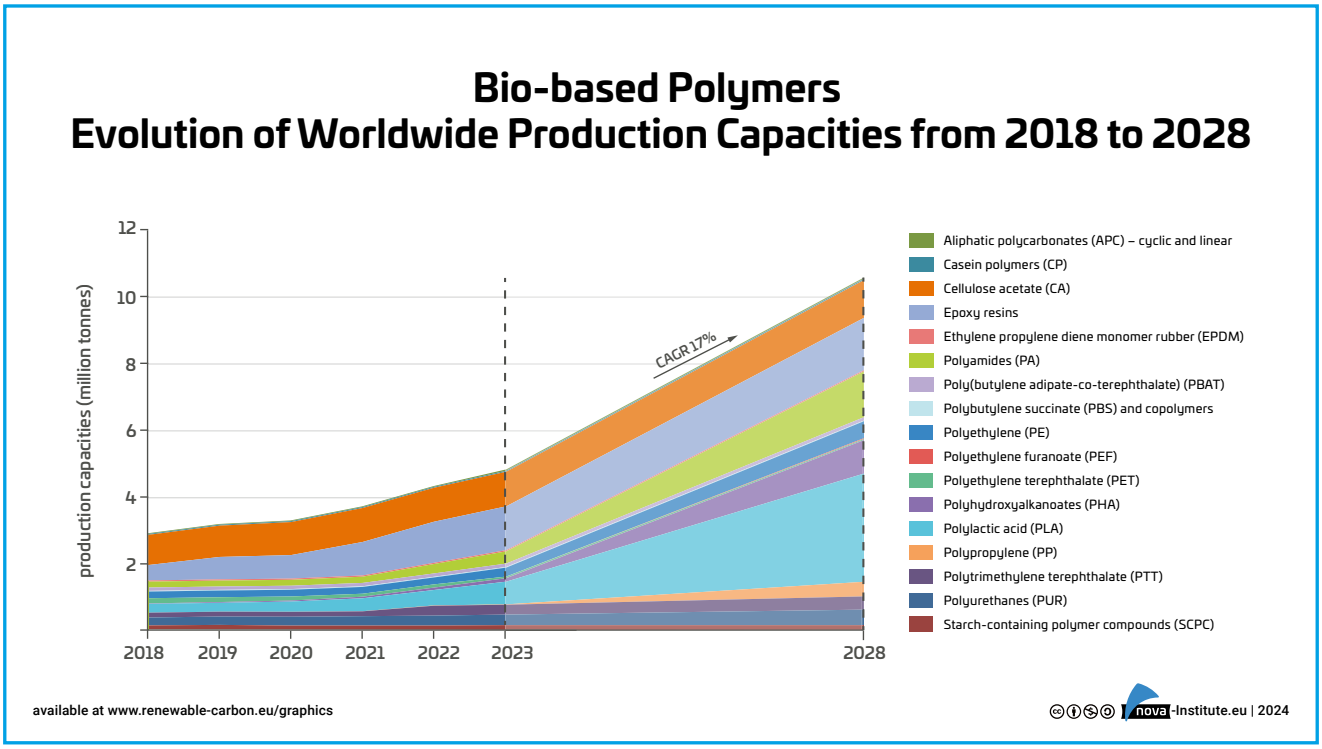
The new market and trend report "Bio-based Building Blocks and Polymers – Global Capacities, Production and Trends 2023–2028", written by the international biopolymer expert group of the nova-Institute, shows capacities and contains production data for 17 commercially available, bio-based polymers in the year 2023 and a forecast for 2028.

The report is now available in full length as well as a freely available short version here: https://renewable-carbon.eu/commercial-reports.

Several global brands are already expanding their feedstock portfolio to include sources of renewable carbon, CO_2, recycling and, in particular, biomass, in addition to fossil-based sources, thereby increasing the demand for bio-based and biodegradable polymers. At the same time, however, there is a lack of political support in Europe, which still only promotes biofuels and bioenergy. By contrast, supportive legislation is in place in Asia and particularly in the US drives demand.

For 2023, the updated market report includes the following features on 438 pages: Coverage of 16 bio-based building blocks and all 17 commercially available bio-based polymers, comprehensive information on the capacity development from 2018 to 2028, production data for the years 2022 and 2023 per bio-based polymer and analyses of market developments and producers per building block and polymer, so that readers can quickly gain an overview of developments that go far beyond capacity and production figures.

Additionally, the market study offers a statistical overview on "Mass Balance and Free Attribution (MBFA)" products available worldwide based on an extensive analysis of the ISCC database, a detailed elaboration on the current European policy for bio-based polymers as well as a comprehensive summary on biodegradability and biodegradable polymers. This information is supported by over 70 figures, over 50 tables and 232 company profiles.



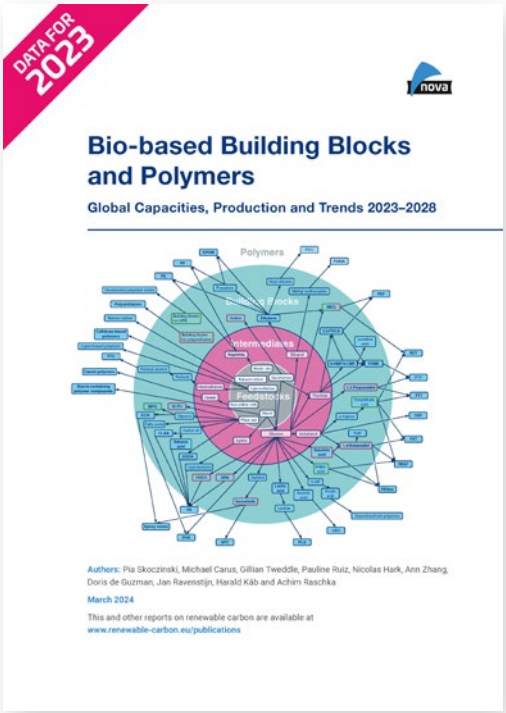
Global Production Capacities of Bio-based Polymers by Region

Asia, the leading continent in 2023, has the largest installed bio-based production capacities in the world with 55%, with the largest capacities for PLA and PA. North America has 19%, with large installed capacities for PLA and PTT, and South America has 13%, mainly based on PE. In contrast to 2022, European shares in worldwide bio-based polymer capacities has decreased to 13%. This is mainly based on the updated data for PE and PP being produced in Europe, where only 10% of the total volume is known to be bio-based and 90 % are bio-attributed based on mass balance and free attribution (MBFA).

The European share is mainly based on installed capacities for SCPC and PA. Less than 1% share of Australia / Oceania was based on SCPC (Figure 8). With an expected CAGR of 35% between 2023 and 2028, Asia displays by far the highest growth of bio-based polymer capacities compared to other regions in the world. This increase is mainly due to extended production capacities for PA, PHA and PLA.

The data published annually by European Bioplastics and the data published by Plastics Europe for 2022 are taken from the market report published by the nova-Institute, albeit with a smaller selection of bio-based polymers and application areas in each case.

Please find the full and short version of the report here: https://renewable-carbon.eu/commercial-reports.



Day 2 • 12 June 2024 • 9:00–18:00 (CET)

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

9:10 – 10:50

Main Session
Building Blocks & Polymers
Grand Hall

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

9:10

Pia Skoczinski
nova-Institute (DE)
Market Update on Bio-based Polymers: Global Capacities, Production and Trends 2023–2028

9:20

Gillian Tweddle
Stripe Consulting (BE)
Algae-based Polymers

9:30

Doris De Guzman
Green D Market Analytics (US)
Renewable Chemicals 2024: Bio-Manufacturing Build-Up

9:50

Alexander Krapivin
Royal Cosun (NL)
Galactaric Acid as a Platform Molecule Based on Sugar Beet Pulp

10:10
Panel Discussion with all Session Speakers

10:50 • Coffee Break

9:00 **Lars Krause**
nova-Institute (DE)
Day Opening

9:10 – 10:50

Parallel Session
Mechanical, Physical & Chemical Recycling
Small Hall

Chairpersons: Lars Krause & Narendar Poranki, nova-Institute (DE)

9:10

Constance Ißbrücker
DIN CERTCO (DE)
A Certifier's Perspective on Material Recyclability

9:30

Dimitri Daniels
GreenDot (DE)
Advanced Recycling of Mixed Plastic Waste: the Future Lies in Intelligent Combination of Processes

9:50

Lars Krause
nova-Institute (DE)
Update on Global Capacities for Advanced Recycling

10:10
Panel Discussion with all Session Speakers

11:00 – 12:30

Workshops
Room 1

Lara Dammer & Michael Carus
nova-Institute (DE)
Food- and Feed Biomass for the Industry – Conflicts with Food Security?

