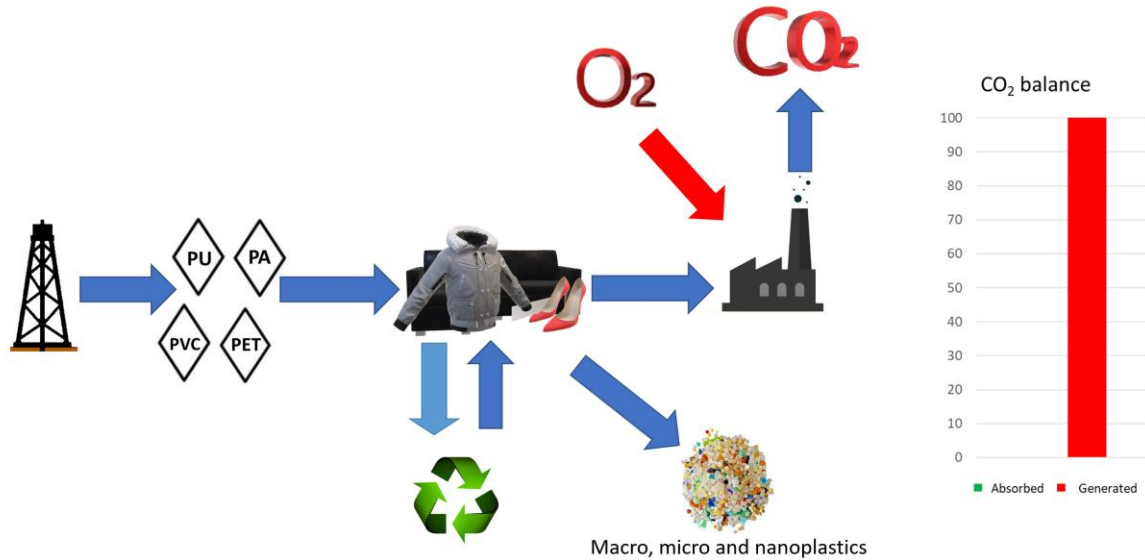


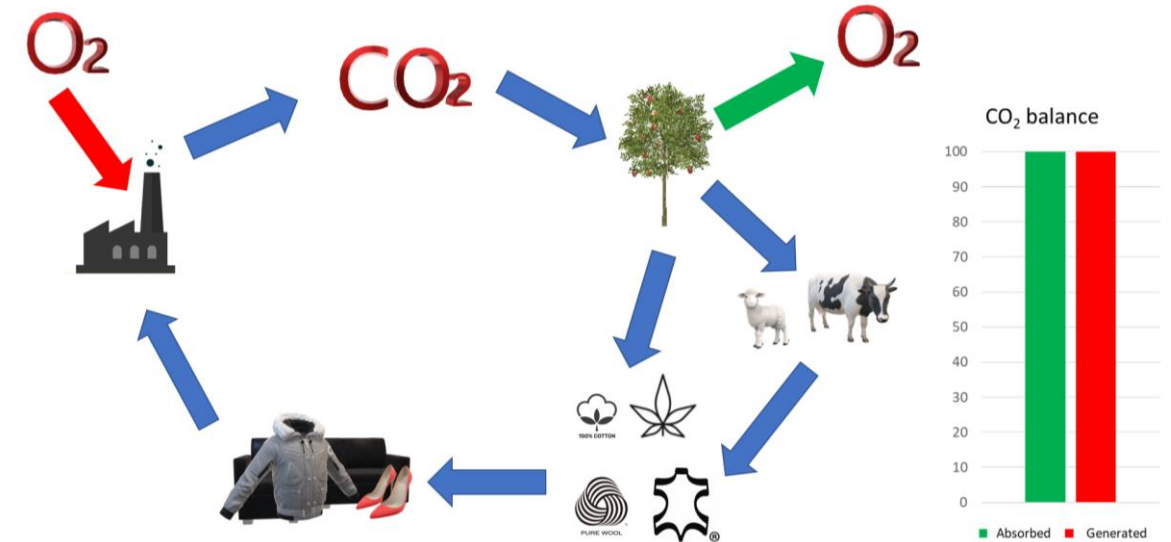
# Leather: A true Bio-based material

# Linear vs circular materials

CO<sub>2</sub> intrinsic emission of 100% synthetic materials



CO<sub>2</sub> intrinsic emission of 100% bio-based materials



Sustainable materials and goods should be:

Durable

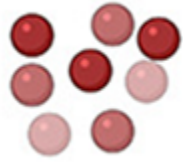
Reusable

Repairable

Renewable

Known environmental fate

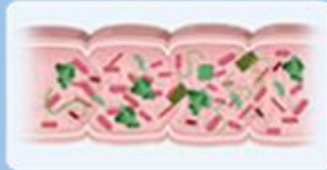
# The impact of plastics



Microplastics



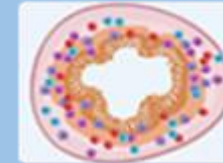
Nanoplastics



Disorders of the intestinal flora



Oxidative stress



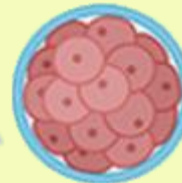
Inflammation



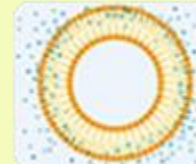
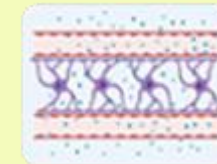
Disorders of fatty acid metabolism



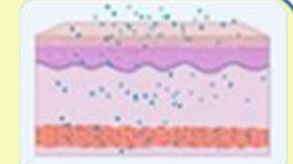
Oxidative stress



Penetrates the blood-brain barrier



Lipid barrier disorders



Penetrates the skin

# The impact of plastics

**Demolishing plastics to their minimum forms (incineration) means increasing GHG abundance**



**Global warming**

**Recycling plastics or landfill**



**Release of persistent macroplastics, micro and nanoplastics**

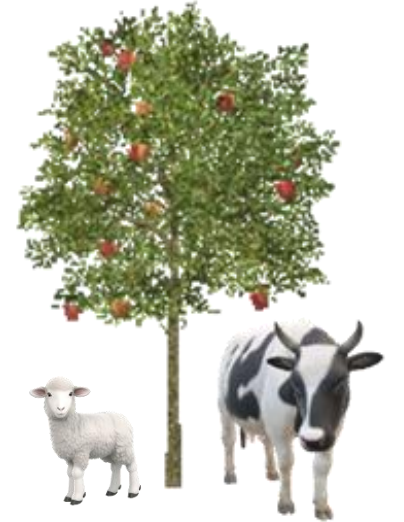


**Certain Bio-plastics may release micro and nanoplastics exactly like fossil-based plastics...**

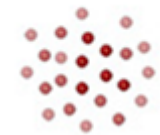
# The clue: understanding the bio-based / fossil content in materials...

