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CARBON FOOTPRINT

A CASE STUDY OF COMPARABLE PAPER /PLASTIC CARRIER BAGS

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WHY CALCULATE THE CARBON FOOTPRINT

- Human activities lead to emissions of green house gases
- Activities such as energy use, production, transportation, consumption of services and products
- A Carbon Footprint identifies the total emissions throughout a product's life cycle
- CEPI – Confederation of European Paper Industries – has developed a framework for paper products; 10 key elements to consider while calculating

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BIOGENIC VERSUS FOSSIL CARBON DIOXIDE

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TEN TOES OF CARBON COUNTING BY CEPI

FROM FOREST TILL THE GATE

1

Sequestration of CO_2 in forests

2

Carbon stored in products

3

Emissions from forest product manufacturing facilities

4

Emissions from producing fibre

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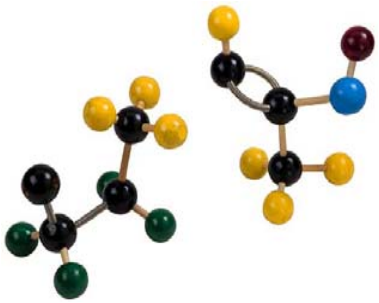
TEN TOES OF CARBON COUNTING BY CEPI

5



Emissions from raw materials/fuels such as chemicals

6

Emissions from purchased energy production

7

Emissions from transport to and from our mills

8

First toe outside our gate: Emissions from product use

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TEN TOES OF CARBON COUNTING BY CEPI

9 Emissions associated with a product's end of life according to 3 different scenarios

A. RECYCLING

B. LANDFILL

C. INCINERATION

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TEN TOES OF CARBON COUNTING BY CEPI

10 Avoided emissions and offsets

- Excess energy from production is used for district heating, replacing fuel oil
- The by-products tall oil and turpentine can replace fuel oil outside the plant
- *Material recycling*: The paper is recycled and replaces virgin material
- *Incineration* with energy recovery: Electricity and heat is produced from the incinerated paper
- *Landfill*: The collected methane gas is substitute for natural gas for heating

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CARBON FOOTPRINT STUDY

IVL SWEDISH ENVIRONMENT RESEARCH INSTITUTE

- Independent Research Consultancy
- Material neutral
- Has performed several paper and packaging studies, including CEPI Carbon Footprint Framework
- Detailed carton and paper mill studies
- Company internal studies, e.g. food companies
- Has repeatedly worked for packaging producers with LCAs on packaging since the early 1990s

IVL Svenska Miljöinstitutet

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COMPARISON: PAPER VERSUS PLASTIC BAG

EXAMPLE: KRAFT MF PAPER FROM GRUVÖN

- The carrier bag case study compares a paper bag with a plastic bag in a Carbon Footprint life cycle analysis
- Both bags converted in the Venice area (northern Italy) and consumed in Frankfurt, Germany
- Both bags have the same functional properties
- The paper is made of MF Kraft Paper from Gruvön – a typical carrier bag paper grade