Room 2

Gillian Tweedle
Stripe Consulting (BE)
Alternative Naphtha – replacing fossil based feedstocks for refineries and naphtha crackers

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HMF 中科国生 GS BIOMATS | 用生物质改变生活 BIOMASS CHANGE LIVES

GS Biomats Specialized in the Design & Development and Industrialization of Furan Bio-based Materials—HMF/FDCA

Successfully Delivered >100 Tons of Products

Production Capacity:
400 tons/a
+ 1000 tons/a
(under construction)

Sales Achieved:
100 tons+

FDCA

2,5-Furandicarboxylic Acid

FDCA is a furan bio-based monomer with similar ring structure and reactivity to PTA(Terephthalic acid), which can be polymerized with diols or diamines through condensation reactions to form a series of high-performance polymer materials. It has the greatest market potential and the clearest applications among furan bio-based materials. GS Biomats has achieved the one-step preparation of polymer-grade FDCA from crude HMF, eliminating the need for raw material purification, low-temperature preservation, cold chain transportation, etc., significantly reducing the production cost of the entire process.

Application Scenarios

HMF

5-Hydroxymethylfurfural

HMF has strong reactivity and huge potential in the downstream market applications. Through oxidation, hydrogenation, esterification, halogenation, hydrolysis, and other chemical reactions, hundreds of high-value-added products such as 2,5-furandicarboxaldehyde (DFF), 2,5-furandicarboxylic acid (FDCA), and 2,5-furandimethanol (FDM) can be synthesized.

Self-invented continuous production process

GS Biomats' self-invented continuous production process not only efficiently catalyzes fructose dehydration to form HMF but also inhibits the formation of large molecular substances from sugar & HMF due to self-polymerization, ensuring that there is no thick slurry or viscous material (no blocking of pipeline reactors) during the reaction process. The continuous production of HMF significantly improves production efficiency while ensuring high yield.

Production Capacity:
600 tons/a
+ 1500 tons/a
(under construction)

About GS Biomats

GS Biomats (Zhongke Guosheng Technology) was established in July 2021, specialized in the design and development of furan bio-based materials. Core team members graduated from the Dalian Institute of Chemical Physics, Chinese Academy of Sciences, with more than 20 years of research and industrialization experiences in biomass catalytic conversion and furan-based material development.

We have established a complete technology chain for various non-grain crops as sources of HMF raw materials, and has simultaneously achieved the continuous production of HMF, FDCA, and THFDM, solved the critical bottleneck of the HMF industry, and built a full industry chain from HMF to upstream biomass raw materials to downstream numerous derivative products to end products.

We utilize AI synthesis high-throughput computing and reverse design capabilities to expand the product pipeline of downstream derivatives of HMF efficiently and accurately, and have created a matrix of derivative products.

Contact Person

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Foreign Trade Sales Director
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nova-Institute
&
Renewable Carbon Initiative

TÜV AUSTRIA

Presents

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NEN Biobased Content, OK recycled, OK biobased,
RecyClass, REDcert2, RSB**

TÜV AUSTRIA Belgium | Wingepark 41 - 3110 Rotselaar – Belgium | www.be.tuvaustria.com/okcert

11:20 – 13:00

Main Session
Building Blocks & Polymers
Grand Hall

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

11:20

Lars Knutstad
Genomatica (US)
Geno BDO – Market Conditions Strengthen Low Carbon Technologies

11:40

Thomas Vössing
Covestro (DE)
Bio-based Aniline: Scale-up of a Sustainable Innovative Route to a Strategic Raw Material

12:00

Maelenn Ravard
Corbion (NL)
Lactic Acid Solutions for a More Sustainable Future

12:20

Daniel Zehm
Fraunhofer Institute for Applied Polymer Research IAP (DE)
Next Generation Bio-Based Thermoplastic Polyester Elastomers Based on FDCA

12:40

Panel Discussion with all Session Speakers

11:20 – 13:00

Parallel Session
Mechanical, Physical & Chemical Recycling
Small Hall

Chairpersons: Lars Krause & Narendar Poranki, nova-Institute (DE)

11:20

Roy Visser
Avantium Renewable Polymers (NL)
Recycling Opportunities for PEF

11:40

Mathias Kirstein
matterr (DE)
Meeting Product Quality and Sustainability Targets in PET/Polyester Applications Using Back-to-Monomer Recycling

12:00

Matthias Wilhelm
Lober (DE)
Alternative Waste Streams – Tackling Unused Waste Streams by Dissolution Recycling and Dedicated Sorting

12:20

Florian Riedl
APK (DE)
Decolorised LDPE Recyclates from Post-Consumer Household Waste via the Solvent-Based Newcycling Technology

12:40

Panel Discussion with all Session Speakers

13:00 • Lunch Break

Poster Session will take place during the Lunch Break

Two Workshops 11:00–12:30,
see page 26

13:00 – 14:30

Workshops
Room 1



Dušica Banduka, Stefanie Fulda & Guido Müller
nova-Institute (DE)
Get your message through: How to support your business with nova's communications tools and expertise

Room 2

Michael Carus & Project Team
nova-Institute/RCI (DE)
RCI/BIC Project on Global and European Availability of Biomass from Agriculture and Forestry in 2050

14:20 – 16:00

Main Session
Building Blocks & Polymers
Grand Hall

Chairpersons: Achim Raschka & Ángel Puente nova-Institute (DE)

14:20

Andreas Kohl
Verbio (DE)
How Can Existing Renewable Streams of Molecules be Utilised by the Chemical Industry? Existing Biorefineries and Their Extension – An Update on the VerbioChem Project

14:40

Maarten Rubens
VITO (BE)
Lignin Depolymerization and Upgrading Towards Sustainable Acrylic Based Materials

15:00

Katrin Eckhardt
amynova polymers (DE)
Making the Switch from Fossil- to Bio-based Film-Formers and Rheology Additives

15:20

Keith Wiggins
Econic Technologies (UK)
From Car Seats to Cleaning Products: Key Learnings From commercialisation of a CO_2 Utilisation Technology

15:40
Panel Discussion with all Session Speakers

14:20 – 16:00

Parallel Session
Mechanical, Physical & Chemical Recycling
Small Hall

Chairpersons: Gillian Tweddle, Stripe Consulting (BE) & Lars Krause, nova-Institute (DE)

14:20

René Bethmann
VAUDE Sport (DE)
Beyond Bottles: The Polyester Journey into Sustainable Feedstocks and Future Market Trends

14:40

Valerie Bloem
BlueAlp (NL)
Accelerating Plastic Recycling

15:00

Niels Jan Schenk
BioBTX (NL)
Chemical Recycling of Hard to Recycle Mixed Waste Plastics

15:20

Michael Carus
nova-Institute/RCI (DE)
RCI Position Paper on Chemical and Physical Recycling, Latest Status Mass Balance & Attribution

15:40
Panel Discussion with all Session Speakers

16:00 • Coffee Break

16:30 – 18:00

Innovation Award "Renewable Material of the Year 2024"

Grand Hall

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

16:30

Michael Carus
nova-Institute (DE)
Innovation Award Introduction

16:40

Eric Appelman
Aduro Clean Technologies (CA)
Hydrochemolytic™ Technology (HCT) for Advanced Plastic Recycling

16:50

Ida Rask Kongsgaard
Again (DK)
Acetic Acid and Other Chemicals Derived from CO_2

17:00

Katrin Eckhardt
amynova polymers (DE)
Starch-Based Polymer Family Amylofol®

17:10

Balázs Miklós Hepp
eChemicles (HU)
$SolarCO_2$ Value – Conversion of Captured CO_2 to CO

17:20

Josefin Larsson
Reselo (SE)
Rubber Made from 100% Birch Bark

17:30

René Bethmann
VAUDE Sport (DE)
First-ever Wood-based Polyester Textile Product

17:40
Voting

17:50

Christoph Gürtler
Covestro (DE)
Innovation Award Ceremony

18:00
Networking

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

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covestro

How we materialize the **circular economy**.

#PushingBoundaries

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.

