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Roles of wood durability and wood protection in climate change mitigation

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IPCC : Forest and Forest Products can play a role in climate change mitigation

Wood protection has a significant positive impact on the role of forest products and forest

Outline :

I - FOREST PRODUCTS ROLES FOR CLIMATE CHANGE MITIGATION

II – IMPACT OF WOOD PROTECTION ON FOREST & FOREST PRODUCTS ROLES

III – CONDITIONS FOR WOOD PROTECTION TO BE ACKNOWLEDGED AS A BENEFIT FOR CLIMATE CHANGE MITIGATION

FOREST PRODUCTS ROLES for CLIMATE CHANGE MITIGATION

1 - What is a carbon sink ?

-> a system that can uptake CO2 from the atmosphere

-> a carbon pool that is increasing, and can be further increased

- **Sustainably managed forest is considered as a carbon sink** (IPCC), national GHG emissions inventory systems acknowledge this

Global level, forest carbon uptake compensate 8 to 20 % of fossil fuel emissions in industrialised countries

2. Are wood products a carbon sink ?

- no physical process for uptaking CO2 from the atmosphere

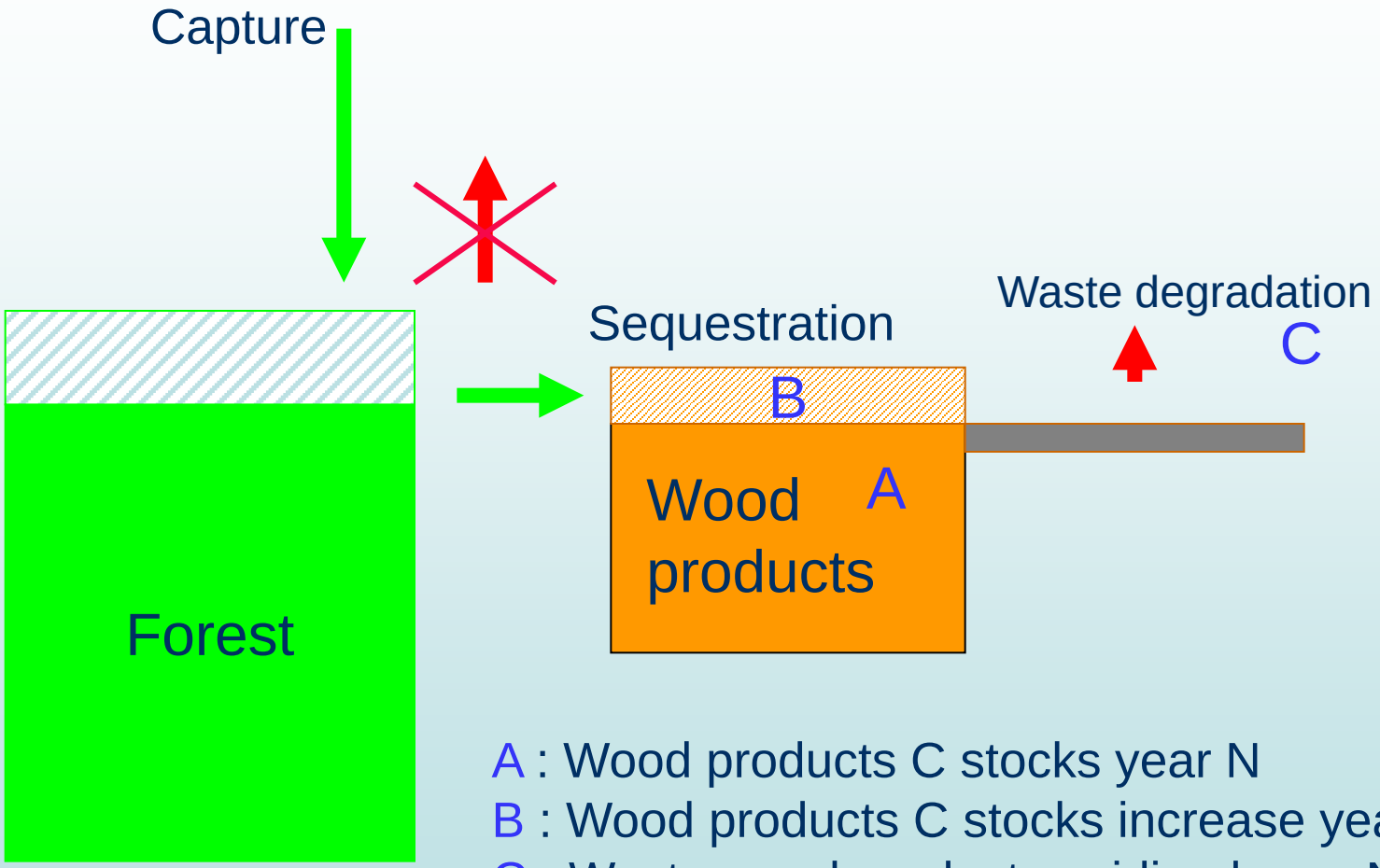
- UNFCCC technical Paper 2003/7 :

