



LanzaTech

CAPTURING CARBON. CREATING VALUE

CO2CZ utilization solutions on an industrial scale

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VP Europe

WASTE CARBON (EMISSIONS) AS A FEEDSTOCK



Readily
available

Low
value

Abundant/
high volume

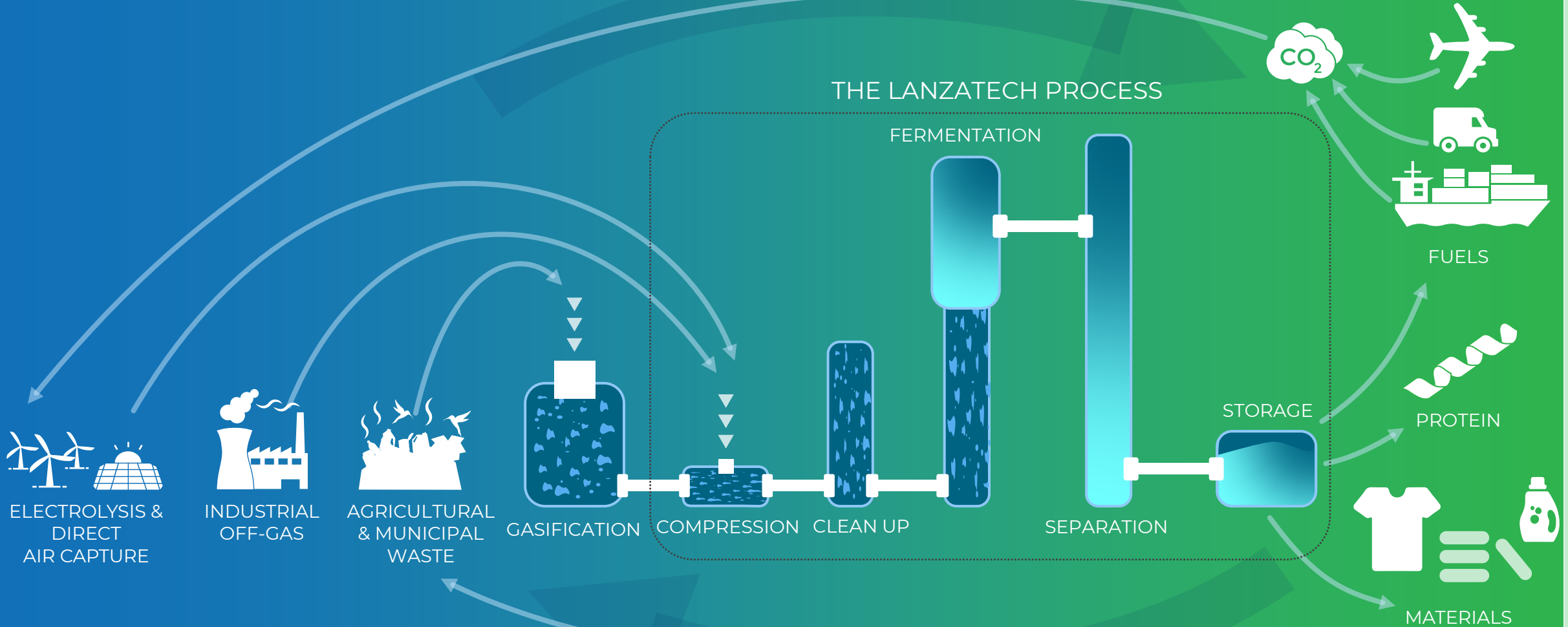
Point
sourced

Non-
food

**no impact on food, land, water, or biodiversity*



A NOVEL CIRCULAR SOLUTION, RECYCLING WASTE CARBON INTO VALUABLE PRODUCTS



CAPTURING CARBON
AT COMMERCIAL SCALE



COMERCIAALLY OPERATIONAL

2018

Volume: 46 KTA

Carbon Source:
Steel Mill Emissions



2021

Volume: 46 KTA

Carbon Source:
Ferroalloy Emissions

2022

Volume: 60 KTA

Carbon Source:
Ferroalloy Emissions

2023 EXPECTED GAS FERMENTATION PLANT START UPS



Project/Partner	Carbon Source	Actual or Anticipated Start Date	Ethanol Production Volume (tons/year)	CO ₂ Abated (tons/year)	Location
Shougang Steel JV	Ferroalloy Off Gas	2Q 2023	60,000	~120,000	China
IndianOil	Refinery Off Gas	3Q 2023	33,500	~60,000	India
ArcelorMittal	Steel Off Gas	4Q 2023	64,000	~125,000	Belgium
TOTAL			157,500		

