



Innovative Technologien
für Ressourceneffizienz –
**Impulse für industrielle
Ressourceneffizienz**

VOM LABOR AUF DEN MARKT

DREAMRESOURCECONTI

Resource-efficient production of CO₂-based surfactants

1st CO₂-WIN conference
June 8th, 2021

Marina Sebastian

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



Bundesministerium
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und Forschung

ACTION IS REQUIRED



- The big enemy for our climate is CO₂ emission
- At the same time, CO₂ is a valuable raw material
- With innovation and new technology, we can contribute to a more sustainable future and foster a fully circular economy

COVESTRO'S CO₂ TECHNOLOGY

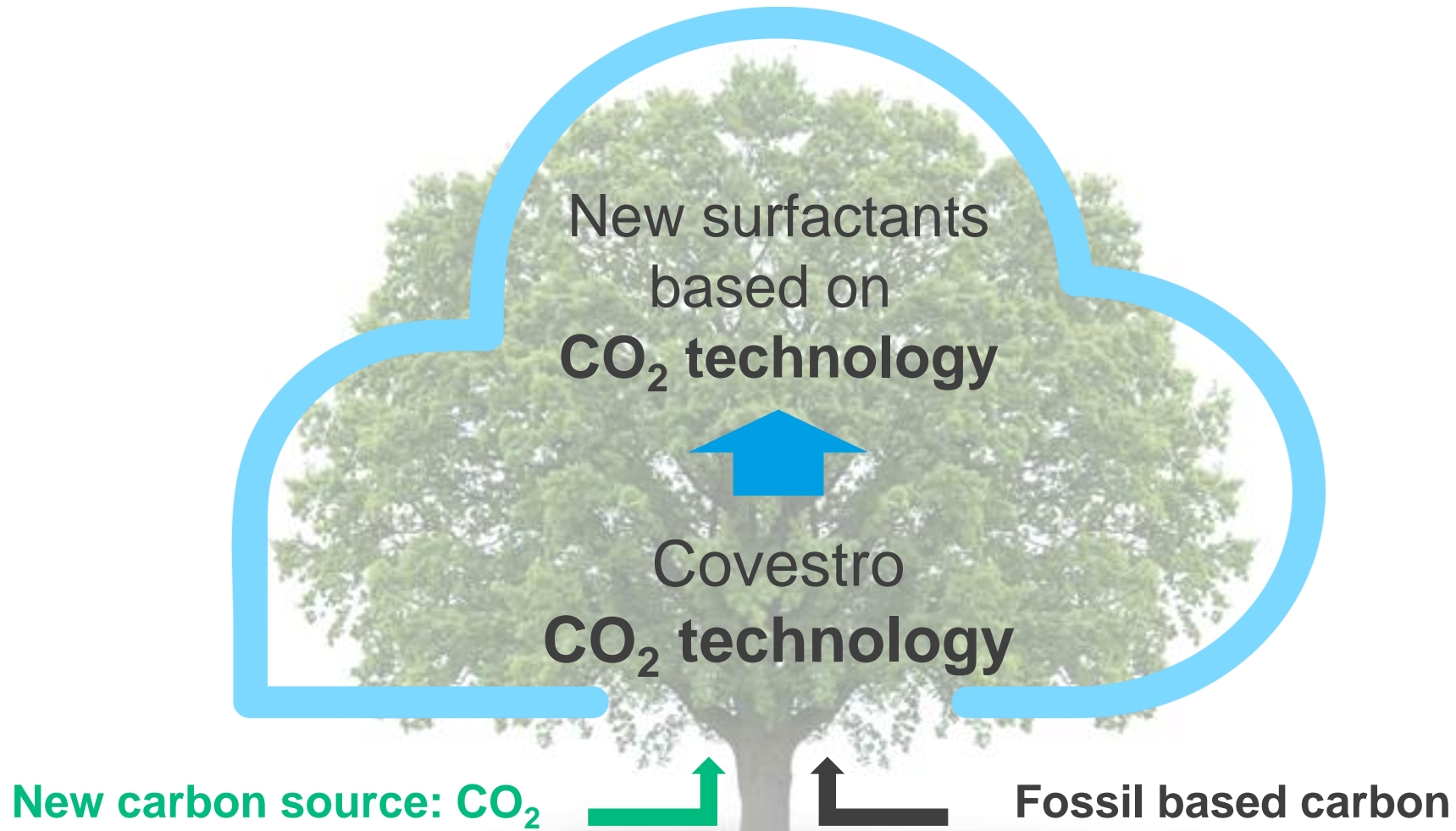
Let nature guide us forward



- At Covestro, we work with ground-breaking technologies to embrace this challenge
- We aim to reduce the carbon footprint – we simply asked nature for guidance

