EUROPEAN FOREST- BASED SECTOR'S ROLE IN LOW CARBON ECONOMY

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FORESTS MITIGATE CLIMATE CHANGE

CO_2: Burning forests emit, growing forests capture it

130 Mha of forest land **has been lost** since 1990

Reforestation is about **ecology, climate and business**

Bioeconomy is about **new carbon materials and bioenergy**

M = million
Ha = hectares

Additional availability

~300

REFORESTATION– SIGNIFICANT CLIMATE & BUSINESS BENEFITS

10
Mha

10 Mha of reforestation would achieve a CO_2-neutral EU-28

Yearly emissions offset yearly carbon capture.

300
Mha

300 Mha would pay off **1/3** of EU CO_2 debt

CO_2 historic debt since 1850 is **656t** per EU citizen.

15,000
per EU citizen

15,000 planted trees per EU citizen would pay off our historic EU CO_2 debt

Currently there are 422 trees per world citizen.

WHAT IS WOOD MADE OF?

Plant biomass - the same basic components, in slightly varied proportions.

Cellulose	Hemicellullose
40-45 %	19-32 %
Lignin	**Extractives**
22-31 %	2-3.5 %

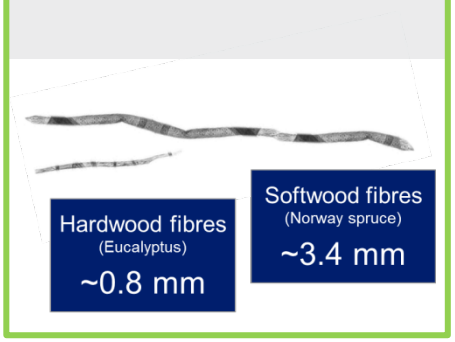
Cellulose is the most abundant organic polymer on earth; strong and crystalline.

Hemicellulose is a sugar rich polymer with a random, amorphous, weak structure.

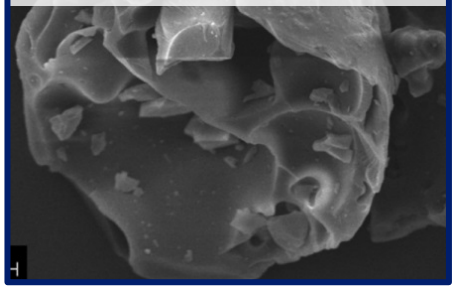
QUARTET OF PROMISES

Four components of key importance with complementary properties and roles.

Fibre

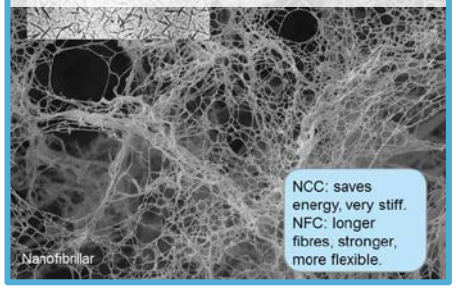


Lignin



Sugar

Nanocellulose



Wood

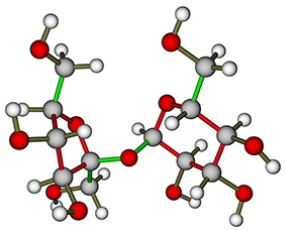
1t =
0,5t C

Carbon is the building block of biomass.