	Paper bag	Plastic bag
Material	Gruvön MF	LDPE
Weight (g)	51	30

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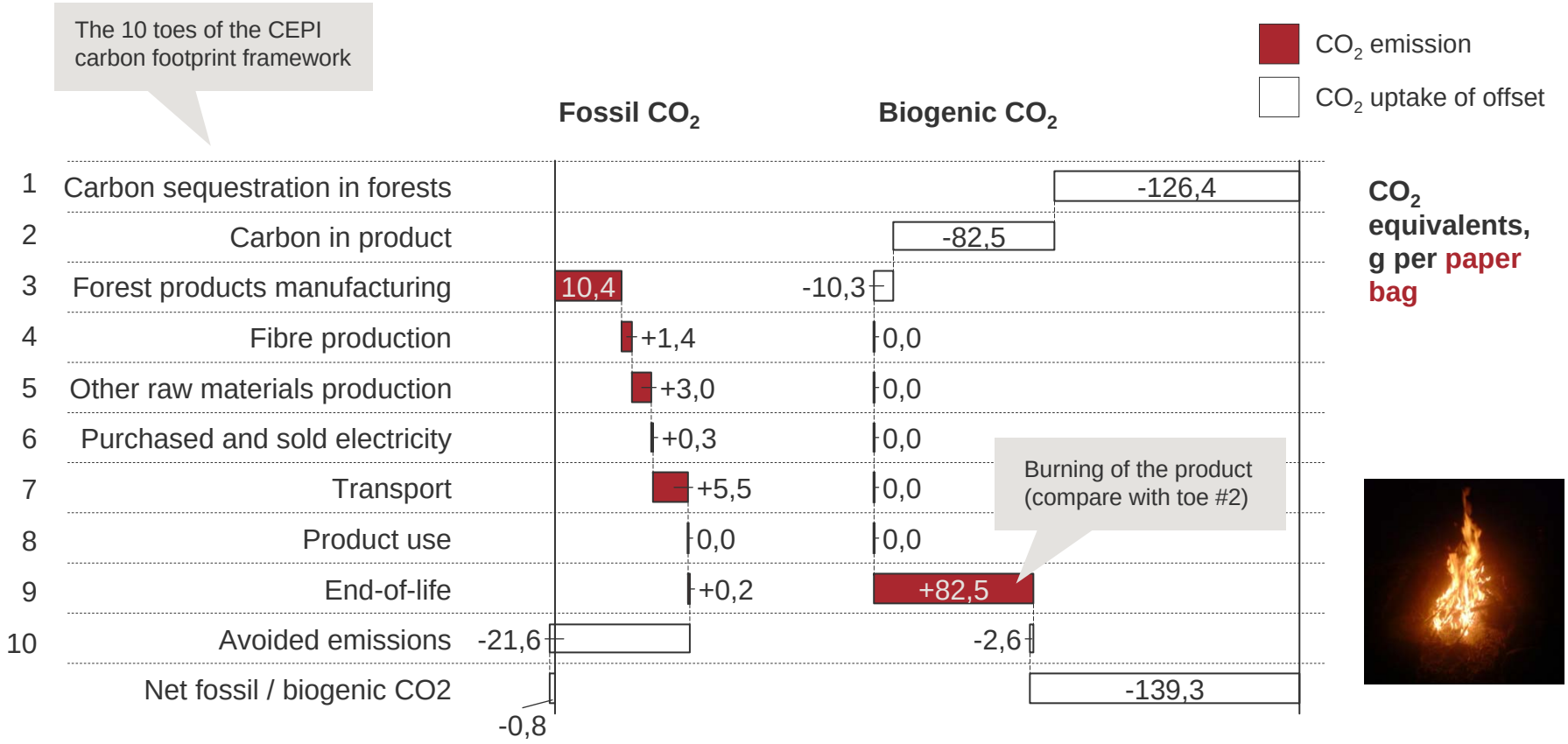
PAPER BAG RESULTS

Separating the fossil and biogenic contributions for the paper bag shows that the biogenic flows are much greater than the fossil flows – *incineration scenario*