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Industry Insider (DE)

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Oost (NL)

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nova-Institute (DE)

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Green D Market Analytics (US)

Ludo Diels
VITO (BE)

Ivana Krkljus
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Stripe Consulting (BE)

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nova-institute (DE)

Haralabos Zorbas
IBB Netzwerk (DE)

Nominees of the Innovation Award

“Renewable Material of the Year 2024”

nova

Organiser

covestro

Award Sponsor

RENEWABLE MATERIAL OF THE YEAR 2024

ORGANISED BY NOVA-INSTITUTE

SPONSORED BY COVESTRO

1

INNOVATION AWARD

1

Aduro Clean Technologies (CA)

Hydrochemolytic™ Technology (HCT) for Advanced Plastic Recycling

HCT deconstructs polymers at low temperatures (350–400°C), supporting controlled breakdown of molecules. The unique chemistry stabilises the newly formed short-chain molecules within the reaction itself. As the exothermic hydrogenation takes place together with the endothermic chain scission, the energy requirement of the process is lower than in other breakdown reactions. The following key summary observations relate to test runs of waste polypropylene using the Continuous Flow Plastic Reactor (R2) unit: Less than 5 % of the carbon was lost to methane and char. Up to 95 % of the carbon in the polyolefin feedstock is converted into potential hydrocarbon feedstock for production of new plastics and/or other chemicals. All feedstock is highly saturated, avoiding the need for costly post- hydrogenation.

More information: adurocleantech.com

2

Again (DK)

Acetic Acid and Other Chemicals Derived from CO_2

By combining millennia-old bacteria with cutting-edge biotechnology, Again ferments waste CO_2 emissions directly from flue gas into CO_2-derived base chemicals such as acetic acid. Its novel biomanufacturing process captures unavoidable carbon emissions from industry and reuses them to produce valuable base chemicals for which there are currently few or no green alternatives, helping to defossilise some of the world's most challenging value chains. This biomanufacturing process represents a paradigm shift, eliminating the need for energy and cost-intensive CO_2 capture and purification.

More information: again.bio

3

amynova polymers (DE)

Starch-Based Polymer Family Amylofol®

The starch-based polymer amylofol® is a platform technology that enables a switch from fossil to renewable carbon in a wide range of applications. Due to its viscous properties and film-forming ability, amylofol® can replace persistent polymers such as polyacrylates in personal care or fossil-based oils and surfactants in agriculture. The flexible modification of product properties enabled by amynova's process technology makes it possible to tailor the properties of amylofol® to many different applications. Furthermore, amylofol® is produced from locally sourced, renewable raw materials. In agriculture, amylofol® is used as an adjuvant in tank mixes of crop protection and fertiliser products. As a film former, amylofol® significantly reduces the leaching of active ingredients from the leaf surface.

More information: amynova.com

4

eChemicles (HU)

SolarCO$_2$Value – Conversion of Captured CO$_2$ to CO

The SolarCO$_2$ Value™ technology uses renewable electricity to convert captured CO$_2$ into CO, a precursor for commodity chemicals and transportation fuels. It is currently the only proven and patented stack-based CO$_2$ electrolyser technology similar in design to today's fuel cell/PEM water electrolyser. The stacked design allows easier transition to larger scales without the need for redesign. The technology can be directly coupled to solar PV. The electrolyser stack is capable of converting CO$_2$ into CO, which can either be consumed directly on site as a feedstock in certain industries, or further processed into a range of valuable chemicals such as synthetic fuels, e-chemicals or as a reducing agent in metallurgical processes.

More information: echemicles.com

5

Reselo (SE)

Rubber Made from 100% Birch Bark

Reselo addresses the need for alternative fossil-free rubber polymers driven by external and internal pressures across the rubber industry. Reducing the climate impact of materials is a priority, but so far there has been little innovation in more sustainable solutions, especially in the rubber segment. Reselo Rubber is therefore very attractive as it is 100 % made from birch bark, a waste stream from the forestry industry. The polymer can be processed in existing equipment and is compatible with current vulcanisation systems, elastomers and additives. Reselo Rubber is currently being used in a number of applications in collaboration with global companies to bring more sustainable products to the market.

More information: reselo.se

6

VAUDE Sport (DE)

First-ever Wood-based Polyester Textile Product

Until now, recycled PET has been favoured for textiles, but criticism is growing over quality concerns. With this first milestone, VAUDE, in cooperation with UPM (Finland), demonstrates the feasibility of tapping new European bio-based sources. The MEG in this demonstrator is made from wood residues and is intended as a drop-in solution without compromising on quality. The goal for the commercial version is a 100 % bio-based solution, which contains, besides bio-based MEG, fully bio-based purified terephthalic acid (PTA). VAUDE is demonstrating a scalable commercial approach to renewable PET and shows what such a solution could entail.

More information: vaude.com

List of Further Innovations Submitted (Selection)

for the “Renewable Material of the Year 2024”

Copecto GmbH (DE)
Timbercard – the worldwide first, plastic-free wood payment card.
www.copecto.com/TIMBERCARD

Unisport Saltex | Innograaf (FI)
Microplastic free biopolymer coated sand infill for use in FIFA approved soccer fields.
www.saltex.fi, www.innograaf.com

i-Compology Corporation (JP)
We can contribute to marine plastic waste problem by marine biodegradable floats, fishing gears, aquaculture equipment etc., made of the biomass composite adjusted the marine biodegradation rate and melt properties suitable for molding methods, by selecting the type and blending ratio of plant biomass to biodegradable polymers.

UPM Biochemicals GmbH (DE)
UPM BioMotion™ Renewable Functional Fillers (RFF): A new and innovative material class designed to increase sustainability of rubber and plastic end-use applications.
www.upmbiochemicals.com

CENER (ES)
OHRIGINS. Depolymerisation Technology ables to transform lignin/liquids of lignin into a natural antioxidant product with a total antioxidant activity 2–2.5 times higher than other commercial products and with a lower OPEX/CAPEX.
www.cener.com

CropEnergies AG (DE)
Bio-based ethyl acetate produced from renewable ethanol in Europe – reducing your carbon footprint!
www.cropenergies.com

Dow Silicones Belgium (US)
EcoSense™ 2470 Surfactant: Dow and LanzaTech have collaborated to launch a new surfactant EcoSense™ 2470 made from the unique and cutting edge technology of conversion of carbon emissions while enabling low temperature.
www.dow.com

Revoltech GmbH (DE)
LOVR™ is a hemp based leather alternative – biodegradable and recyclable.
www.revoltech.com

Floreon Technology (UK)
Floreon® Therma-Tech Description: A durable, halogen free and plant based alternative to flame retarded engineering polymers, achieving a UL94V-0 rating for fire resistance.
www.floreon.com

Sustanix Materialtech (NL)
100% bio-based and degradable coating for paper packaging made from forestry waste.
www.sustanix.com

Winners of the Innovation Award

“Renewable Material of the Year 2023”

KUORI (CH)

KUORI – Bio-based and Biodegradable Elastic Materials

COLIPI (DE)

Carbon-Light Yeast Oil

traceless materials (DE)