*"…Wood products themselves are not sinks of carbon but rather reservoirs (or pools) to which the carbon resulting from photosynthesis is transferred. However decaying products are a source of greenhouse gas emissions …. **A distinction must be made between an increasing stock of carbon resulting from the accumulation of wood products and emissions resulting from decay of the products**."*

- Wood products represent C pools from harvesting to end of life,
- if this pool is growing, (amount of wood products incoming exceeding amount burnt or degraded),

  -> then wood products are a carbon sink

2. Are wood products a carbon sink ? (cont.)



A : Wood products C stocks year N
B : Wood products C stocks increase year N+1
C : Waste wood products oxidized year N+1
If Stock N+1 (A+B-C) > Stock N (A),
Then « C sink »

2. Are wood products a carbon sink ? (cont.)

Literature data on C sequestration in wood and paper products

- **France** (Paquet 2003, Vial 2008) :
  -> 1990 - 2010 : + **33% in 20 years** (28.6 MtC) :
  possible impact of public policies : **+5%**
  -> 2005 : + **1,3 Mt C** (**4.6 MtCO2)**

- **World wide** total uptake of carbon (1990's) (Goodhale 2002) :
  - 80 Mt C/yr in forest products
  - 210 Mt C/yr in living biomass, 150 Mt C/yr in dead wood and 130 Gt C/yr in the forest floor and soil organic matter

- **UNFCCC 2003** "Estimation, reporting and accounting of harvested wood products",
  - Estimated changes in C stocks resulting from global wood products in use :*" …. Data based on FAO suggest **an increase of 40 Mt C/y** and a 2000 global stock of 3000 Mt C."*
  - *Statistics compiled by FAO since 1960 show that **the production of wood products has shown an increasing trend since then. …."***

2. Are wood products a carbon sink ? (cont.)

Conclusion:

wood products act as carbon sinks

! Kyoto protocol : wood products not integrated in the quantification of carbon sinks (as a possibility to fulfil the states commitments), mainly because of a lack of agreement on measurement and accounting methods

-> the accounting process considers that the harvested wood is oxidized to CO2 directly after harvest.

But, there is a general recognition of this carbon sink role through the work of the UNFCCC and some countries climate change mitigation policies.

IPCC 2006 : "Description of alternative methods to estimate and report C stock changes associated with harvested wood products;

2. Are wood products a carbon sink ? (cont.)

Comments :

A) Amounts of carbon fluxes for products ~ one order of magnitude less than for forest on a world scale;

- C storage in wood products is not be considered as a large scale answer to the climate change issue.
- **but** efforts on the development of wood products on the market may have an impact on the development of the forest C pool

B) Management factors enhancing this carbon sink function:

- increasing recycling *and land-filling* in controlled conditions
- developing the use of wood on the market
- ***increasing the lifespan of wood products***

3 -The substitution effect of wood products

- Bibliographic and calculations study (Deroubaix & al, 2003) :

  Comparative studies : buildings and construction products with different materials in Germany, Australia, Sweden, Norway, Canada ; Comparative calculations : window frames, warehouse frames.