1st European Plant, Gent, Belgium



Volume: 64 KTA
Carbon Source:
Steel Mill Emissions



CREATING VALUE

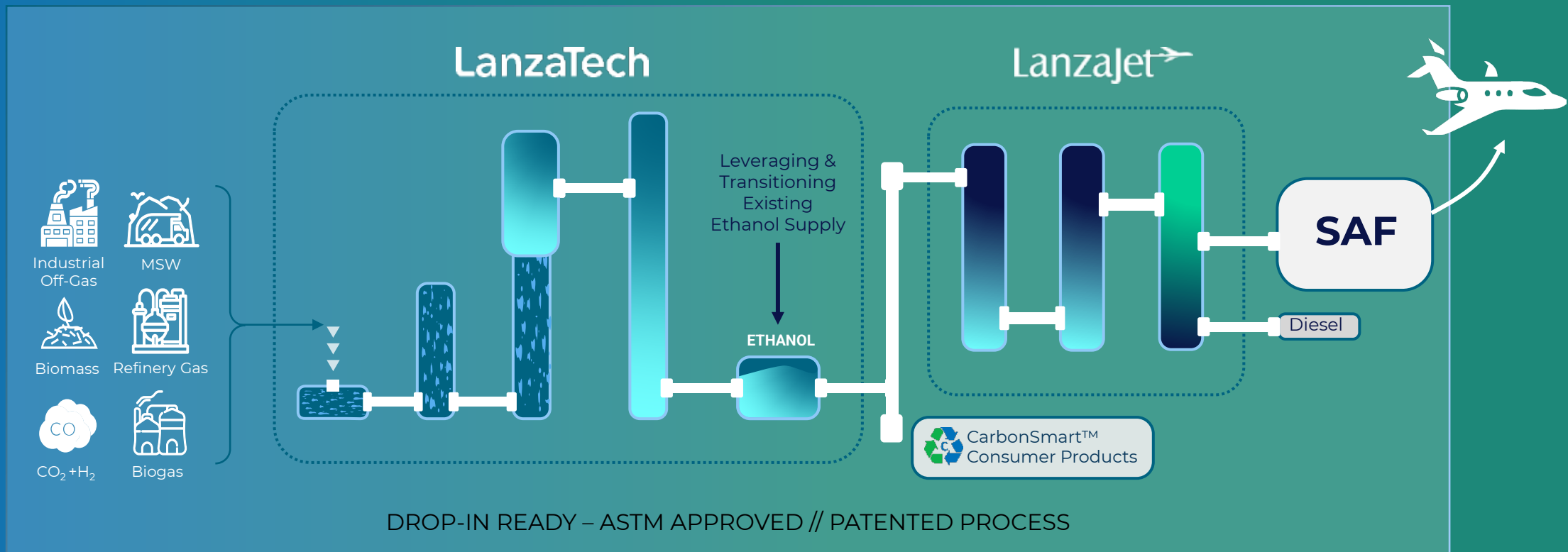
SUSTAINABLE FUELS

DOWNSTREAM FLEXIBILITY TO INTEGRATE WITH LANZAJET'S SAF PLATFORM

Alcohol-to-Jet
Technology Developed

LanzaTech Ownership
~25%, Path to Majority
through Additional IP
Contribution

SAF from LanzaJet
Platform Creates
Demand Pull for Waste-
Based Ethanol



WORLD'S FIRST CCU TRANSATLANTIC FLIGHT



AIRLINE: VIRGIN ATLANTIC
ROUTE: ORLANDO TO LONDON
DATE: OCTOBER 18, 2018

WORLD'S FIRST ATJ BIOREFINERY



FREEDOM PINES, GEORGIA, USA

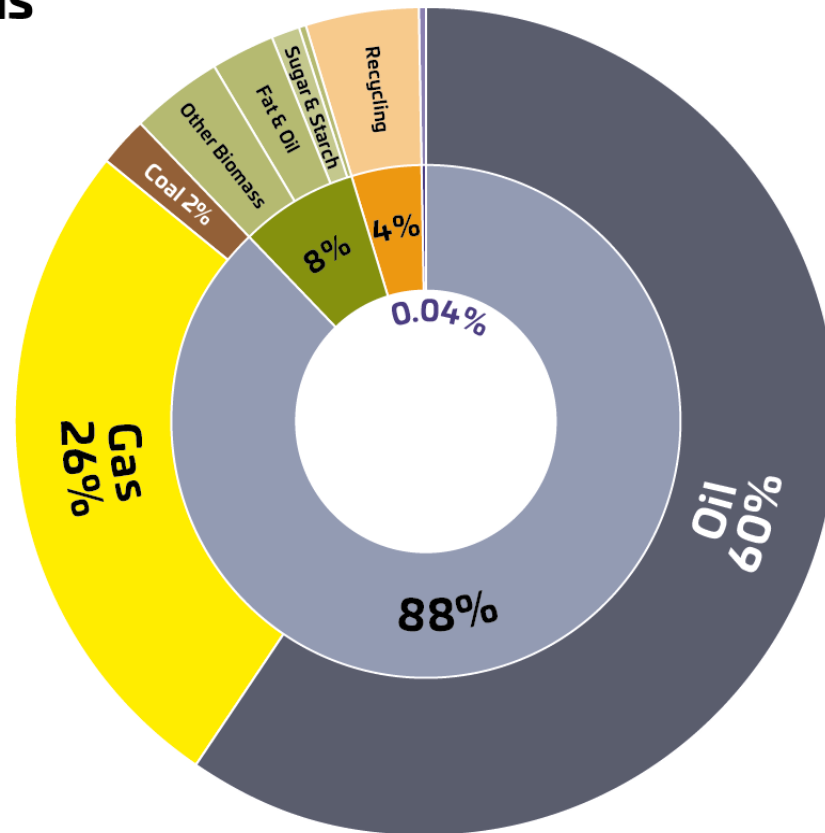
CREATING VALUE