INSPIRED BY NATURE – A NEW TECHNOLOGY FOR CHEMICALS

Covestro's CO₂-technology converts CO₂ into a valuable material source



DREAMRESOURCECONTI – COMBINATION OF EO & CO₂



Surface-active materials based on CO₂

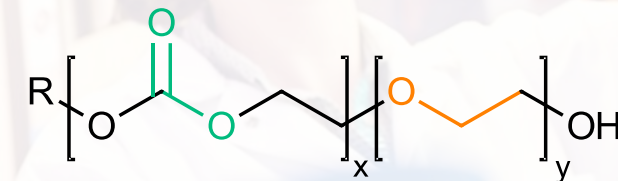
Conventional EO-based material



Ethylene oxide

Ethoxylate

Novel EO/CO₂-based material



Ethylene oxide Carbon dioxide

Polyether polycarbonate

SURFACTANTS BASED ON CO₂

Make an everyday hero more sustainable



**surfactant =
surface active agent**

- Reduces the surface tension of other compounds by its chemical structure
- This effect allows to penetrate dirt, grease and dissolving residues from surfaces

Hydrophobic part

Petrochemical and bio-based raw material broadly available

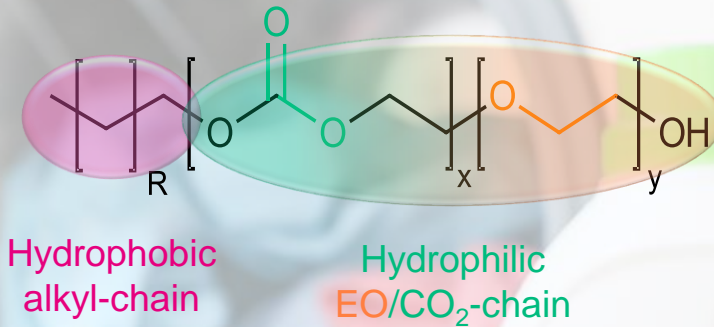
Hydrophilic part

Largely fossil based, only few alternatives feedstocks known,
until now:

Reuse CO₂

SURFACTANTS BASED ON CO₂

Characterization and performance testing

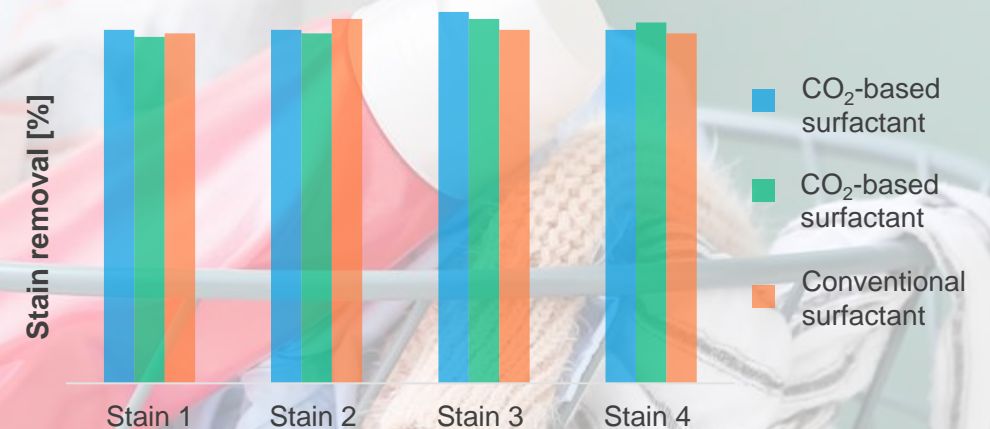


Hochschule Niederrhein
University of Applied Sciences

Washing performance tested of CO₂-based surfactants

- ➔ Applicable in standard detergents formulation
- ➔ Comparable primary washing performance to market reference

No	Surfactant	M _n [g/mol]	Substituted EO-content [wt.-%]	σ _{CMC} [mN/m]	HLB _{exp}
1	C ₁₂₋₁₈ -EO/CO ₂ -OH	780	15	37	~ 11
2	C ₁₂₋₁₈ -EO/CO ₂ -OH	710	15	37	~ 10
3	C ₁₂ -EO/CO ₂ -OH	800	14	34	~ 12
4	C ₁₂ -EO/CO ₂ -OH	710	15	34	~ 11
5	C ₁₂ -EO-OH	800	-	40	~ 16