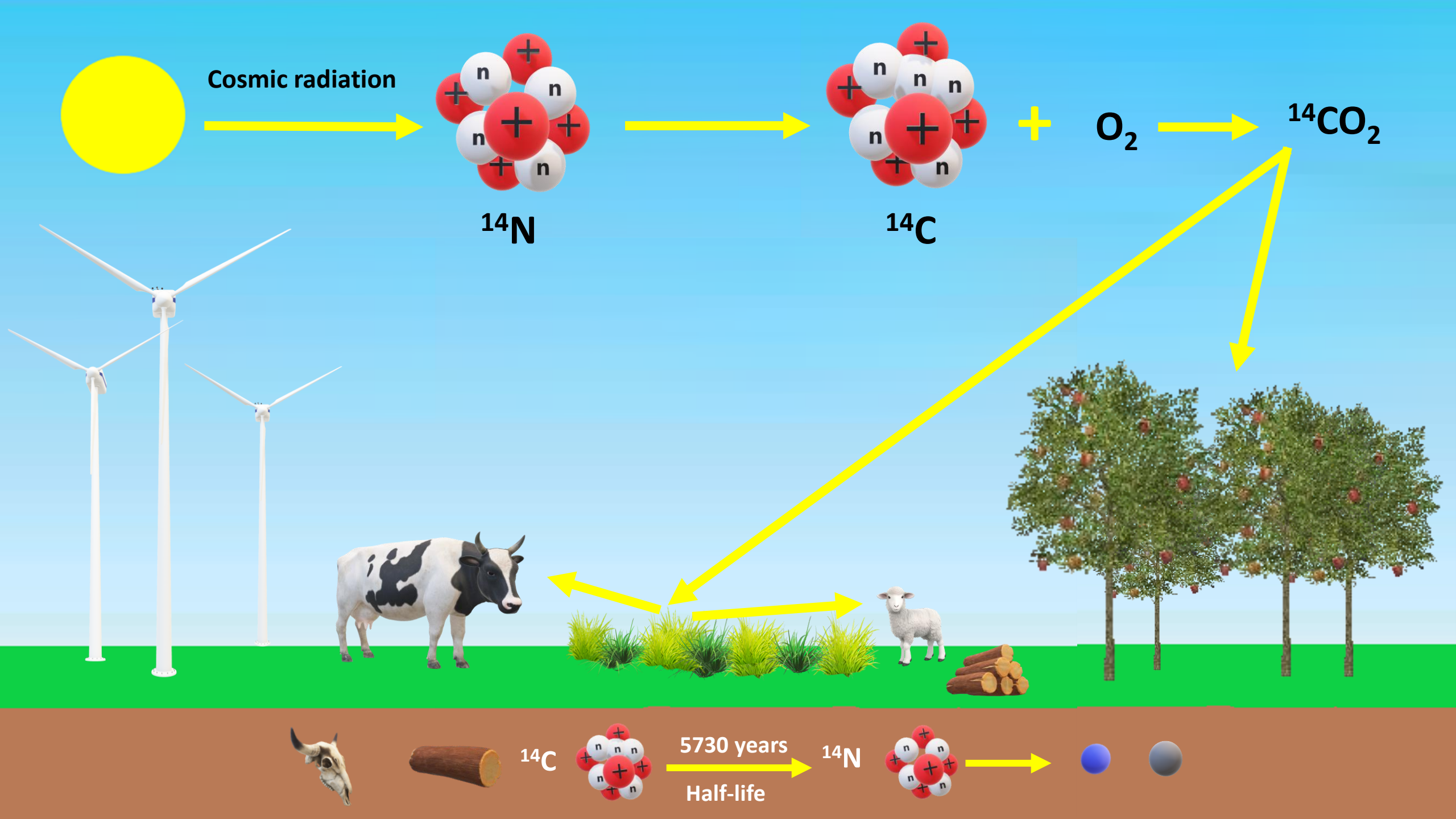


**$^{14}\text{C}$  !**



... and also, the environmental fate (micro and nano plastics).