CO_2 equivalents, g per paper bag

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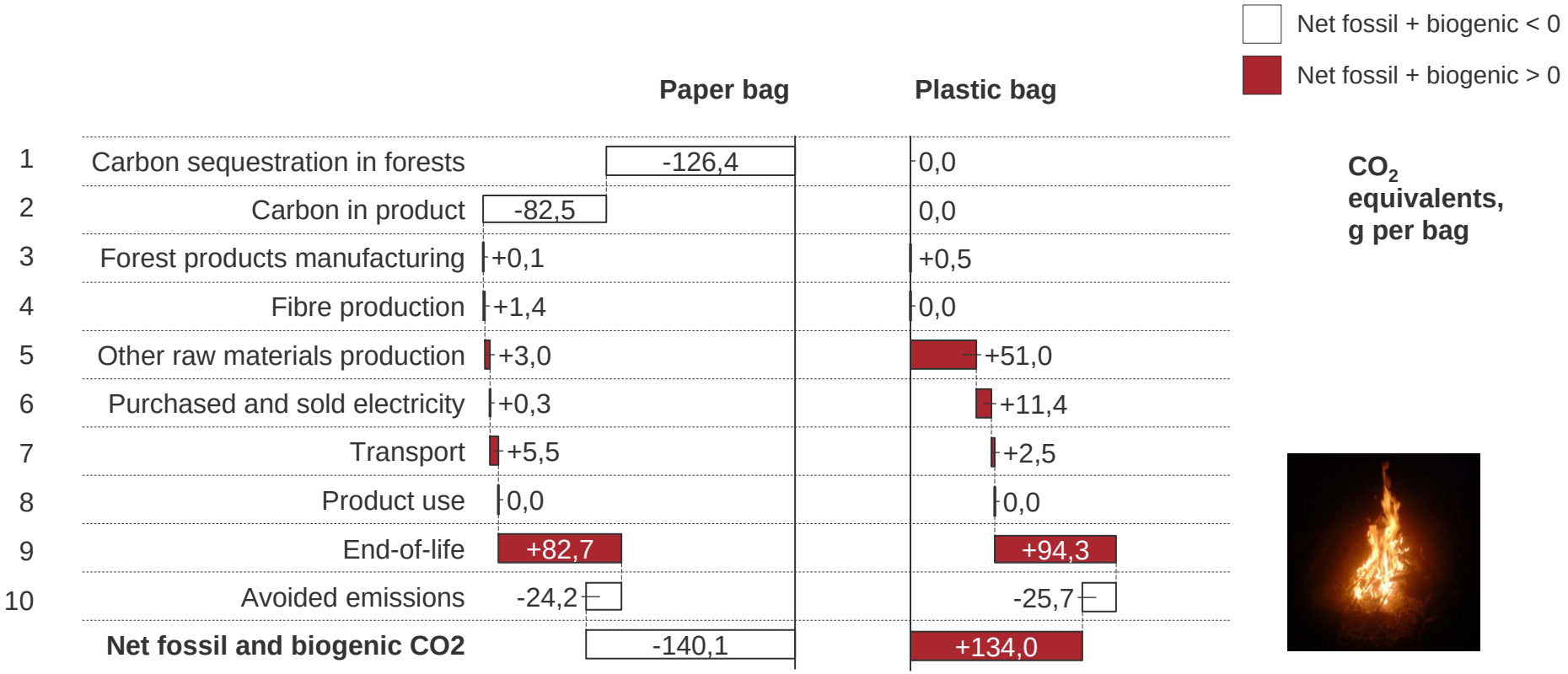
COMPARATIVE RESULTS – PAPER/PLASTIC BAG

By summing up biogenic and fossil contributions for each toe, we can see the total carbon dioxide balances for the paper and plastic bags – *incineration scenario*



