



**CO<sub>2</sub> VALUE  
EUROPE**

# **Building on Fit-for-55: what is next for CCU in EU policies**

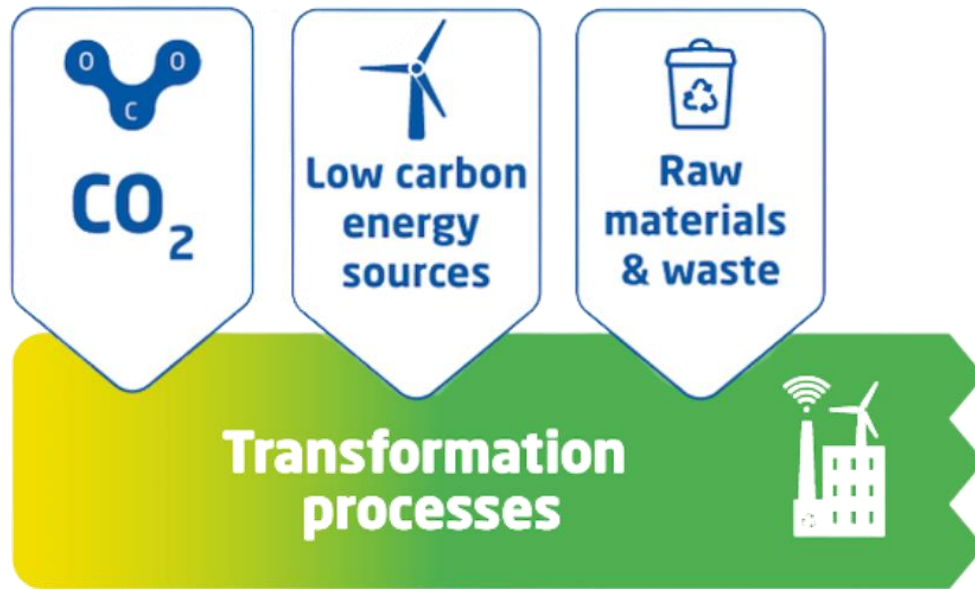
*Carbon Capture Storage & Reuse Conference, Copenhagen, 16 May 2023*

**Tudy Bernier, Senior Policy Manager,  
CO<sub>2</sub> Value Europe**

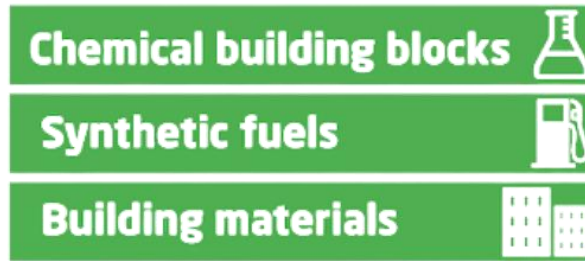
# CO<sub>2</sub> Value Europe: our organisation

CO<sub>2</sub> Value Europe is the European association dedicated to CO<sub>2</sub> Utilisation, bringing together stakeholders from the complete CCU value chain and across industries

## Upstream



## Products



## Downstream



EU funded projects on CCU we participate to



'Building on Fit-for-55: what is next for CCU in EU policies', 16 May 2023, Tudy Bernier, CO<sub>2</sub> Value Europe