- Energy used in construction, is lower for wood-based products than for other building materials". (materials, components and buildings)

- In many cases : *main energy source used for manufacturing of sawnwood products is renewable bio-energy".* (supported by different studies covering namely German, Norway and Finish cases). *There is more renewable energy use into the wood industry, than in competing materials sectors.*

- **<u>lower energy consumption + higher share of non fossil energy</u>** :

  -> ***CO2 emissions for production, transportation, construction, lower for wood than for substitutes (steel, concrete, aluminium and PVC*)**

3 -The substitution effect of wood products (cont.)

Conclusion :

wood products have “low carbon intensity”, when compared to competing materials;

-> the substitution of competing materials by wood is therefore a way to reduce CO2 emissions

- Notes : Wood products :

  - Importance of waste management at the end of life on the whole life energy balance of the products

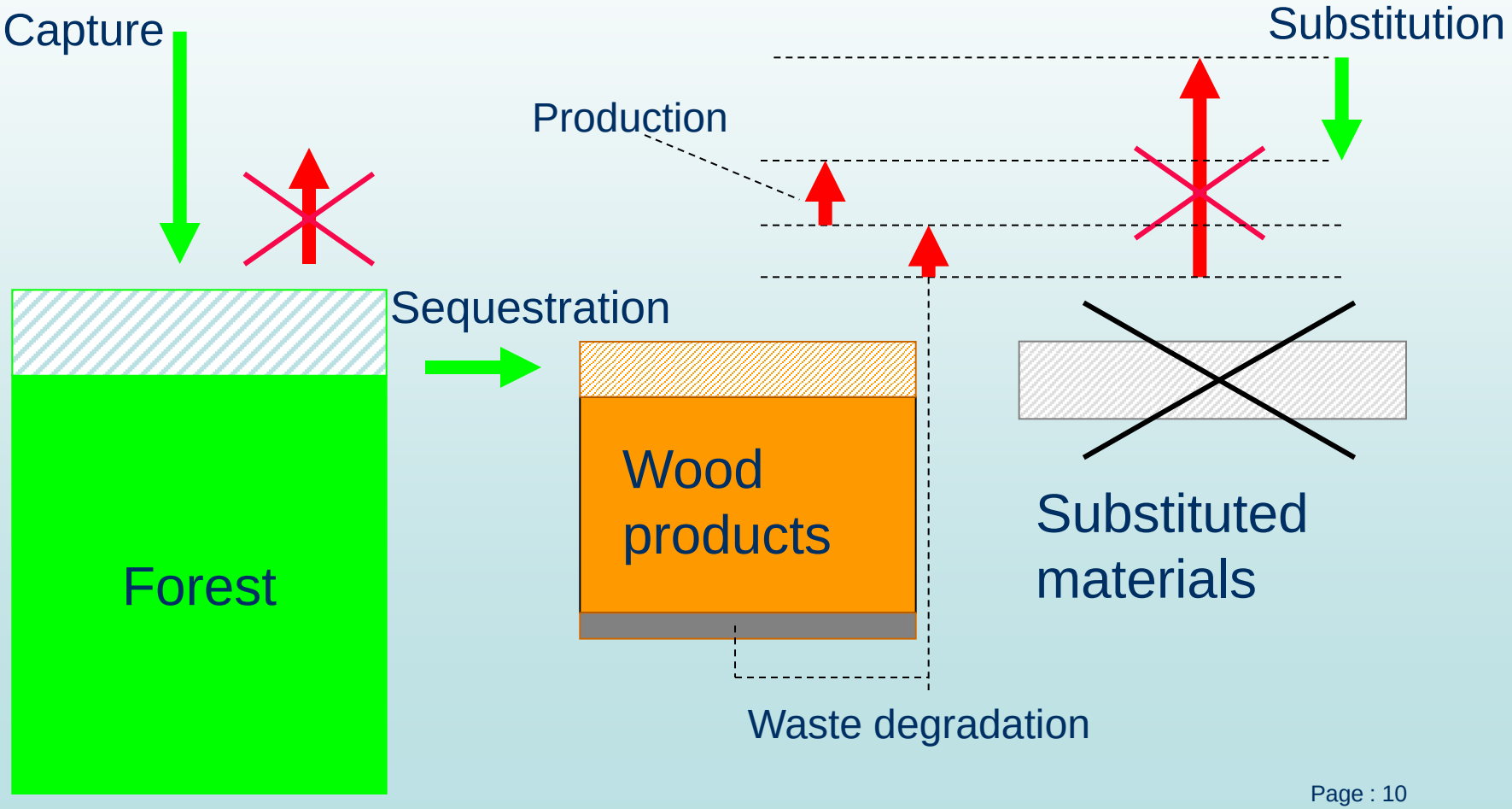
  - manufacturing = important part of the energy cost of the products