CARBONSMART™ CHEMICALS

Global Supply for Embedded Carbon in Chemicals and Derived Materials by Type of Feedstock

Total: **550 Mt embedded C/yr**
Reference Years: **2015–2022**

- Fossil-based: **480 Mt embedded C/yr**
- Bio-based: **41 Mt embedded C/yr**
- Recycling: **24 Mt embedded C/yr**
- CO₂-based: **0.2 Mt embedded C/yr**

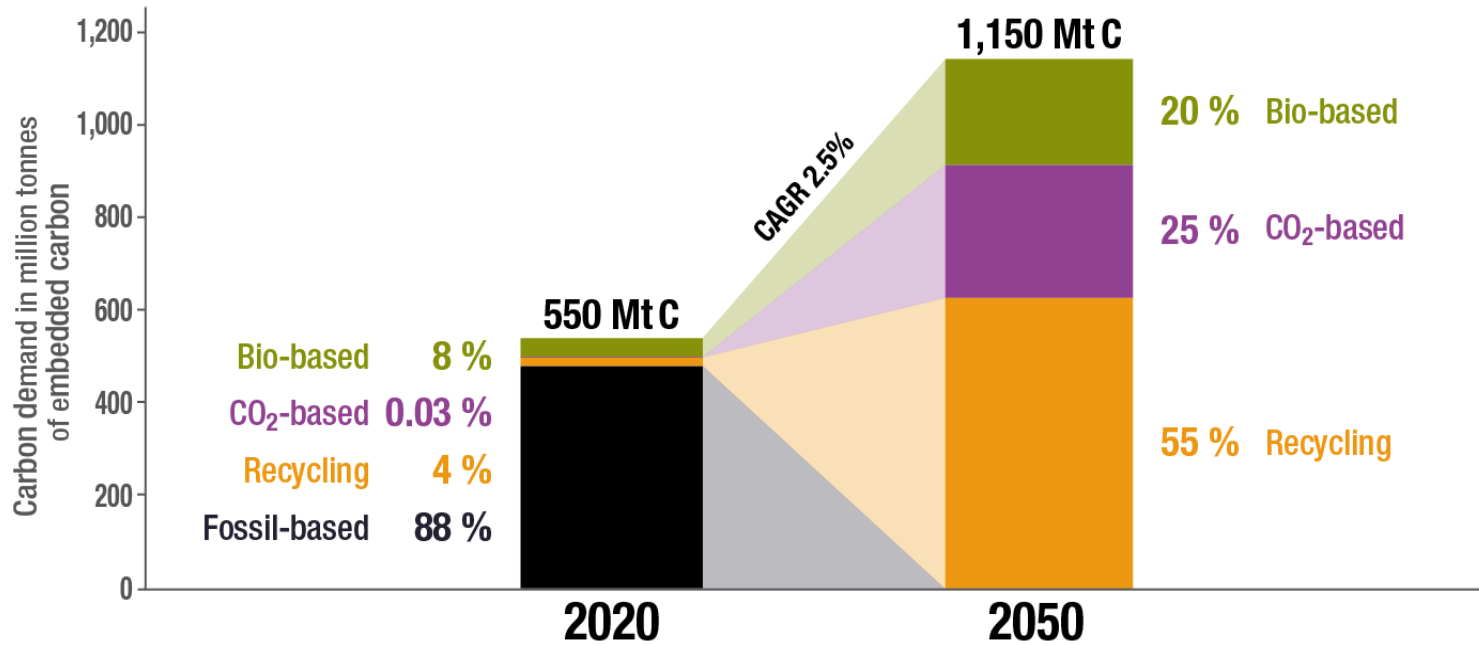


available at www.renewable-carbon.eu/graphics

Main Sources: Updated data using methodology based on Piotrowski et al. 2015, Levi and Cullen 2018, Plastics Europe 2022b, Skoczinski et al. 2022

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Carbon Embedded in Chemicals and Derived Materials