# CO<sub>2</sub> Value Europe: 87 members

28 Large Companies

24 RTOs

28 SMEs

6 Clusters

 ALBIOMA  Axens Powering integrated solutions An IFP Group company  CarbonWorks	 cea  DIFFER Dutch Institute for Fundamental Energy Research  EPFL	 accelera by Cummins  avantium  Biostoom	 axelera  cdec Conseil pour le Développement Economique de la Construction a.s.b.l.		
 CARMOUSE  drax  FLUOR  Keppel Seghers Solutions for a Cleaner Future	 climeworks  Endress+Hauser  fortum  Lhoist  MITSUBISHI HEAVY INDUSTRIES	 GRH  ENGIE  HOLCIM  lyondellbasell  NEA GROUP	 GHENT UNIVERSITY  ICIQ Institute of Chemical Research of Catalonia  ifp Energies nouvelles  LEITAT managing technologies  SOTACARBO SUSTAINABLE ENERGY RESEARCH CENTRE	 carbon8  CARBON RECYCLING INTERNATIONAL  D-CRBN  ENVIRO Ambient  HYSYTECH  IC <sup>2</sup> R srl INNOVATIVE CATALYSIS for CARBON RECYCLING srl	 ePURE european renewable ethanol  LanzaTech  EURAÉNERGIE PARC D'INNOVATION
 Mitsubishi Corporation  ORLEN  SIBELCO  Svante  TERÉGA LE GAZ, ACCÉLÉRATEUR D'AVANCE  VEOLIA  VICAT	 SWERIM Swedish Research Institute for Mining, Metallurgy and Materials  tecna:ia MEMBER OF BASQUE RESEARCH & TECHNOLOGY ALLIANCE  UCLouvain  LIÈGE université  UNIVERSITY OF SURREY	 NOVA  TNO innovation for life  ALMA MATER STUDIOUM UNIVERSITÀ DI BOLOGNA  Universidad LOYOLA  UMONS Université de Mons  UNIVERSIDAD DE SEVILLA  vito	 INFINIUM  MGH energy  norsk e-fuel  storengy  TES Hydrogen for life	 KHIMOD ALLEN  NeoCarbons Innovate for Prosperity  twelve  sunfire  VERSO energy	 ePURE european renewable ethanol  LanzaTech  EURAÉNERGIE PARC D'INNOVATION  Nordic Electrofuel  orbix  Synkero  ZETON  THE JAPAN GAS ASSOCIATION

# Decarbonisation, defossilisation, or both?

Most of the current **policy debate is focused on decarbonisation**, meaning replacing carbon-intensive energies with carbon-free alternatives, which is crucial: **in other words, replacing fossil fuels with renewable/low carbon alternatives**

**But two crucial elements need to be taken into account:**

- Some activities and products are hard to abate under the current infrastructures and technologies: aviation, shipping, heavy-duty, chemicals, cement, lime, steel, etc.
- Many daily products are made from carbon and some will remain indispensable for the functioning of our society (chemicals, plastics, etc.). The question is whether the carbon comes from additional fossil resources or not

In addition to decarbonisation, we need to support **defossilisation**, meaning replacing fossil resources by fossil-free resources, by bio-based resources, by CO<sub>2</sub>-based resources

# CCU technologies have different climate impacts based on the carbon used and what product it is converted into

## MAKING LOW CARBON PRODUCTS

Creating products with lower carbon footprint compared to fossil counterparts

Example: capturing industrial CO<sub>2</sub>, producing e-kerosene, replacing fossil kerosene by e-kerosene in a plane



**NET REDUCTION**

## MAKING CO<sub>2</sub>-NEUTRAL PRODUCTS

Creating products that do not lead to additional CO<sub>2</sub> being emitted in the atmosphere

Example 1: Capturing industrial CO<sub>2</sub> and mineralising it permanently  
Example 2: Capturing atmospheric or biogenic CO<sub>2</sub> and using it in a fuel



**ZERO EMISSION**

## REMOVING CARBON FROM THE ATMOSPHERE

Removing CO<sub>2</sub> from the air and durably storing it away from the atmosphere

Example: capturing atmospheric/biogenic CO<sub>2</sub> and storing it permanently in construction products



**NEGATIVE EMISSIONS**

# EU definitions around sustainable fuels

The decisive factor in the definitions of sustainable fuels at EU level: what qualifies a fuel is not the technology used, it is not its carbon source, it is not its end use, it is its energy source

## Renewable fuels of non biological origin (RFNBOs)

- EU definition: *'liquid or gaseous fuels, the energy content of which is derived from renewable sources other than biomass'*
- Also known as: CCU fuels, e-fuels, synthetic fuels, Power-to-X
- They must use renewable energy but use different carbon sources
- Meets -70% GHG threshold
- Examples: e-methane, e-methanol, e-kerosene, renewable hydrogen

## Low carbon fuels

- Energy content derived from low-carbon hydrogen
- Non-renewable sources: pink (nuclear) hydrogen, blue (CCS) hydrogen?
- Meets -70% GHG threshold
- To be further detailed in future delegated act by December 2024

## Recycled carbon fuels

- Produced from liquid/solid waste non-renewable origin which cannot be recovered
- Produced from waste exhaust gas as an unavoidable/unintentional consequence in industrial installations
- Meets -70% GHG threshold
- Example: using CO from steelmaking exhaust gases to make a fuel

## Biomass fuels (biofuels)

- EU definition: *'gaseous and solid fuels produced from biomass'*
- Definition includes biogas, bioliquids, biofuels
- They must use biomass and respect REDII criteria
- 4 types of biofuels with different rules and eligible uses:
  - 1) *Food & feed crops*
  - 2) *Advanced biofuels (Annex IX A)*
  - 3) *Used cooking oil/animal fats (Annex IX B)*
  - 4) *Other residues/feedstock*