traceless® – Plastic-Free Natural Polymer

Advanced recycling technologies to complement mechanical recycling

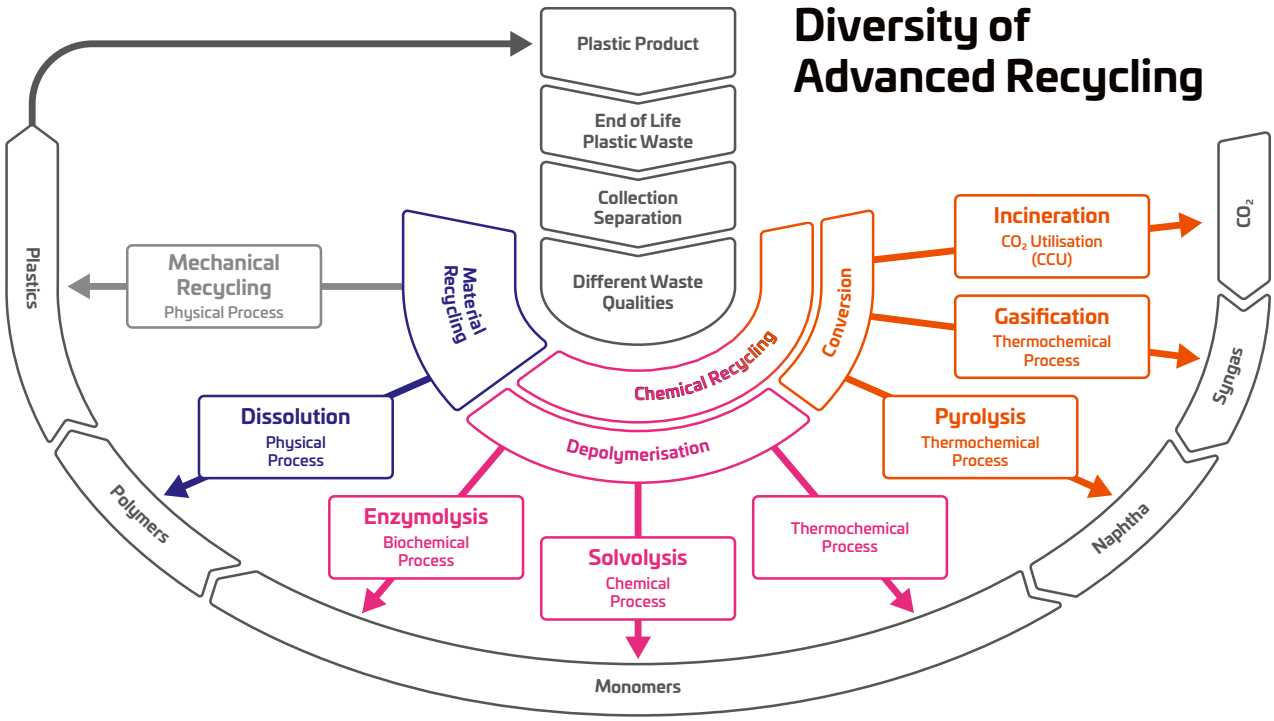
Advanced Recycling on the Rise

Source:
PETplanet Insider Vol. 25 No. 05/24

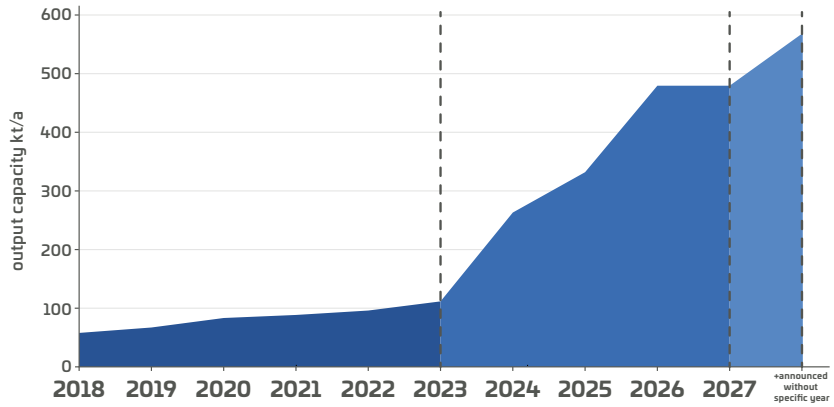
Advanced recycling technologies are developing at a fast pace, with new players constantly appearing on the market, from start-ups to chemistry giants and everything in-between. New plants are being built, new capacities are being achieved, and new partnerships are being established. With all these dynamic developments, it is difficult to keep track of what is happening. nova-Institute's report "Mapping of advanced plastic waste recycling technologies and their global capacities" aims to clear up this jungle of information providing a structured overview and in-depth insight.

Besides conventional mechanical recycling and taking account of recent discussions on the improvement of recycling rates, a wide spectrum of advanced recycling technologies is moving into focus. Whilst PET bottle mechanical recycling is well established and performing well, in cases of mixed plastic waste or mixed waste containing various plastics and organic waste, mechanical recycling is not an option, or allows only partial solutions with considerable effort of pretreatment. In consequence, these waste streams mostly end up in landfill or incineration instead of being further processed into a new feedstock. This is why advanced recycling technologies are crucial for the circular economy.

With advanced recycling a toolbox of versatile technologies is available to address plastic waste streams in different compositions and qualities in order to transform them into a range of different raw materials that can be reintroduced at different positions along the value chain of polymers and plastics. The technologies include material recycling based on dissolution (physical process) from which polymers can be obtained.



Installed and Future Advanced Recycling Production Capacities EU27+3



Furthermore, numerous chemical recycling technologies are available that are capable of depolymerising a targeted polymer into its component parts (monomers) via enzymolysis (biochemical process), solvolysis (chemical process), and thermal depolymerisation (thermochemical process).

Another group of chemical recycling technologies are thermochemical processes which are currently achieving the largest capacities. These technologies are based on pyrolysis, gasification and incineration coupled with Carbon Capture and Utilisation (CCU) which are capable of converting plastic waste into secondary valuable chemicals as well as naphtha, syngas, and CO_2 which can be used as feedstock for the production of new polymers.

Which technologies are suitable for PET?

The nova-Institute report "Mapping of advanced plastic waste recycling technologies and their global capacities" provides an in-depth insight into advanced recycling technologies and their providers. More than 100 technologies and their status are presented in detail listing the companies, their strategies and investment as well as cooperation partners. But which technologies are actually suitable for PET?

Solvolysis

The solvent-based solvolysis describes a chemical process based on depolymerisation which can be achieved with different solvents. This process breaks down polymers (mainly PET) into their building units (e.g. monomers, dimers, oligomers). After breakdown, the building units need to be cleaned from the other plastic components (e.g. additives, pigments, fillers, non-targeted polymers). After cleaning, the component parts are polymerised to synthesise new polymers. With only 24 companies involved, fewer solvolysis technology providers are on the market compared to pyrolysis which likewise offers smaller capacities, typically between 550–8,750 t/a. Of the identified solvolysis technology providers a majority are located in Europe (14 providers) followed by North America (seven), Japan (two), and China (one provider). In the case of nine companies, the majority of providers are mainly small enterprises. Large providers consist of seven companies, whilst five are medium scale and two are micro/start-up enterprises. Among the large enterprises are Aquafil (Arco, Trentino, Italy, Eastman Chemical Company (Kingsport, TN, USA), IFP Energies Nouvelles (IFPEN) (Rueil-Malmaison, France), International Business Machines Corporation (IBM) (Armonk, NY, USA), DuPont Teijin Films (Tokyo, Japan), and Dow (Midland, MI, USA).

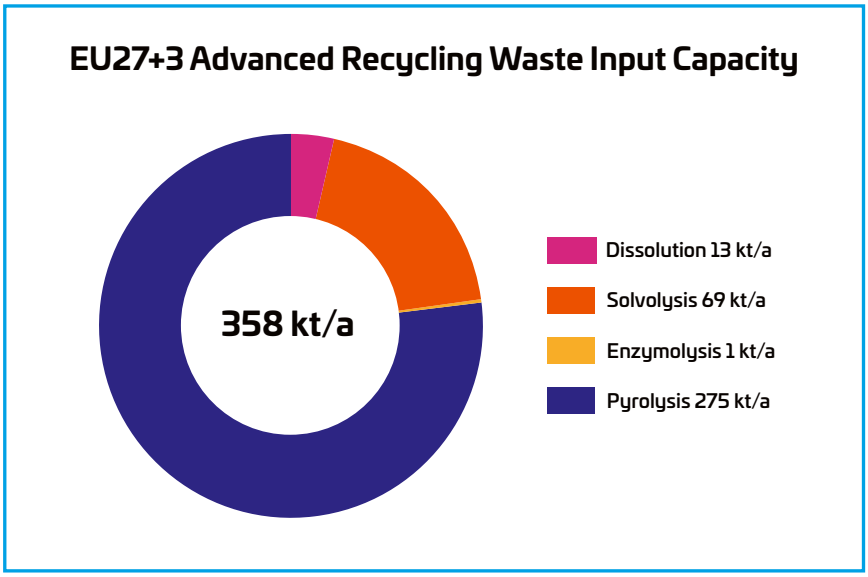
Dissolution

Dissolution describes a solvent-based technology that is based on physical processes. Targeted polymers from mixed plastic wastes can be dissolved in a suitable solvent, leaving the chemical structure of the polymer intact. Dissolution is suitable for PET, but most suppliers primarily focus on PP/PE. However, where high PET content is desired, solutions for PET are available. Other plastic components (e.g. additives, pigments, fillers, non-targeted polymers) remain undissolved and can be cleaned from the dissolved target polymer. Afterwards an anti-solvent is added to initiate the precipitation of the target polymer. The polymer can be obtained directly, and in contrast to solvolysis, no polymerisation step is needed. Currently, the process is achieving a maximum capacity of 8,000 t/a; the majority of the nine identified technology providers is located in Europe (four providers), followed by North America (three), China (one), and the rest of the world (one provider).