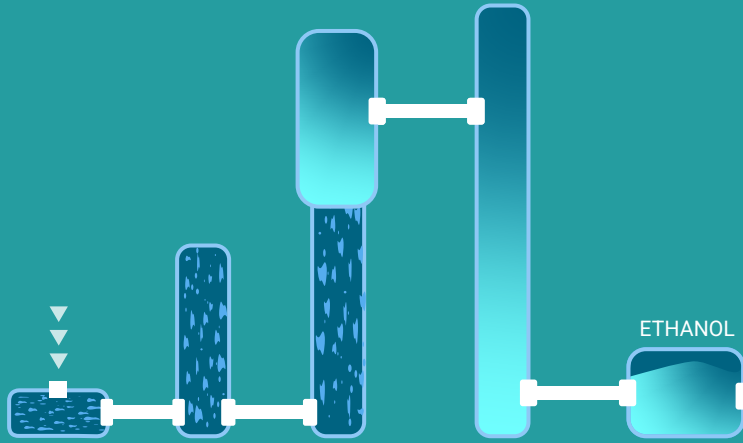
available at www.renewable-carbon.eu/graphics

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DRIVING DEMAND

LANZATECH'S GAS FERMENTATION TECHNOLOGY ENABLES CARBON CAPTURE AND TRANSFORMATION INTO CARBONSMART™ PRODUCTS THAT OFFER VALUE THROUGH IMPROVED SUSTAINABILITY

LanzaTech



PURIFIED ETHANOL



PURIFIED ETHANOL



SURFACTANTS



POLYESTER RESINS



POLYESTER FIBERS



SURFACTANTS



POLYETHYLENE



EVA FOAMS



SAF



GLOBAL BRAND SUSTAINABILITY TARGETS DRIVE DEMAND FOR CARBONSMART™ PRODUCTS

By 2030, 100% of the plastic used in our packaging will be either from recycled or biobased sources (we will reach 50% by 2025).

L'ORÉAL

Our climate action goal



By 2030 we will replace 100% of the carbon derived from fossil fuels in all our cleaning and laundry product formulations with renewable or recycled carbon.

INDITEX

2025 / 100% more sustainable linen and recycled polyester

100%

100% SUSTAINABLE RAW MATERIALS:
From 2040, we will only process sustainable raw materials.

BEAUTY THAT LASTS

The beauty of our product
Drive product innovation with sustainability and the circular economy in mind

The beauty of our planet
Protect and conserve natural resources to achieve a healthy, clean and safe environment

Greenhouse Gas Emissions by Scope

Scope	Percentage
Scope 1	1.8%
Scope 2	3.1%
Scope 3	
Cat. 1 Purchased goods and services	63%
Cat. 4 & 9 Upstream and downstream transportation and distribution	14%

COTY LAUNCHES WORLD'S FIRST GLOBALLY DISTRIBUTED FRAGRANCE, MANUFACTURED USING 100% CARBON- CAPTURED ALCOHOL

GUCCI, THE ALCHEMIST'S GARDEN,
WHERE MY HEART BEATS, EAU DE PARFUM

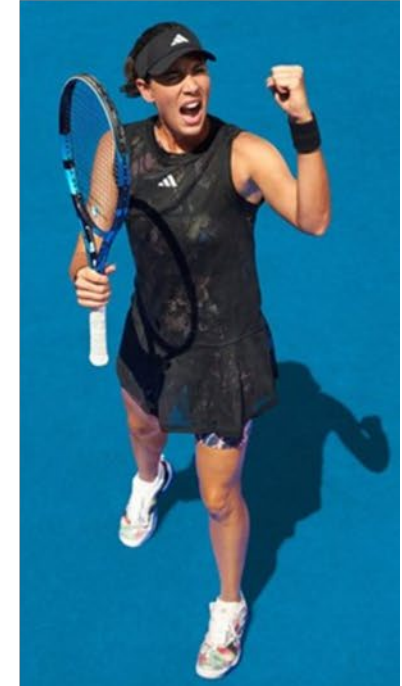
The fragrance uses CarbonSmart alcohol produced by biotech company LanzaTech.

This novel technology process captures carbon from Industrial emissions and, after a clean-up step, transforms it through fermentation, into ethanol for use in fine fragrances.





ADIDAS INTRODUCES THE NEW SS23 MELBOURNE TENNIS COLLECTION



MADE TO RETHINK MATERIALS AND DESIGNED TO HELP PERFORMANCE

With the help of innovation, adidas is seeing possibilities in turning towards new resources. For these products adidas turned to a greenhouse gas technology. It uses captured industrial emissions as a new material feedstock. CO₂ is fermented into ethanol which constitutes 30% by weight of a polyester yarn. adidas knitted this yarn into various products and now this carbon-based ethanol makes up a minimum of 15% by weight of these garments.