# The Fit-for-55 package: what was adopted around CCU

# Progress in Fit-for-55 negotiations

Policy instrument	Council of the EU		EU Parliament		Trilogues' status	
EU Emissions Trading System (EU ETS) revision	Position adopted in June 2022		Position adopted in June 2022		Completed	
ETS Aviation	Position adopted in June 2022		Position adopted in June 2022		Completed	
Carbon Border Adjustment Mechanism (CBAM)	Position adopted in March 2022		Position adopted in June 2022		Completed	
Renewable Energy Directive revision (REDIII)	Position adopted in June 2022		Position adopted in September 2022		Completed	
ReFuelEU Aviation	Position adopted in June 2022		Position adopted in July 2022		Completed	
FuelEU Maritime	Position adopted in June 2022		Position to be adopted in October 2022		Completed	
Energy Taxation Directive revision	No position adopted yet		No position adopted yet		Not started	



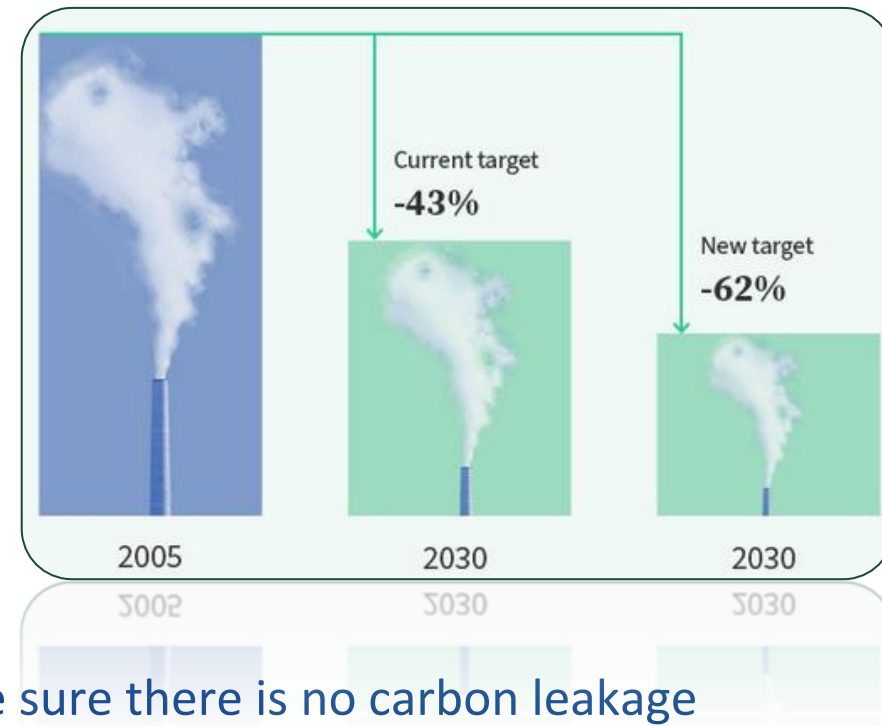
# CCU at the heart of Fit-for-55 Package as adopted

Policy instrument	Impact on CCU
 <b>EU Emissions Trading System (EU ETS) revision</b>	<ul style="list-style-type: none"> <li>✓ CO<sub>2</sub> which is chemically and permanently bound in a product under normal use (e.g. CO<sub>2</sub> mineralisation) is excluded from the obligation to surrender allowances</li> <li>✓ Avoid double-counting of emissions released by the use of RFNBOs</li> </ul>
 <b>ETS Aviation</b>	<ul style="list-style-type: none"> <li>✓ Complete phase-out of free ETS allowances by 2027</li> <li>✓ Dedicated funds for innovation (€450M) and sustainable fuels (€1.8B)</li> <li>✓ 95% of costs differential for synthetic aviation fuels to be covered</li> </ul>
 <b>Renewable Energy Directive revision (REDIII)</b>	<ul style="list-style-type: none"> <li>✓ Combined target of advanced biofuels + RFNBOs: minimum 5.5% of energy in transport by 2030</li> <li>✓ Subtarget for RFNBOs: minimum 1% of energy in transport by 2030</li> <li>✓ 42% of the use of hydrogen in the industry to be RFNBOs by 2030, 60% by 2035</li> </ul>
 <b>ReFuelEU Aviation</b>	<ul style="list-style-type: none"> <li>➤ SAFs quotas: min 6%, 34%, 70% by 2030/2040/2050</li> <li>➤ Synthetic aviation fuels quotas (RFNBOs): min 1.2%, 5%, 35% by 2030/2035/2050</li> </ul>
 <b>FuelEU Maritime</b>	<ul style="list-style-type: none"> <li>✓ Binding GHG reduction targets for ships: 2%, 6%, 31%, 80% in 2025, 2030, 2040, 2050</li> <li>✓ 2% RFNBOs quota in 2034 if RFNBOs account for less than 1% in fuel mix in 2031</li> </ul>
 <b>Energy Taxation Directive</b> <b>STILL UNDER DISCUSSION</b>	<ul style="list-style-type: none"> <li>✓ Minimum taxation rate of zero for 10 years for RFNBOs for specific types of air and waterborne navigation</li> </ul>