In the case of three of the companies, most are small enterprises followed by micro/start-up- (two companies), medium- (two companies), and a large (two companies) enterprise which is represented by Shuye Environmental Technology (Shantou, China).

Enzymolysis

An alternative path is represented by enzymolysis, a technology based on biochemical processes utilising different kinds of biocatalysts to depolymerise a polymer into its building units. Being in an early development phase, this technology is available only at lab-scale. Currently, only one enzymolysis technology provider was identified which is a small enterprise located in Europe. The process is suitable for PET.



Gasification

Another thermochemical process that is suitable for PET and capable of converting mixed plastics waste and biomass in presence of heat and oxygen into syngas and CO_2 is gasification. Overall, 12 gasification technology providers were identified and currently the largest achieved capacity measure is of up to 200,000 t/a; most providers are located in North America (seven providers) followed by Europe (five). The majority of the identified companies (four) are medium-sized enterprises, followed by small-(three companies), micro/start-up (two companies), with just one large enterprise (Eastman).

Pyrolysis

In the pyrolysis process, a thermochemical recycling process is available that converts or depolymerises mixed plastic wastes (mainly polyolefins) and biomass into liquids, solids, and gases in the presence of heat and the absence of oxygen. Obtained products range, for example, from various different fractions of liquids including oils, diesel, naphtha, and monomers as well as syngas, char, to waxes. Depending on the obtained products these can be utilised as renewable feedstocks for the production of new polymers. With 40,000 t/a, the second-largest capacity found in the report is achieved with pyrolysis.

The majority of the 80 identified technology providers are located in Europe (42 providers) followed by North America (21), rest of the world (11), China (four), Cis (one), and Japan (one provider). With 27 companies most providers are small enterprises followed by micro/start-up- and medium- enterprises (both each comprising 18 companies), and large enterprises (16 providers) such as Blue Alp (Eindhoven, the Netherlands), Demont (Millesimo, Italy), Ineos Styrolution (Frankfurt, Germany), Neste (Espoo, Finland), Österreichische Mineralölverwaltung (OMV) (Vienna, Austria), Repsol (Madrid, Spain), Unipetrol (Prague, Czechia), VTT (Espoo, Finland), and Chevron Phillips (The Woodlands, TX, USA).

In Europe, pyrolysis is the predominant form of chemical recycling for PE/PP. However, for PET, the process is only suitable to a limited extent of <5%.

Evaluation of capacities

More than 340 planned as well as installed and operating plants were mapped worldwide providing a total input capacity of 1,477 kt/a. In Europe, there is already a considerable potential of know-how and providers for chemical and physical recycling technologies which is reflected in the comparison with the globally installed plants and capacities. From all installed chemical and physical recycling plants worldwide more than 60 and thus the majority are operating in Europe covering nearly one quarter of the worldwide input capacity. Europe therefore ranks top in the global comparison chart.

Globally, the production capacity of advanced recycling is 1,082 kt/a with products ranging from polymers, monomers, naphtha, Secondary Valuable Chemicals (SVC), and fuels & energy. Europe's circular strategy becomes evident by putting the product shares of polymers, monomers, naphtha, and SVC from chemical and physical recycling into a global context. Here, Europe covers 36 % of the installed global capacity.

In the coming five years a strong growth of the market is expected in which the amount of installed chemical and physical recycling plants will steadily grow. A first indicator are the announcements of the technology providers for the construction of new plants. An analysis of these announcements shows that the input capacity in Europe will more than triple by 2027 while globally the capacity will double.

However, the projection for Europe might change depending on any additional political measures, such as the revision of relevant directives or the establishment of incentives and investment programmes.

The full version (276 pages) is available here: https://renewable-carbon.eu/publications/product/mapping-of-advanced-plastic-waste-recycling-technologies-and-their-global-capacities

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Day 3 • 13 June 2024 • 9:00–15:30 (CET)

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

9:10 – 10:30

Main Session
Consumer Perspective & Certification
Grand Hall

Chairpersons: Lara Dammer & Nicolas Hark, nova-Institute (DE)

9:10

Patrick Van Waes
CovationBio PDO (BE/US)
Consumer Acceptance of Bio-based Materials is key to the Shift to a Circular Bioeconomy. A USA Footwear Consumer Research Case Provides More Insights

9:30

Erica Ording
FrieslandCampina (NL)
A Brand Owner's Perspective: Barriers & Opportunities for Bio-Based Materials

9:50

Asta Partanen
nova-Institute (DE)
Biomass Certification – a Solid Basis for Reliable Sustainability Claims

10:10
Panel Discussion with all Session Speakers

10:30 • Coffee Break

9:00 **Pauline Ruiz**
nova-Institute (DE)
Day Opening

9:10 – 10:30

Parallel Session
Biodegradation
Small Hall

Chairpersons: Pauline Ruiz & Asta Partanen, nova-Institute (DE)

9:10

Andreas Künkel
BASF (DE)
Polymer Biodegradability 2.0: A Holistic View on Polymer Biodegradation in Natural and Engineered Environments

9:30


Miriam Weber & Christian Lott
HYDRA Marine Sciences (DE)
The Path Through the Jungle to Realise the Potential of Biodegradable Plastic in the Environment – Towards a Catalogue of Biodegradable Materials in Relevant Conditions

10:10
Panel Discussion with all Session Speakers

11:00 – 12:30

Workshop
Room 1



Olaf Porc, **nova-Institute (DE)**, Jurjen Spekreijse, **BTG (NL)** & Myrna van Leeuwen, **WECR (NL)**, The Role of Certification in Global Trade Flows in Bio-based Value Chains

11:00 – 12:40

Main Session
Policy Perspective
Grand Hall

Chairpersons: Lara Dammer & Nicolas Hark, nova-Institute (DE)

11:00

Christopher vom Berg
nova-Institute / RCI (DE)
Work and Impact of the Renewable Carbon Initiative

11:20

Martin Clemesha
Braskem (NL/BR)
The Need of Harmonised Policies for Biofuels and Biomaterials

11:40


Ivana Krkljus & Christian Krüger
BASF (DE)
How to Enable Business and Climate Benefits While Going Circular?

12:00

Mauro Cordella
DG Env, European Commission (EU)
Policy Perspective on Bio-based and CO_2-based Materials and Recycling

12:20

Panel Discussion with all Session Speakers

12:40 • Lunch Break

11:00 – 12:40

Parallel Session
Recyclability of Bio-polymers, Focus: PHA
Small Hall

Chairperson: Rick Passenier, GO!PHA (NL)

11:00

Rick Passenier
GO!PHA (NL)
Unlocking the Circular Potential: Exploring the Recyclability of Biopolymers

11:20

Jan Pels
TORWASH (NL)
Chemical Recycling of PLA/PHA Composites by TORWASH

11:40

Fred D. Pinczuk
Beyond Plastic (US)
Commercialisation of PHA Products and Their Impact on Recyclability, Current Infrastructure, and Solutions

12:00

Laurens Welles
Renewi (NL)
Organic Recycling Through Biorefinery

12:20

Panel Discussion with all Session Speakers

13:00 – 14:30

Workshops

Room 1

Chairperson: Christopher vom Berg, nova-Institute (DE)



Mauro Cordella
DG Env, European Commission (EU)
Matthias Stratmann & Ángel Puente, nova-Institute (DE)
Workshop on LCA Methodology for Bio-based, CCU and Recycling

Room 2


Miriam Weber & Christian Lott
Hydra Marine Sciences (DE)
The Science behind Biodegradation – Implications for Testing, Certification, Policy, and Communication

13:50 – 15:30

Main Session

Sustainability & Life Cycle Assessment

Grand Hall

Chairpersons: Michael Carus & Nadja Wulff, nova-Institute (DE)

13:50


Daniel Bochnitschek & Dominik Auer

AllocNow (DE) & Wacker Chemie (DE)

Transparency at Scale: Automating Lifecycle Assessments in the Chemical Industry

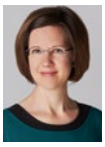
14:10


Verena Koch & Pauline Ruiz

Peter Greven (DE) & nova-Institute (DE)

Bio-Based Oleochemicals Used as Lubricant Additives – Renewable Counterparts to Fossil-based Products and Comparative LCA

14:30



Kathleen Meisel

DBFZ (DE)

Sustainable Chemistry: Life Cycle Assessment of High-Demand Biopolymers for Petrochemical Substitution

14:50

Jan Harm Urbanus

TNO (NL)

Pathways to Sustainable Plastics – A Comparative Analysis of Bio- and CO_2-based Feedstocks for Virgin Sustainable Plastics Production in Function of Application

15:10

Panel Discussion with all Session Speakers

15:30 • Final Get Together

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Valuable Quotes

Daniel Bochnitschek
AllocNow (DE)
"The seriousness, determination, and creativity with which the participants of the RMC advance the topic of sustainability in chemistry fill us with optimism for the future."