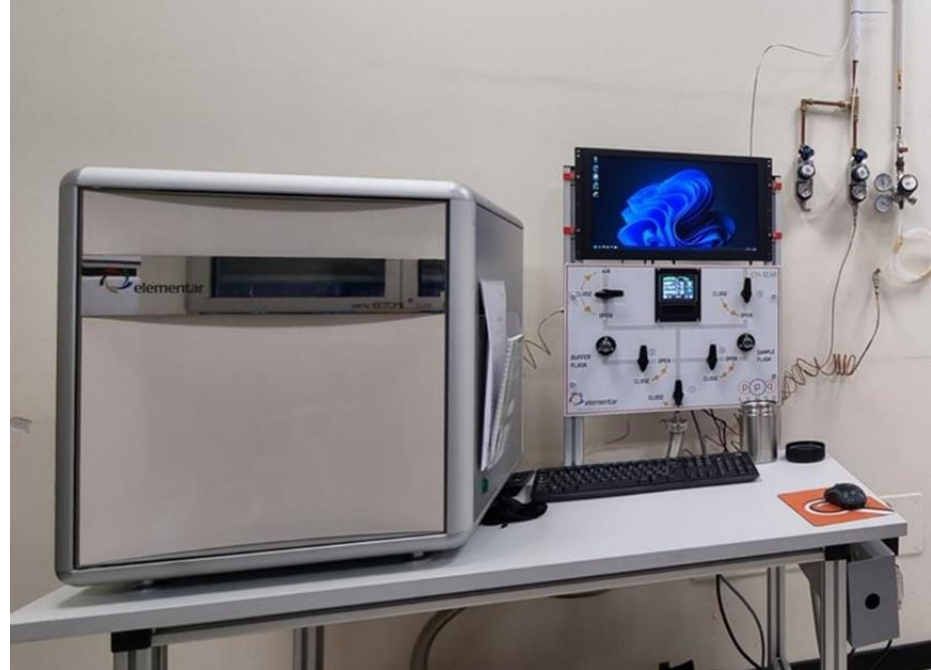
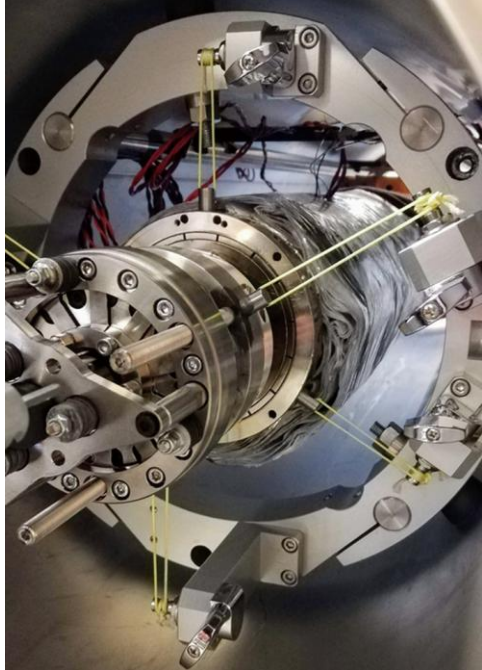
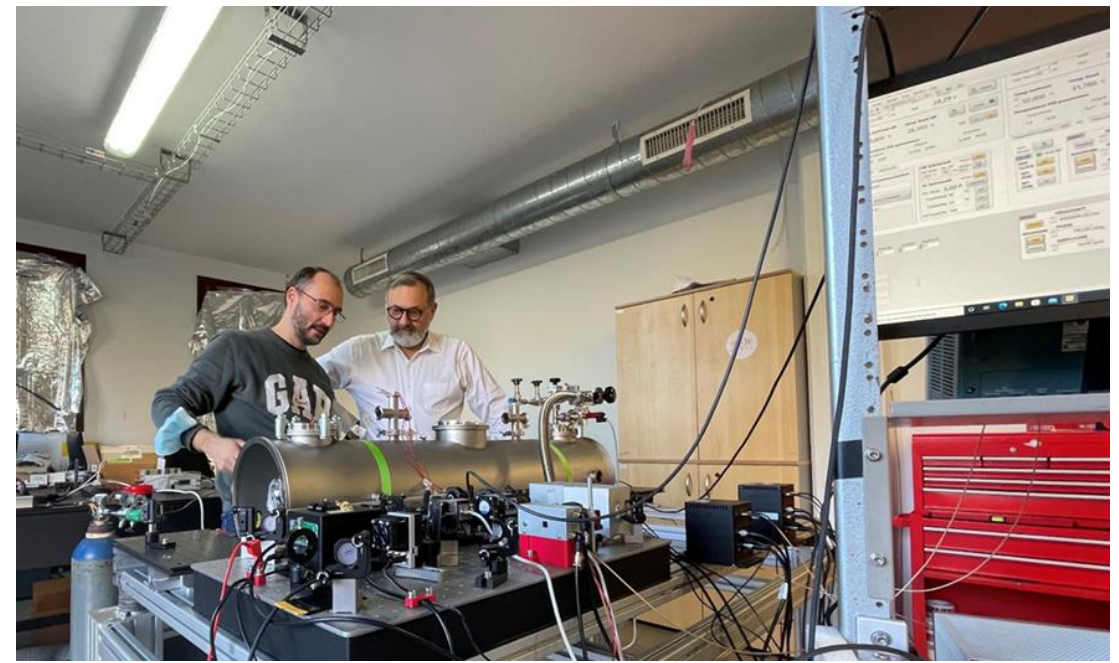




# $^{14}\text{C}$ quantification

## SCAR (Saturated-Absorption Cavity Ring-Down)

This new device developed by CNR-INO (National Institute of Optics) and LENS (European Laboratory for Non-Linear Spectroscopy) was the first of its class installed for materials analysis...