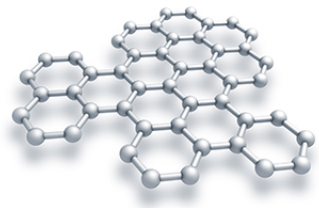
CIRCULAR BIOSOLUTIONS: SUGARS AND GRAPHENE

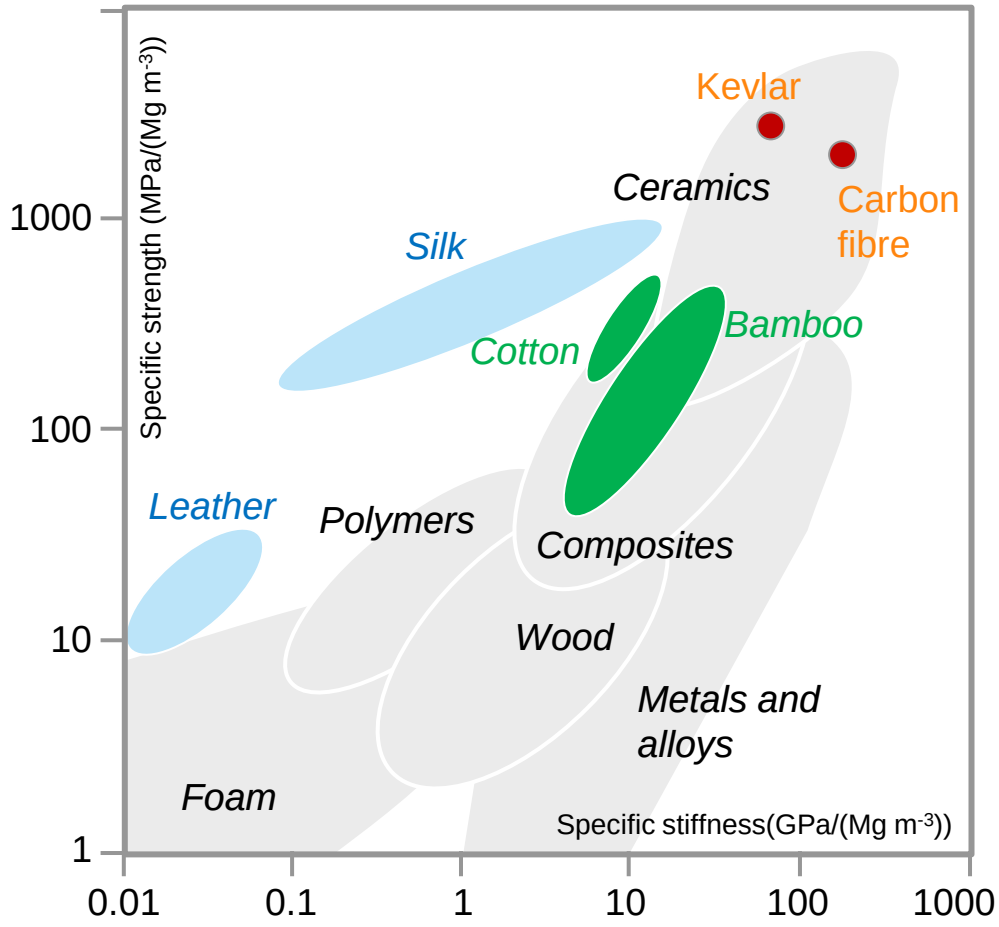
Is carbon the material of the future?

Sugar



Graphene





Graphene:

- 2D layer of carbon
- 100 x stronger than steel
- Higher conductivity than copper

Graph : Bioinspired structural materials : Ulrike G. K. Wegst1, Hao Bai2, Eduardo Saiz3, Antoni P. Tomsia2 and Robert O. Ritchie2,4* Nature Materials*