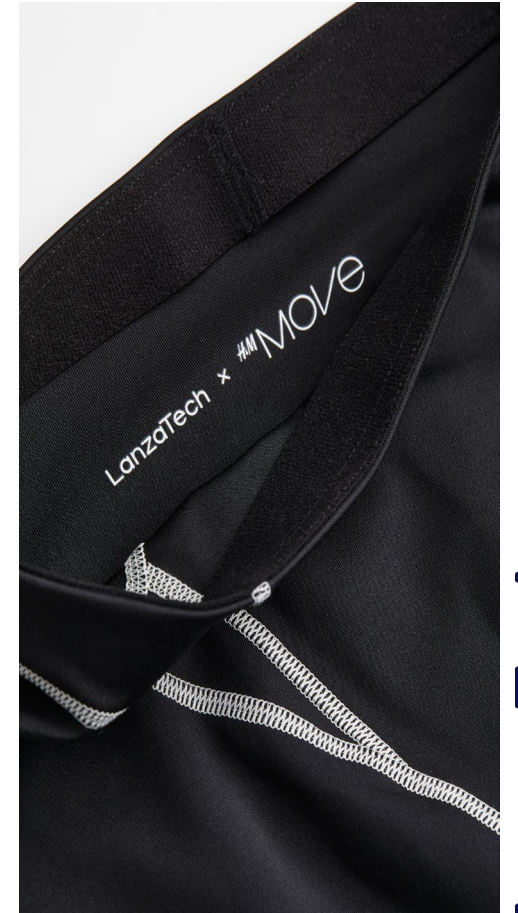
H&M MOVE PARTNERS WITH LANZATECH TO LAUNCH CAPSULE COLLECTION USING CAPTURED CARBON EMISSIONS



This is the stuff of science fiction:

LanzaTech diverts carbon emissions heading for the atmosphere, traps them, and turns them into thread.

In a leap towards innovating sportswear, H&M Move partners with the breakthrough material science company for a drop arriving at hm.com/move on April 6.



LanzaTech



STARTUP LANZATECH X ZARA

THIS PRODUCT CONTAINS POLYESTER
MADE OF 20% INDUSTRIAL CARBON
EMISSIONS DIRECTLY CAPTURED AND
REPURPOSED THROUGH LANZATECH
TECHNOLOGY.

LANZATECH HAS CREATED A CARBON
CAPTURE TECHNOLOGY THAT CONVERTS
CARBON EMISSIONS INTO ETHANOL,
WHICH CAN THEN BE USED TO PRODUCE
POLYESTER.

CAPTURING CARBON EMISSIONS HELPS
LIMIT THEIR RELEASE INTO THE
ATMOSPHERE AND TRANSFORMING THEM
INTO POLYESTER HELPS LIMIT THE USE OF
VIRGIN FOSSIL RESOURCES.

FAST@MPANY
**These gorgeous Zara party dresses
are made from carbon emissions**
Carbon created by a Chinese steel factory is fermented with bacteria and then ends up in
this capsule collection.