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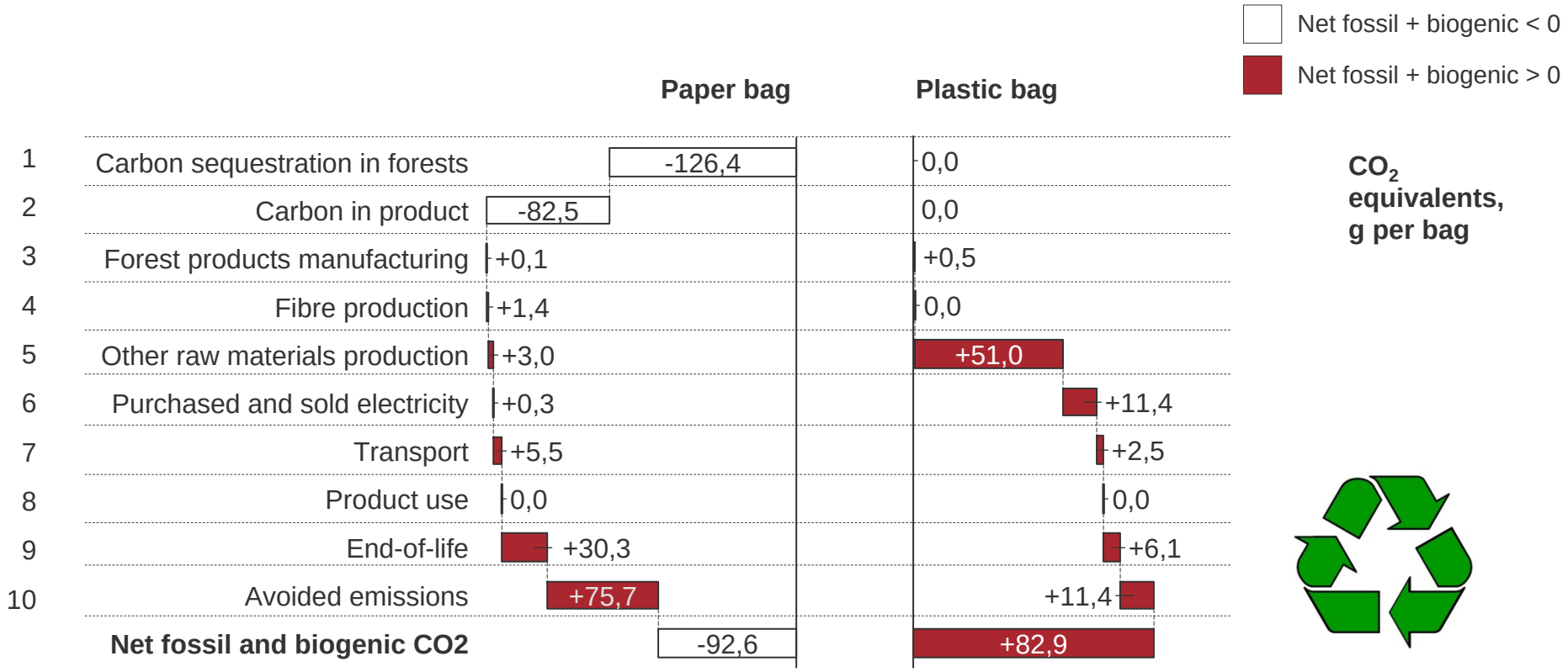
COMPARATIVE RESULTS – PAPER/PLASTIC BAG

By summing up biogenic and fossil contributions for each toe, we can see the total carbon dioxide balances for the paper and plastic bags – *recycling scenario*



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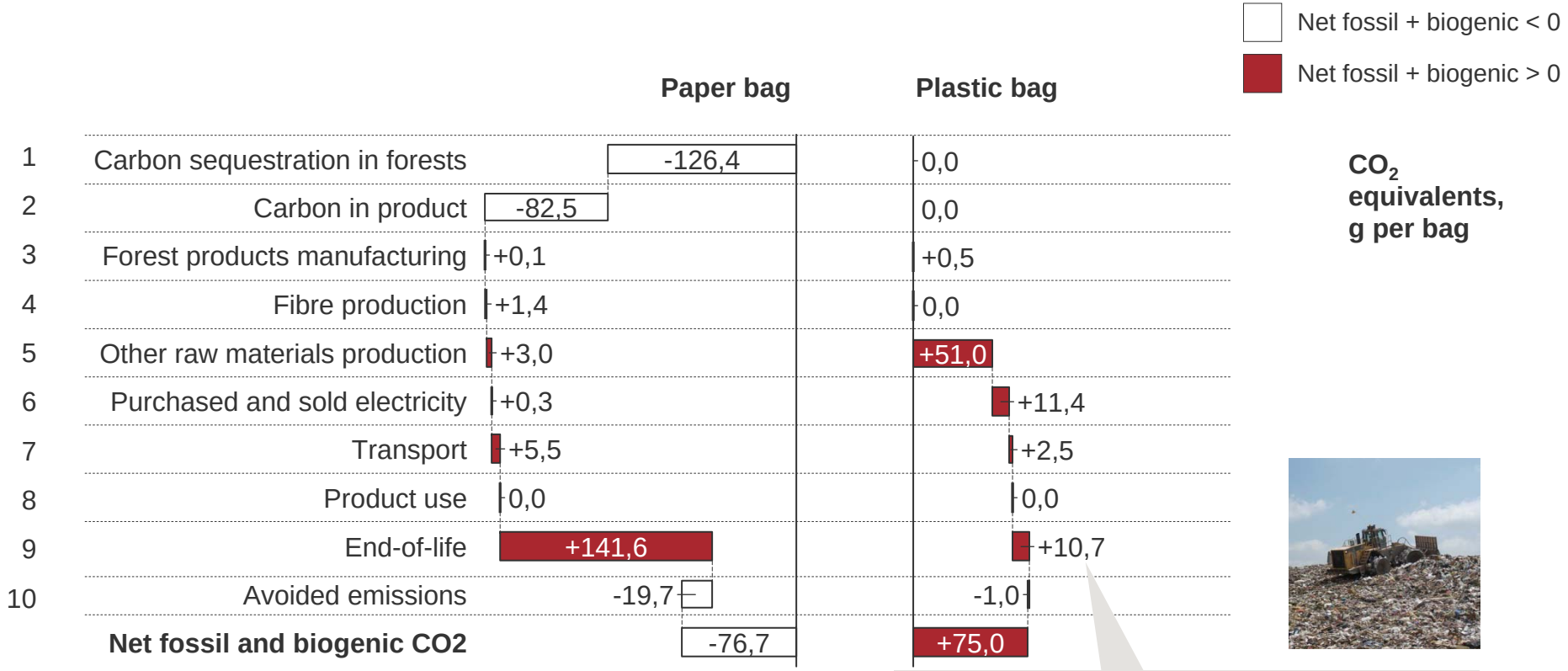
COMPARATIVE RESULTS – PAPER/PLASTIC BAG