# EU adopts ETS revision and new carbon border tax

## The ETS revision

- **CCS and permanently bound CCU are fully exempted** from surrender requirements in the EU ETS
- End of **double counting** of carbon emissions for CCU fuels and CCU chemicals production
- Number of **free allowances will be reduced**, and the number of **total ETS allowances as well**. Consequence: the price of CO<sub>2</sub> will rise (currently 90€/ton on ETS market)



## The Carbon Border Adjustment Mechanism

- **CBAM**: carbon tax for products made outside Europe aiming to make sure there is no carbon leakage
- **Principle**: producers outside Europe will need to pay the difference between the carbon price in a given country and the EU ETS carbon price
- **Scope**: raw materials like iron and steel, cement, aluminium, fertilisers, electricity, hydrogen, certain indirect emissions
- **Timeline**: will be phased-in as ETS free allowances are phased out between 2026-2034. Then reassessed to potentially include downstream products (e.g. plastics & chemicals)

# REDIII sets new targets for renewable energy & renewable fuels

## Renewable energy

42.5% of renewable energy by 2030 + 2.5% aspirational

## Transport GHG reduction

-14.5% by 2030

OR 29% share of renewable energy in final energy consumption

## Sustainable fuels in transport

Combined target advanced biofuels/RFNBOs: 5.5% by 2030

Subtarget RFNBOs: 1% by 2030

## CCU fuels and green hydrogen in industry

42% of hydrogen use in industry from RFNBOs by 2030

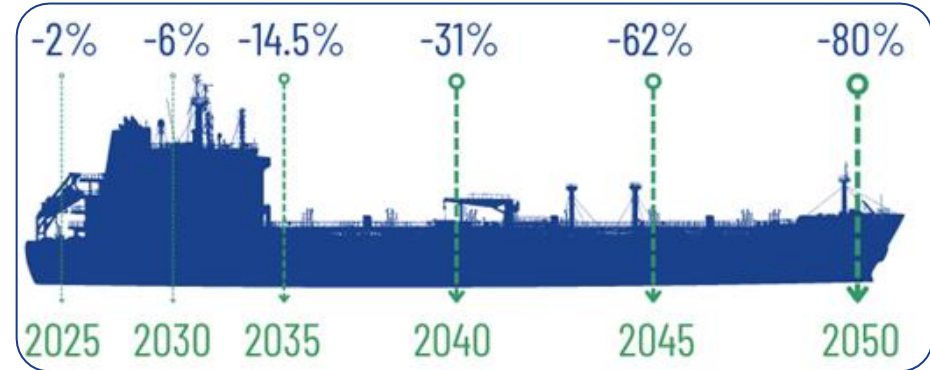
60% in 2035 (with conditions for lower targets)

# Race for defossilising EU shipping & aviation is on

## FuelEU Maritime

- Gradually increase the use of sustainable fuels and technologies
- GHG reduction targets in the energy they use
- Plans to set a 2% renewable fuels usage target as of 2034 if the Commission reports that in 2031 RFNBO amount to less than 1% in fuel mix

## GHG reduction targets



## ReFuelEU Aviation

- Mandates minimum quotas for sustainable fuels: RFNBOs, RCFs, advanced biofuels and even low carbon fuels
- Mandates specific subquotas for RFNBOs
- Sets penalties for fuels suppliers (most of it) and aircraft operators (part of it) if they don't comply with targets

	2025	2030	2032	2035	2040	2045	2050
SAF	2%	6%		20%	34%	42%	70%
E-kerosene		1.2%	2%	5%			35%