Katrin Eckhardt
amynova polymers (DE)
"Explore how renewable film-formers and rheology modifiers outperform fossil alternatives at the RMC."

Florian Riedl
APK (DE)
"Newcycling generates purified and decolorized LDPE recyclates in a quality level that enables the replacement of virgin LDPE in a wide range of flexible packaging applications."

Roy Visser
Avantium (NL)
"It's Avantium's mission to steer way from fossil resources; the Renewable Materials Conference is an excellent platform to discuss approaches to move the world in the right direction."

Ivana Krkljus
BASF (DE)
"Renewable Material Conference is bringing together thought leaders and individuals from across business, policy, and finance to identify solutions and advocate change."

Andreas Künkel
BASF (DE)
"We look in great detail at how we should design materials so that our products biodegrade in soil and in technical systems such as compost and sewage treatment facilities. This incredibly complex topic can only be mastered as an interdisciplinary team together with internal and external partners such as customers, universities as well as research institutes."

Thomas Lüder
Beckers-Group (DE)
"The supply chain thinking bringing together inventors, producers, formulators, and downstream industrial users of renewable carbon materials with academia is the unique value of this conference."

Martin Clemesha
Braskem (NL)
"If you are into developing, promoting or simply using products coming from renewable carbon technologies, this is the place to be."

Eric Brouwer
Cargill (NL)
"Renewable raw materials, with respect for the planet throughout the whole product lifecycle, are the only way forward."

José Barbosa
CeNTI (PT)
"I am thrilled to be part of the Renewable Materials Conference 2024, which gathers leading researchers in circularity, renewable refineries, and chemical recycling. I look forward to contributing during these three days of conference where we will certainly gather different perspectives that will help us drive technological advancement in these areas."

Alexander Krapivin
Cosun Beet Company (NL)
"The most complete, balanced and worth attending European conference focused on Renewable Materials and feedstocks."

Patrick Van Waes
CovationBio PDO (BE)
"The Renewable Material Conference is the perfect place to learn about latest innovations in renewable materials and practices which will support the 2050 carbon neutral goals and to showcase current status and achievements."

Thomas Vössing
Covestro (DE)
"Great opportunity to interact with inspiring scientists and to exchange on recent sustainability issues."

Kathleen Meisel
DBFZ (DE)
"Renewable materials are not sustainable *per se*. Sustainability assessment and certification are necessary tools."

Saugata Nad
Dow (BE/US)
"Connecting sustainability with performance and defining the future."

Mauro Cordella
DG Env, European Commission (EU)
"Great opportunity to gather together key bio-economy stakeholders, and discuss sustainability and policy aspects of bio-based materials."

Patrick Glöckner
Evonik (DE)
"The transformation towards a Circular Economy is gaining momentum and will help us to meet climate targets while ensuring profitable growth. For the successful industry transformation we do need collaboration. The conference is the perfect platform to discuss with open minded people from diverse backgrounds."

Daniel Zehm
Fraunhofer Institute (DE)
"The concept of renewable carbon inspires my research on materials, and the top-level renewable carbon conference might inspire you to integrate such material concepts to your R&D program."

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Erica Ording
Friesland Campus (NL)
"Looking forward to a conference organized by one of the most important pioneers in pushing biobased materials to where they need to be."

Lars Knutstad
Geno (US)
"Geno sees RMC as the event of the year for the sustainable materials industry."

Dimitri Daniels
GreenDot (DE)
"Advanced recycling of mixed plastic waste: The future lies in intelligent combination of processes."

Doris De Guzman
Green D Market Analytics (US)
"A valuable platform for exchanging ideas, exploring new developments and building connections in the renewable chemicals and materials industries."

Miriam Weber & Christian Lott
HYDRA MArine Sciences (DE)
"The 'biodegradable in the environment' property of new materials is essential (and a great business opportunity) for the numerous applications that we apply there and cannot collect again."

Reinhold Lang
Johannes Kepler University (AT)
"The Renewable Materials Conference addresses key topics needed to enable the industrial transition towards a climate-neutral circular economy and provides an excellent opportunity to share ideas on where we may be headed."

Verena Koch
Peter Greven (DE)
"The Renewable Materials Conference is the annual event for getting news on sustainable material innovations and meeting the industry."

Adrian Brandt
Henkel (DE)
"On a global level, the RMC is the place to be to gain the latest insights about the transformation from fossil to renewable carbon in the materials industry."

Lars Börger
Industry Insider (DE)
"It is simply sustainable to visit RMC – only one place and you meet all the people and hear all the news you need in bioeconomy."

Matthias Wilhelm
Lober (DE)
"The conference shows and shapes innovative approaches to the materials of tomorrow – we are pleased to be able to help shape this future with a small contribution."

Hans Rovers
New Normal Consulting (CH)
"This conference must be used as a stepping stone for powerfull collaboration between Business, Finance and Technology."

Ann Zhang
nova-Institute (CN/DE)
"Looking forward to meeting like-minded people from academia, business, and the public sector to collectively address the challenge of global warming."

Laurens Welles
Renewi (NL)
"Waste no more!"

Mathias Kirstein
RITTEC (DE)
"An empowering event that vividly paints the vision of a fully circular economy."

Mathias Kaldenhoff
SAP (DE)
"The Renewable Materials Conference is about to recover the future and recycle time."

Bernhard Urwyler
Sugar Energy (CN/CH)
"Excellent innovations to solve our climate challenges are available, but we still struggle to bring them in time to application and accelerate the industrialisation at scale to benefit the world."

Titta Rosvall-Puplett
Syensqo (BE)
"Excited to contribute to the Renewable Materials Conference, the perfect platform for showcasing how we are fast-tracking renewable carbon strategy. Holistic value chain collaborations like this enable us to reduce both our and our customers' emissions and reach our ambitious goal of carbon neutrality by 2040."

Jan Harm Urbanus
TNO (NL)
"Looking forward to meet so many people active in the field of renewable materials!"

Jan Pels
TORWASH (NL)
"The Renewable Materials Conference is the perfect platform to let the World know that it is possible to do chemical recycling of PLA from dirty feedstocks, composites and laminates."

Philippe Dewolfs
TÜV AUSTRIA (BE)
"Definitely the place to talk about renewable carbon."

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"It's time to turn ambition into action – let's accelerate the defossilization of key industries."

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"Experience the transformative power of the renewable carbon concept brought to life!"

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"The Renewable Materials Conference is one of the best Conferences on renewable and biobased chemicals, specifically relevant for the chemical industry in Europe but also world-wide, and a unique possibility to network with a good mix of industry and academia."

Maarten Rubens
VITO (BE)
"The Renewable Materials Conference is a great opportunity to learn about the latest innovations and trends in the field of bio-based and circular materials."

John Zhang
Zhongke Guosheng (CN)
"RMC is a professional platform that is needed for all parties and has an ambitious sustainability agenda. This event plays an important role in the whole value chain."