# Bio-based materials quantification standards



## CEN TC 411

EUROPEAN STANDARD **EN 16640**  
NORME EUROPÉENNE  
EUROPÄISCHE NORM February 2017

ICS 13.020.55; 71.040.40; 83.040.01 Supersedes CEN/TS 16640:2014

English Version  
**Bio-based products - Bio-based carbon content -  
Determination of the bio-based carbon content using the  
radiocarbon method**

Produits biosourcés - Teneur en carbone biosourcé -  
Détermination de la teneur en carbone biosourcé par la  
méthode au radiocarbone


Biobasierte Produkte - Gehalt an biobasiertem  
Kohlenstoff - Bestimmung des Gehalts an biobasiertem  
Kohlenstoff mittels Radiokarbonmethode

This European Standard was approved by CEN on 4 December 2016.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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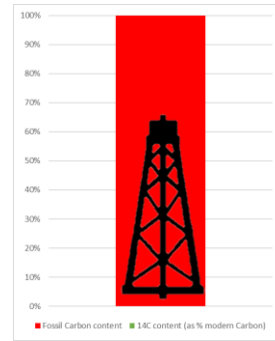
**CEN/TS 16640 – Bio-based products —  
Determination of the bio-based carbon  
content of products using the radiocarbon  
method**

**EN 16785-1, Bio-based products — Bio-based  
content — Part 1: Determination of the bio-  
based content using the radiocarbon analysis  
and elemental analysis**

# Bio-based quantification as anti-greenwashing tool



**Vegan**



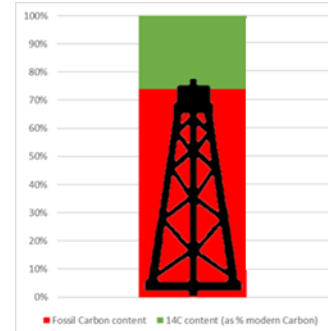
**100% Fossil carbon**

≡

**0% Bio-based**



**Appleskin**



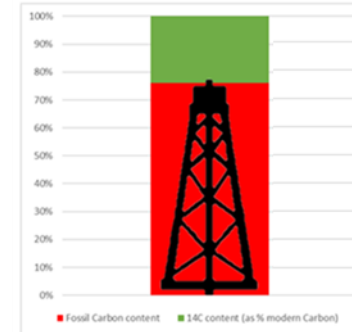
**74% Fossil carbon**

≡

**26% Bio-based**



**Cactus «Leather»**



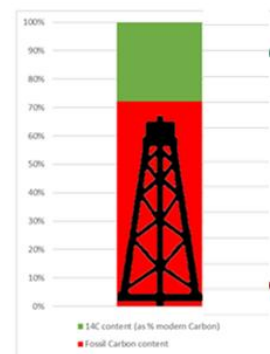
**76% Fossil carbon**

≡

**24% Bio-based**



**Plant based**



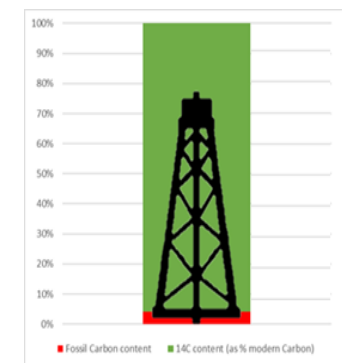
**72% Fossil carbon**

≡

**28% Bio-based**



**Vegetable tanned  
Vacchetta leather**



**4% Fossil carbon**

≡

**96% Bio-based**

**Thank you for your attention**



ars tinctoria

[gdefeo@ctcgroupe.com](mailto:gdefeo@ctcgroupe.com)