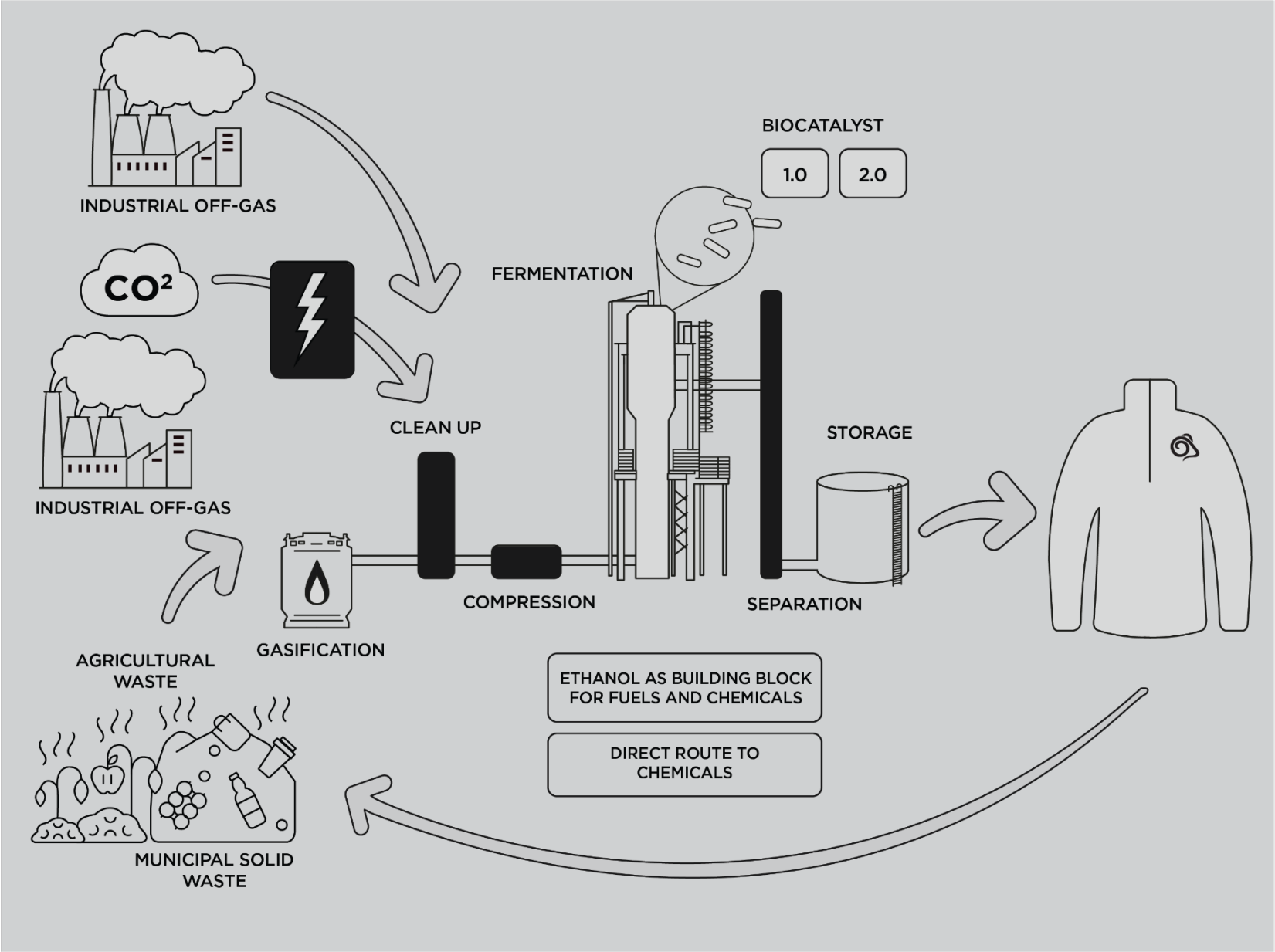
ZARA



CARBONSMART™ PET FIBERS FOR OUTDOOR APPAREL



CAPTURING CARBON. CREATING VALUE



(<https://qrco.de/co2renu>)

Forbes

**Swiss Footwear Brand
Develops A Running Shoe
Made From Carbon Emissions**



Run on clouds.