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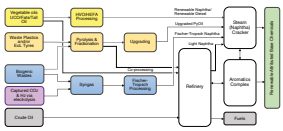

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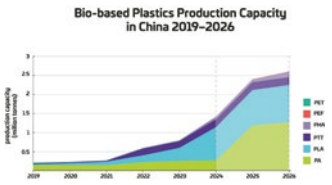

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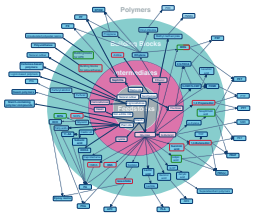

Authors: Pia Skoczinski, Michael Carus, Gillian Tweddle, Pauline Ruiz, Nicolas Hark, Ann Zhang, Doris de Guzman, Jan Ravenstijn, Harald Käb and Achim Raschka
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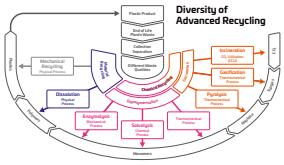
Mapping of Advanced Plastic Waste Recycling Technologies and Their Global Capacities

Providers, Technologies, Partnerships, Status and Outlook



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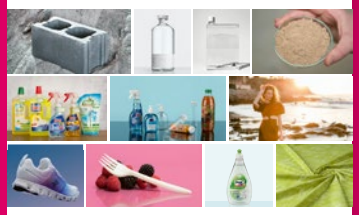
Technologies and Market, Status and Outlook, Company Profiles



Authors: Pauline Ruiz, Pia Skoczinski, Achim Raschka, Nicolas Hark, Michael Carus. With the support of: Aylin Özgen, Jasper Kern, Nico Plum
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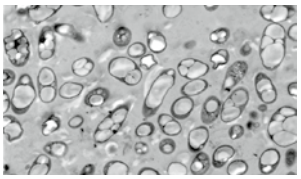

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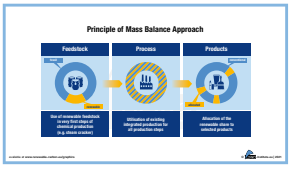
Status & Outlook, Standards & Certification Schemes



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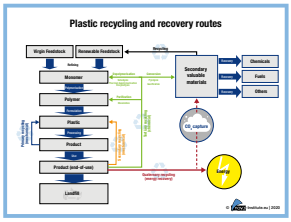
Technologies, Sustainability, Policy and Key Players



Author: Lars Krause, Florian Dietrich, Pia Skoczinski, Michael Carus, Pauline Ruiz, Lara Dammer, Achim Raschka, nova-Institut GmbH, Germany
November 2020
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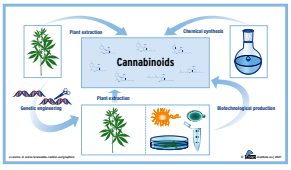
Production of Cannabinoids via Extraction, Chemical Synthesis and Especially Biotechnology

Current Technologies, Potential & Drawbacks and Future Development



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

renewable-carbon.eu/publications

RENEWABLE CARBON PUBLICATIONS

Press Release: Hürth, 16. May 2024

Chemical and Physical Recycling are Essential for the Realisation of the Green Deal and the Circular Economy

The Renewable Carbon Initiative has published a position paper outlining the importance of chemical and physical recycling and what is needed to realise its huge potential.

Chemical and physical recycling play essential roles in realising the objectives of the Green Deal and advancing the circular economy. These technologies are indispensable for the green transition. A wider range of different chemical and physical recycling processes are needed to keep as much of the carbon embedded in plastics as possible in the cycle. Through this, the required volumes and scalability of the circular economy can be achieved. Chemical and physical recycling enable the utilisation of waste streams that cannot be mechanically recycled and are currently sent to incineration or landfill. They are the only ways to ensure these materials remain in a cycle, reducing reliance on disposal methods like incineration and landfill.

Mechanical, physical, and chemical recycling complement each other due to differences in available waste stream composition, sorting needs, target products and economics. Each technology has distinct strengths and weaknesses in terms of input, output quality and quantity. Chemical and physical recycling are fundamental for a comprehensive carbon management that creates sustainable carbon cycles and enables the defossilisation of the chemical industry. While they hold considerable high-volume potential, significant investment is needed to fully leverage these technologies. Creating secure demand, in particular through the policy framework, is imperative to achieve this.

RENEWABLE CARBON INITIATIVE

CO_2

renewable-carbon-initiative.com

What is necessary to realise the huge potential of chemical and physical recycling?

In its latest position paper, the Renewable Carbon Initiative (RCI) identifies eleven requirements to create secure demand, drive investment and further improve the technology field. These include general acceptance of the technology; mandatory recycled content for all polymers/plastics in all applications; recognition and clarification of rules for the calculation of recycling rates; full acceptance of mass balance & attribution with fuel-use excluded; accelerated approval

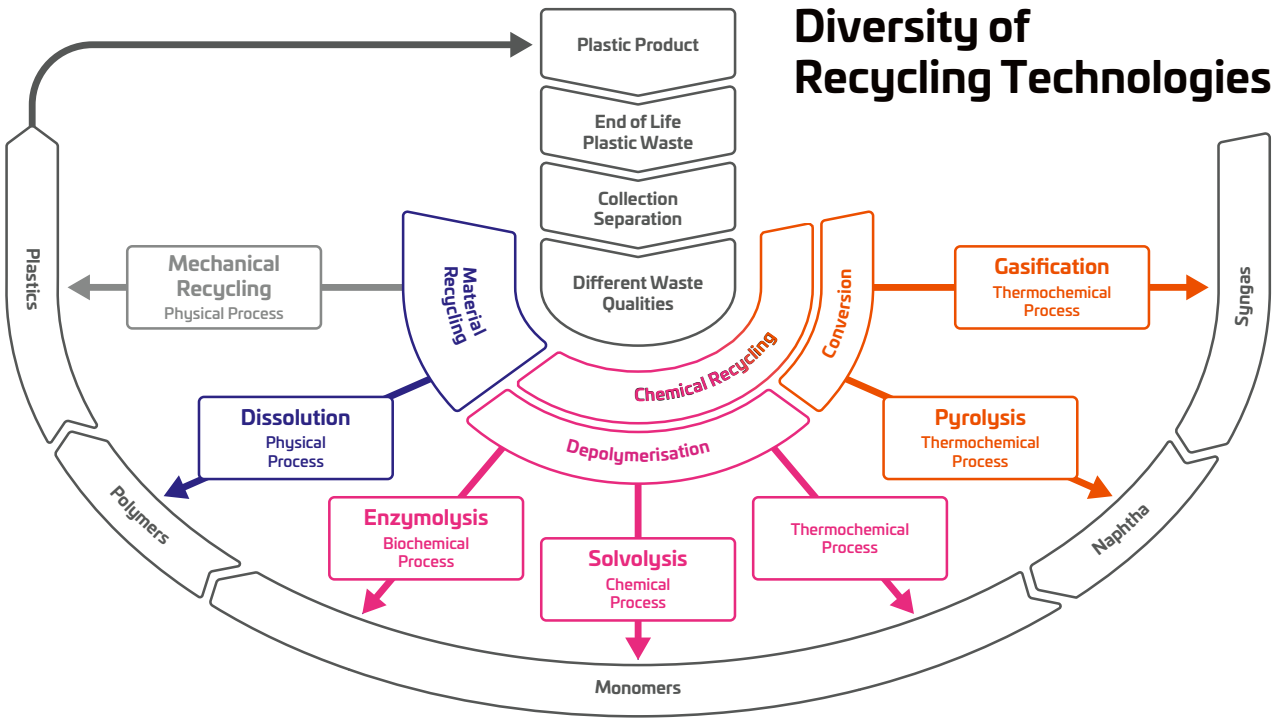


Figure based on nova-Institute 2024, modified by RCI

of new chemical and physical recycling facilities; expansion of recycling infrastructure for all sectors beyond packaging; and the extension of CO_2 pricing for waste incineration in the ETS combined with a landfill ban.

Additionally, RCI advocates for a pragmatic approach, emphasising that while closed-loop recycling is a noble goal for sectors such as packaging, textiles and automobiles, it should not be approached too dogmatically. Flexibility is essential to prevent environmental and economic inefficiencies. If the waste stream of one sector can be better used in another, this should be possible.

Comprehensive Carbon Management

Chemical and physical recycling emerge as key technologies and critical component of a comprehensive carbon management. Carbon management goes beyond the reduction of CO_2 emissions and their capture and long-term storage. It decouples the entire industry from fossil feedstocks from the ground, eliminates the use of fossil carbon wherever possible and allocates renewable carbon from biomass, CO_2 and recycling as efficiently and effectively as possible where carbon use is unavoidable, like chemicals and plastics.

Disclaimer

RCI members are a diverse group of companies addressing the challenges of the transition to renewable carbon with different approaches. The opinions expressed in these publications may not reflect the exact individual policies and views of all RCI members.

About RCI

The Renewable Carbon Initiative (RCI) is a global network of more than 60 prominent companies dedicated to supporting and accelerating the transition from fossil carbon to renewable carbon (bio-based, CO_2-based and recycled) for all organic chemicals and materials. Its work focuses on scientific background reports, position papers, advocacy and networking.