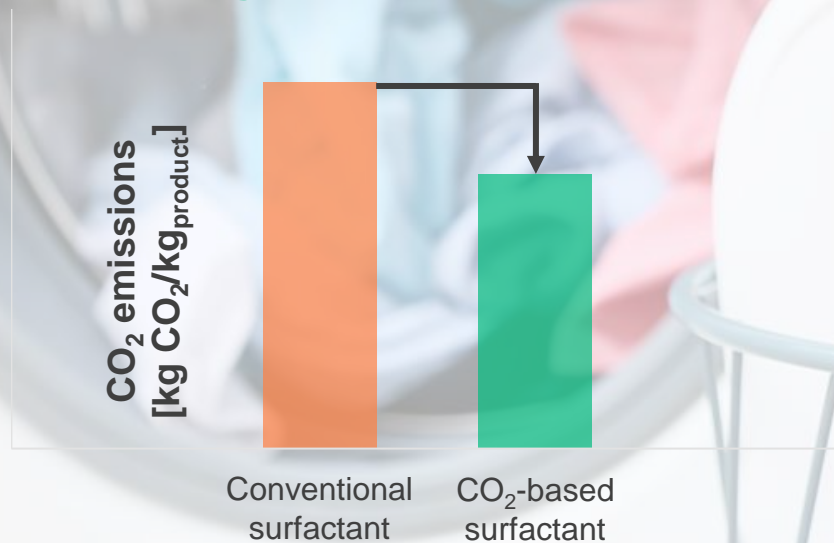


SURFACTANTS BASED ON CO₂

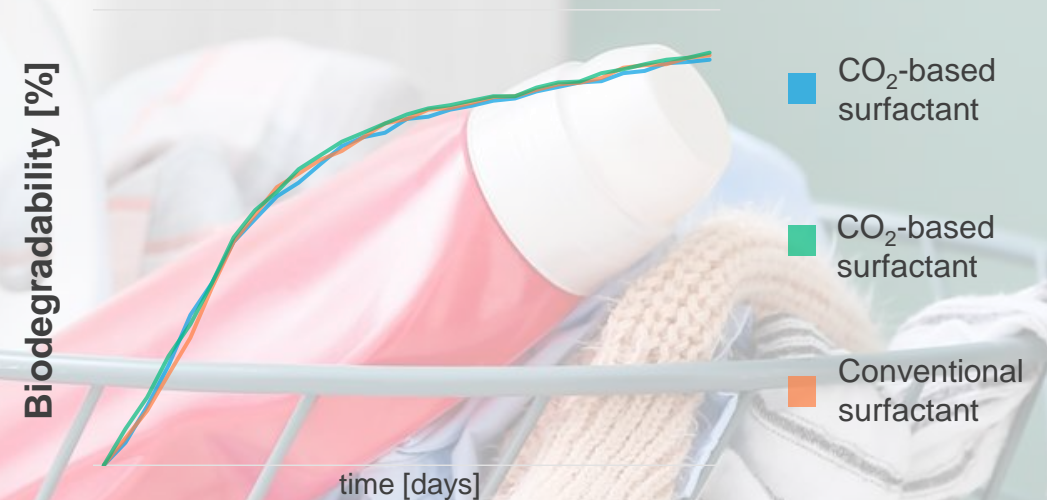
Ecological and ecotoxicological assessments



First life cycle assessment showed **reduction of global warming potential up to 25 %**



Tested in accordance with OECD 301F guideline
→ CO₂-based surfactants are **readily biodegradable**



COV CO₂-TECHNOLOGY HONORED WITH MANY AWARDS



Dr. Guertler and Prof. Leitner are nominated for the European Inventor Award of EPO
 → Final on 17th June 2021
 → **Vote for Popular Prize**

06/2021



Winner of the third place of the “Best CO₂ utilization 2021” award of nova institute for the developments on CO₂-based surfactants



DEUTSCHER ZUKUNFTSPREIS
 Preis des Bundespräsidenten für Technik und Innovation
 Nominee 2019

DEUTSCHER ZUKUNFTSPREIS
 The Federal President's Award for Innovation and Technology

In the circle of excellence 2019, Covestro employees are nominated for the German President's Award for Innovation and Technology

03/2021

2019



2017



2016



2015



2012



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