CarbonSmart™

INNOVATION PIPELINE



Biocatalyst Programming

LanzaTech

OAK RIDGE
National Laboratory

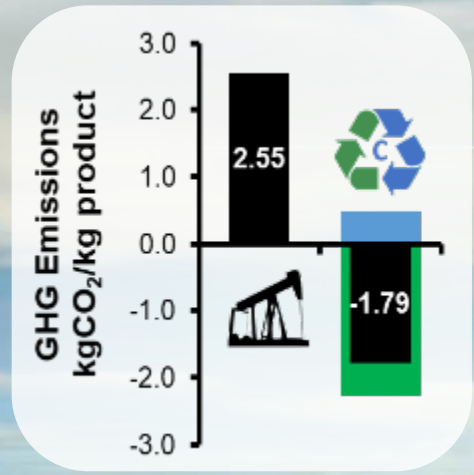
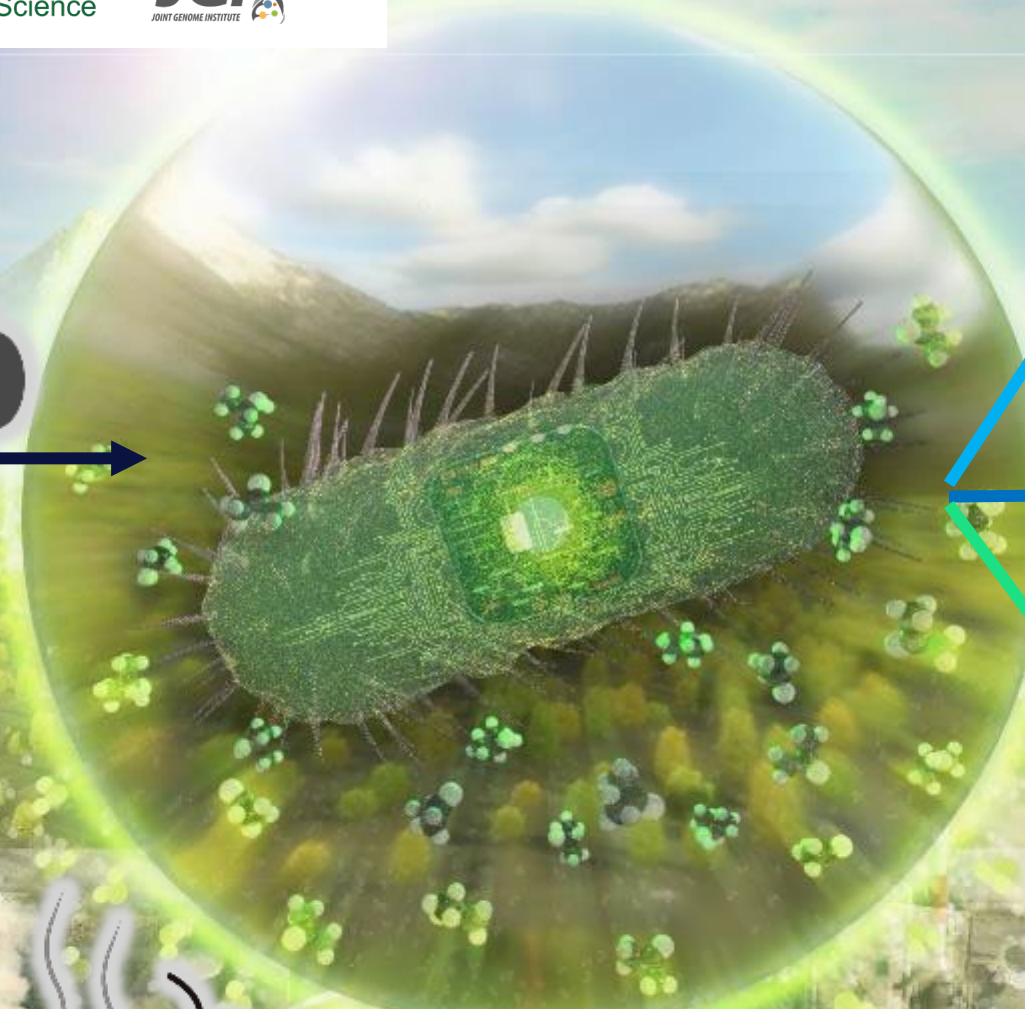
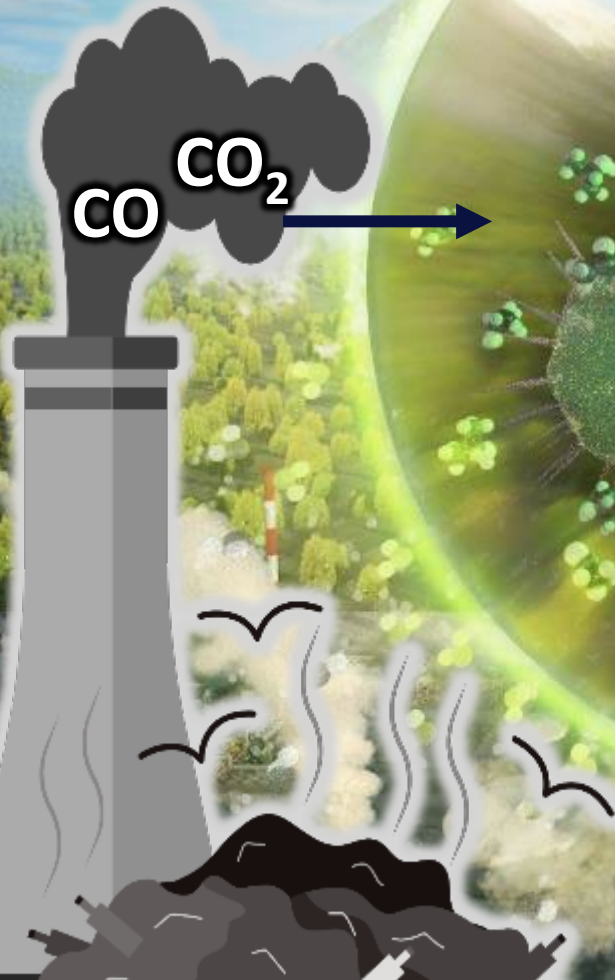