Find all press releases of the Renewable Carbon Initiative (RCI), visuals and more free-for-press purposes at **www.renewable-carbon-initiative.com/media/press**

Responsible for the content under German press law (V. i. S. d. P.):
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Internet: www.nova-institute.de
Email: contact@nova-institut.de
Phone: +49 2233 460 14 00

Visit RCI at Booth 27.

RENEWABLE CARBON INITIATIVE

Bio-based CO_2-based Recycling

Circular Economy

Shape the Future of the Chemical and Material Industry

WHY JOIN RCI?

RCI is an organisation for all companies working in and on renewable chemicals and materials – plastics, composites, fibres and other products can be produced either from biomass, CCU 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.

LinkedIn:
www.linkedin.com/showcase/renewable-carbon-initiative
#RenewableCarbon

Executive Managers:
Christopher vom Berg & Michael Carus

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

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

Find all current RCI members at:
www. renewable-carbon-initiative.com/members

MEMBERS OF THE INITIATIVE

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SME

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BRANDS

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RESEARCH INSTITUTES

Danish Technological Institute, IKT Kunststoff Technik Stuttgart, ITA RWTH Aachen University, Leibniz-Institut für Verbundwerkstoffe, NORCE

* Board Member

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C.A.R.M.E.N., Chemie Cluster Bayern, Circular Rubber Platform, CO_2 Value Europe, ECBF, ecp-news, EIHA, Global CO_2 Initiative, GO!PHA, IBB, Renewable Carbon Plastics Magazine, TextileExchange, WWF

ADMINISTRATIVE OFFICE

nova-Institute

- Initiator and scientific backbone
- Organisation, management and coordination of RCI

MEMBERS

Board

- Strategic direction
- Budget allocation
- Highly active
- Max. 20 members

General assembly

- 2–3 main representatives per member
- Identify / define priorities of RCI
- Decide on future projects

PARTNERS

- Support and promote each other
- Advise on specific topics

ACTIVITIES

- Advocacy
- Scientific background reports
- Position papers
- Networking

WORKING GROUPS - Involvement of all interested members

WG Labelling

- Development of a renewable carbon share (RCS) certificate and label

WG Policy

- Position papers
- Factsheets
- Stakeholder dialogues
- Public consultations of regulations

WG Recycling

- Chemical and mechanical recycling
- Position papers
- Strategic reports

WG Sustainability

- Deep understanding and harmonisation of sustainability assessment and reporting
- Position papers
- Strategic reports

MEMBERSHIP BENEFITS

Advocating for renewable carbon

RCI is at the forefront of advocating for the transition from fossil to renewable carbon. As a member, you'll actively contribute to shaping future policy and driving the transition, ensuring your voice is heard in the movement towards defossilisation.

Contribute to leading scientific reports and positions

RCI's publications are instrumental in advocating for renewable carbon. As a member, you contribute your knowledge and insights, shaping the discourse and decisions that are transforming our economy.

Connect with a vibrant network

Joining RCI means connecting with a diverse network spanning the entire value chain, fostering collaboration and innovation. Supported by our partners, you'll be at the heart of a growing community that drives positive change in the renewable carbon landscape.

Shape the future of the RCI

Your membership gives you the opportunity to shape the direction of RCI, by proposing new ideas, participating in ongoing projects or joining the board. Your membership funds RCI's activities, actively enabling collaboration towards a sustainable future.

Join specialised working groups

Engage in specialised working groups focused on critical aspects such as policy, labelling, recycling, and sustainability. Together, as a trusted pool of expertise, you'll tackle challenges and drive solutions forward.

Increase your visibility

As an RCI member, you'll be recognised as a leader in the transition to renewable carbon. Benefit from increased visibility through our communications activities and share your own successes to build credibility on your path to sustainability.

Enjoy exclusive discounts

Benefit from exclusive discounts on conferences and commercial market reports by nova-Institute, along with additional benefits through our partners. Your membership brings added value beyond just networking and collaboration.

Get cloud access to internal RCI documents

Gain access to the internal RCI cloud, containing draft documents, policy consultations, presentations, and factsheets. It's everything you need to stay ahead of the curve.

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.

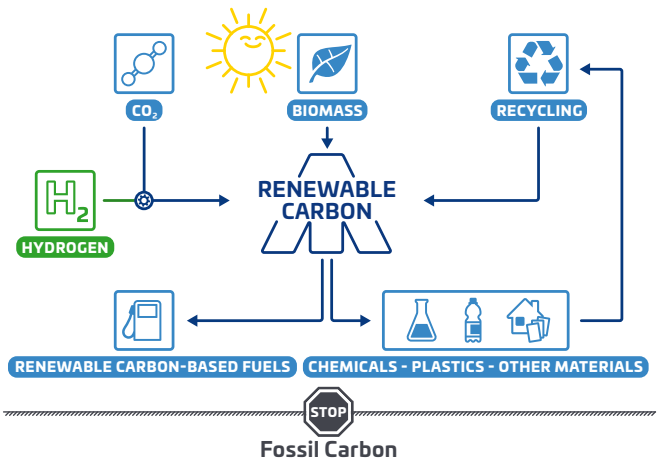
RCI addresses the core problem of climate change, which is extracting and using additional fossil carbon from the ground that will eventually end up in the atmosphere. Companies are encouraged to focus on phasing out fossil resources and to use renewable carbon instead.

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, CO_2 and recycling.

RENEWABLE CARBON



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- Flexible - due to the recognition of equivalent certification schemes
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www.redcert.org

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 CO_2-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

RENEWABLE CARBON COMPANIES

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EUROPE'S LEADING EVENT FOR RENEWABLE & SUSTAINABLE CHEMICALS

TO LEARN MORE VISIT:

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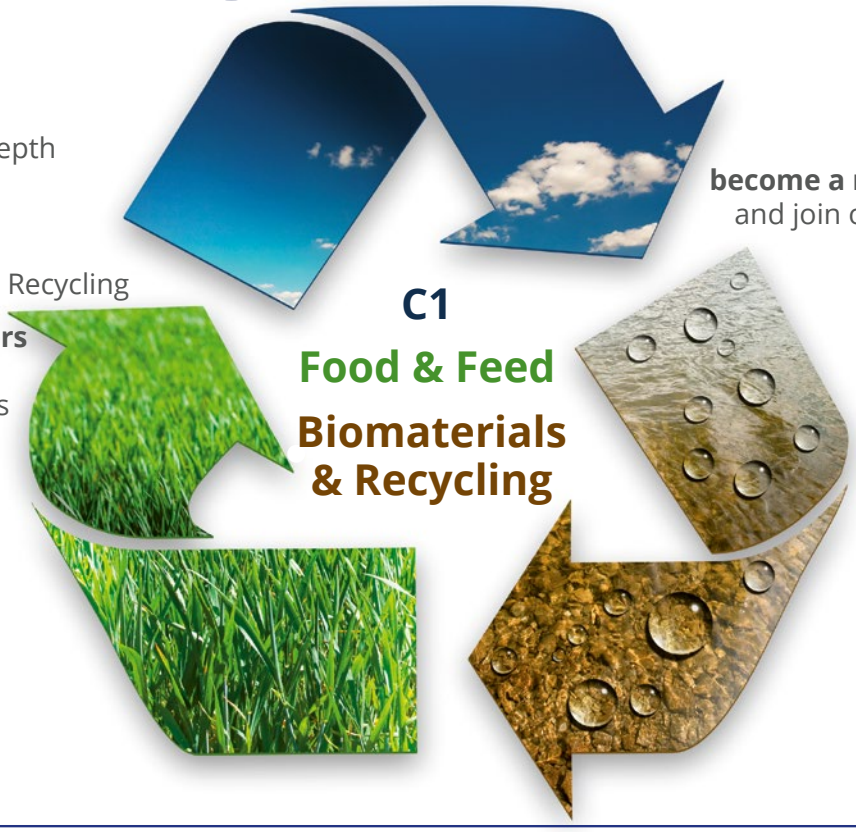
Want to join in-depth discussions on
- C1
- Food & Feed
- Biomaterials & Recycling

Meet stakeholders from companies and R&D institutes

Establish new collaborations

Form research consortia



Contact us to **become a member of CLIB** and join our Focus Groups

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

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- 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

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

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- 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

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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. Multidisciplinary and international team of 45 scientists.

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