# EU policies in the making beyond Fit-for-55

# New EU rules for renewable hydrogen & CCU fuels: are they fit for purpose?



- In February 2023, the EU Commission published new rules for the production of renewable hydrogen and renewable fuels
- They are up for scrutiny until June 2023
- Draft REDII delegated act on additionality
  - Definition of additionality: ensure the renewable hydrogen comes from new renewable energy installations and do not divert existing clean power from other decarbonisation efforts
  - EU rules would provide more flexibility for projects starting before 2028, but stricter rules after that
- Draft REDII delegated act on GHG methodology to calculate GHG savings from RFNBOs and RCFs to reach 70% GHG reduction threshold. The rules distinguish between carbon sources to use:
  - Eligible without an end date: DAC CO<sub>2</sub>, biogenic CO<sub>2</sub> that respects REDII criteria, RFNBOs/RCFs' CO<sub>2</sub>, geothermal CO<sub>2</sub>
  - Industrial CO<sub>2</sub> from power production (e.g. gas-fired powerplant): eligible until 2036
  - Industrial CO<sub>2</sub> from industrial production (e.g. emissions from cement): eligible until 2041

# Carbon removals & CCUS Strategy

## Carbon removals certification framework

- EU proposal to certify removals from geological storage, long-term products storage and carbon farming
- CCU fuels not considered removals, but **CCU mineralisation pathways (from DAC/biogenic CO<sub>2</sub>) eligible**

	CCU fuels	CCU chemicals	CCU mineralisation
Industrial CO <sub>2</sub>	Not a carbon removal	Not a carbon removal	Not a carbon removal
Biogenic CO <sub>2</sub>	Not a carbon removal	Under discussion	Carbon removal
DAC CO <sub>2</sub>	Not a carbon removal	Under discussion	Carbon removal



## EU CCUS Strategy

- EU Commission gathering input to publish an ‘EU CCUS Strategy’ by **end 2023** through CCUS Forum
- Strategy to list **key milestones and actions needed to deploy CCS and CCU** in Europe in the coming years
- Great signal that **EU strategy towards net zero will also rely on CCUS**
- But ‘**CCUS**’ needs to include **both** ‘**CCS**’ and ‘**CCU**’

# New EU initiatives for CO<sub>2</sub>-based quotas for chemicals and other products?



**Transition Pathway  
for Chemical  
Industry**



*“Setting targets for  
renewable/non-fossil  
carbon content to  
stimulate demand”*



**Packaging & Packaging  
Waste Regulation &  
biobased plastics  
framework**



*“Carbon feedstock will  
continue to be needed”*



**Restoring  
Sustainable  
Carbon Cycles**



*“At least 20% of  
carbon chemicals &  
plastics to be non-  
fossil by 2030”*



**Ecodesign for  
Sustainable  
Products Regulation**



**No reference to CCU:  
opportunity to include  
horizontal measure with  
renewable carbon  
quotas?**



# EU Net Zero Industry Act as next horizon

- EU gearing up to fast track net zero technologies deployment and support industry in green transition
- Net zero techs: solar power, wind power, batteries, heat pumps, electrolysers, biogas/biomethane, CCU, CCS, some nuclear-related activities, sustainable fuels including RFNBOs, etc.
- Additional category of “strategic” projects with further incentives for manufacturing certain technologies: but **CCU and RFNBOs are not part of it. They shouldn’t be excluded by design**
- **Not all CCU pathways are “net-zero”. But some can become net zero:** e.g. producing chemicals from industrial CO<sub>2</sub> and substituting the carbon supply when available with biogenic/DAC CO<sub>2</sub>



# Beyond 2023: challenges & opportunities ahead

# Fit-for-55 is only the beginning

- Hydrogen & Gas Package
- CO<sub>2</sub> standards for cars and vans
- Heavy-duty vehicles legislation
- ETS Delegated Act
- Low carbon fuels Delegated Act
- EU Taxonomy
- EU Solar Energy Strategy
- TEN-E/TEN-T
- EU 2040 Climate targets

# What is next for CCU?

## Research & Innovation

- Materials & catalysts
- Process integration
- CCU in modelling & scenarios
- Metrology for CO<sub>2</sub>
- LCA/TEA
- Social acceptance

## Policy

- Fit-for-55
- EU Taxonomy
- Renewable electricity
- CCUS Forum
- RLCF Alliance
- Market-pull mechanisms

## Funding

- Ecosystem of public, private and industrial investors
- Innovation Fund frontloading
- Synchronisation between national & EU schemes

***We need long-term, consistent and systematic drivers to move away from fossil fuels and fossil resources***

***It's time to defossilise !***



# Thank you!

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Think about checking out  
our CCU database !

<https://database.co2value.eu/>

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