U.S. DEPARTMENT OF
ENERGY

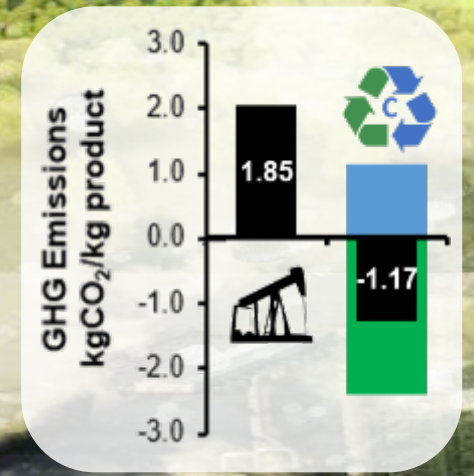
Office of
Science



NEW CARBONSMART™ CHEMICALS



■ Total Emissions ■ Process ■ Avoided Off-Gas

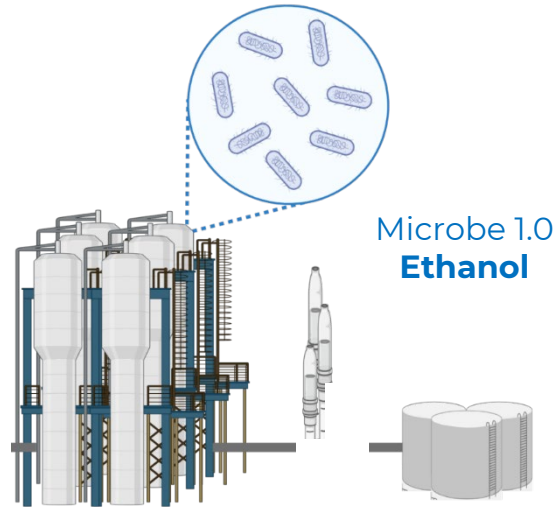


Nature Biotechnology cover story, March 2022 issue

BEYOND CARBONSMART™ ETHANOL TO DIRECT PRODUCTION OF OTHER CHEMICALS

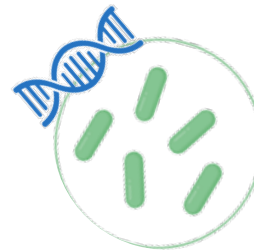
“Hardware”

Existing Commercial Plants

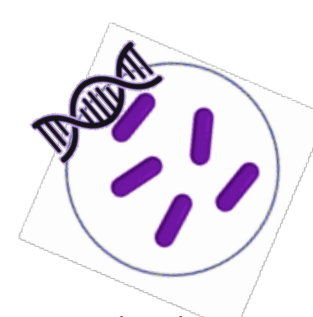


“Software”

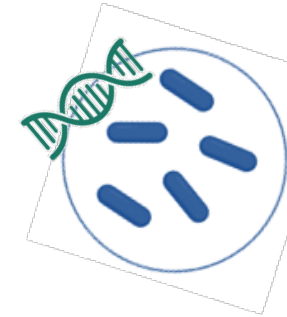
New Strains To Expand Product Portfolio & Efficiency



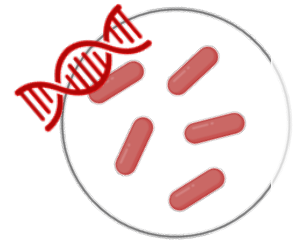
Microbe 2.0
Isopropanol



Microbe 3.0
Acetone



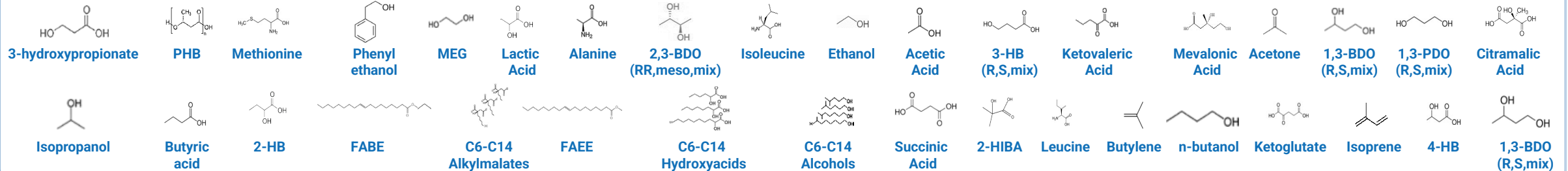
Microbe 4.0
MEG



Microbe ...

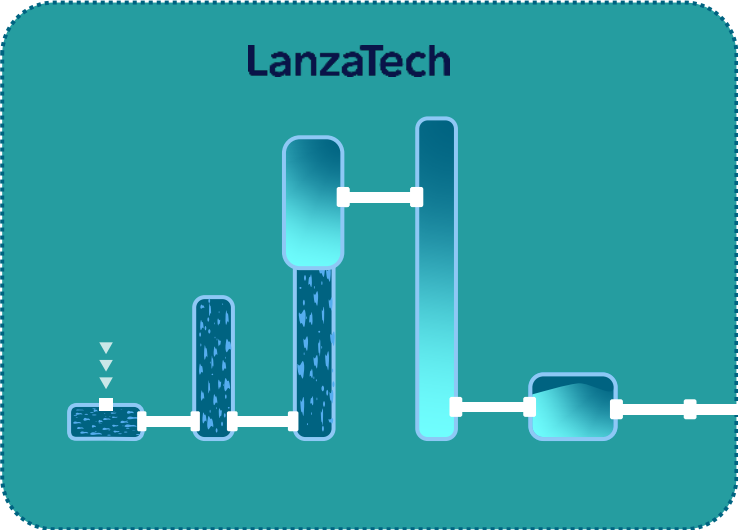
✓ **Same reactor** ✓ **Same feedstock** ✓ **Same process**

100+ Potential Chemicals Identified



IN CONCLUSION

THE NEW CARBON ECONOMY IS DISTRIBUTED AND CIRCULAR



TEXTILES



SHOE SOLES



PACKAGING



CLEANING



FRAGRANCES



AVIATION FUEL



DETERGENTS



CONTAINERS



SURFACTANTS





THE WORLD HAS
ENOUGH CARBON ABOVE
GROUND TO MAKE
EVERYTHING WE NEED

WE CREATE VALUE
WHERE OTHERS
SEE WASTE

THANK YOU FOR YOUR
ATTENTION!

LanzaTech

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