COMPOSITES: THE OPPORTUNITY EXPLOSION

Pulp

Nanocellulose

Biochemical

Lignin

Graphene

+

Plastic

Paper

Mineral

Glass

Metal

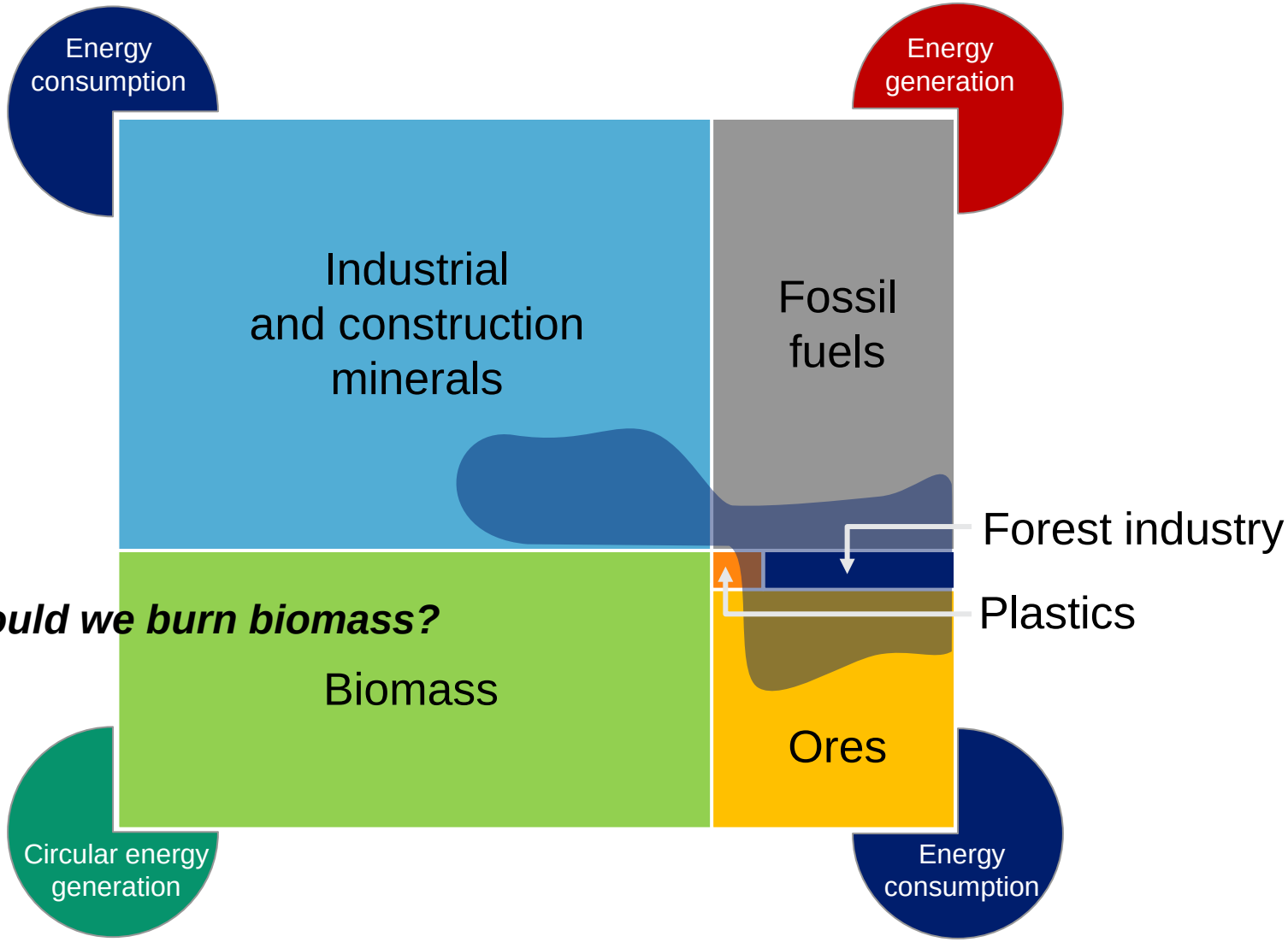
Cement

=

Nanocellulose
+ Mineral
=
New filler/coater properties

Nanocellulose
+ Cement
=
New cement properties

BUILDING BLOCKS OF HUMAN ENVIRONMENT



Should we burn biomass?

WE ARE SUFFOCATED BY PLASTICS

Microplastic fragments are ingested by plankton, penetrating the marine ecosystem and infiltrating our bodies.

GOOD GREEN BUSINESS: THE 1 % SOLUTION

1%	**BIOPLASTICS** Cleaning the environment	**3.5 bill EUR/a**
1%	**BIOPACKAGING** Better sustainable packaging	**6 bill EUR/a**
1%	**COTTON** Saving water	**~0.5 bill EUR/a**
		10 bill EUR/a **Business of ”1 % solution”**
1%	**COAL** Land impact	**28 Mha**

DO WE HAVE A BIOECONOMY VISION?

1. Are we going towards a (new) age of biomaterials?
2. Is Europe investing in bio research?
3. Should biomass be used to (re)carbonise materials rather than decarbonise energy production?
4. Are incentives adequate and neutral for a favorable business environment?

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