By summing up biogenic and fossil contributions for each toe, we can see the total carbon dioxide balances for the paper and plastic bags – *landfill scenario*



Calculated with 100 years cycle – i.e. only 3 % of plastic breaks down, rest gives no emissions because it still exists. With infinite time frame bar would be much taller

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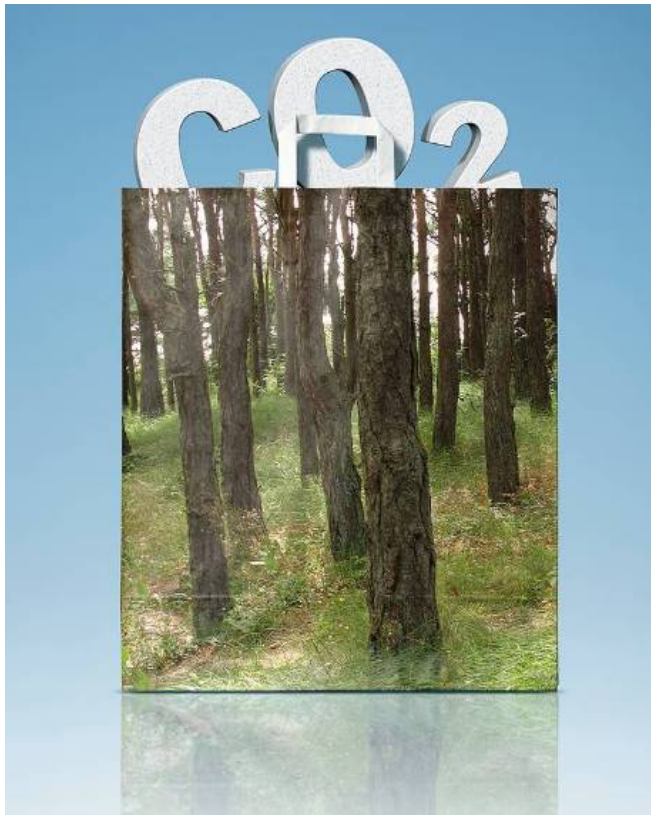
CONCLUSION OF THE CARBON FOOTPRINT STUDY

IN SUMMARY, THE PAPER BAG IS ALWAYS THE BETTER CHOICE

- Regardless of which end-of-life scenario we choose, the paper bag is a better choice
- The paper bag shows a negative carbon footprint
- Even if toe 1 is excluded (sequestration in forest) the paper bag is superior
- And we should remember the difference between fossil and biogenic CO_2…



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WHY BILLERUD IS ONE OF THE BEST

- Own bio fuel power stations cover 60% of our electricity needs. 96% of heat use is based on bio fuels
- Provide surroundings with district heating which lowers the need for and usage of oil for heating
- Well managed forests: Sequestration exceeds CO_2 emissions and harvesting by 50-300% annually

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PAPER IS SUPERIOR

THANK YOU