  - Important transportation distances may result in significantly higher GWP

- Note : competing materials are doing their best to reduce their C footprint (ex: use of renewable energy in manufacturing process)

Summary of forest & wood products « climate benefits »

What happens yearly with a sustainably managed forest and an increasing wood products market



II - IMPACT OF WOOD PROTECTION ON FOREST & FOREST PRODUCTS ROLES

1 - Developing the carbon sinks

1.1 – Helping the forest carbon sink

Forests = carbon sinks <u>if managed in a sustainable way</u>

Literature :

- all changes from forest to other land uses are detrimental to the C balance of the land.
- best C strategy : maximum C storage in forest ecosystems

+ sustainable supply of wood sector with wood products

1 - Developing the carbon sinks (cont.)

1.1 – Helping the forest carbon sink (cont.)

- **How is wood protection useful in that context** :

  - by allowing the use of large sets of non naturally durable species, and timbers coming from sustainably managed forests,

  - by **giving the possibility to use species growing faster than most durable species** : helps managing forest resource, at a time when the pressure on the wood resource is growing.

  -> strong policy in EU for the development of bio-energy, the competition between material and energy uses is tangible.

  - by **increasing the service life** of wood products, wood protection is also **saving forest resource consumption**.

1 - Developing the carbon sinks *(cont.)*

1.2 Helping the wood products carbon sink

- **Increasing the lifespan of wood products is one way of enhancing the wood products carbon sink.**

- ex : construction products carbon stock :

Construction sector “in service products” yearly variation

= + amount of incoming new products

- amount of wood disposed off

Increasing the life span of products will therefore reduce the amount of wood disposed off and increase the stock growth.

(Vial & al., 2008) Carbon stocks in wood products: sensitivity analysis: changing the assumption on mean service life of structural timber in France from 40 to 75 years results in a change of the 2005 “CO2 stock increase” from 2.1 to 2.6 Mt.

2 - Keeping the low carbon intensity of wood products

- Most competing materials have longer service life than most non durable wood species.
- Service life impacts on C intensity of the product :Ex :
  - wood cladding non-durable specie: service life 15 years
  - plastic cladding : service life 30 years

  => GWP of wood cladding doubled before comparing to the GWP of plastic façade (comparison for the same service life)
- If wood protection allows the wood cladding to last 30 years, without adding a significant use of energy or GHG emissions, then it divides by two the carbon intensity of the product in its function.

+ if wood protection allows the wood product to need less maintenance during the service life, it saves the CO2 emissions generated by these maintenance operations.

2 - Keeping the low carbon intensity of wood products (cont.)

- Wood preservation also allows the use of local species:
  -> limits the long distances transportations of timber.
  which are sometimes the highest CO2 emissions step of the wood products life cycle

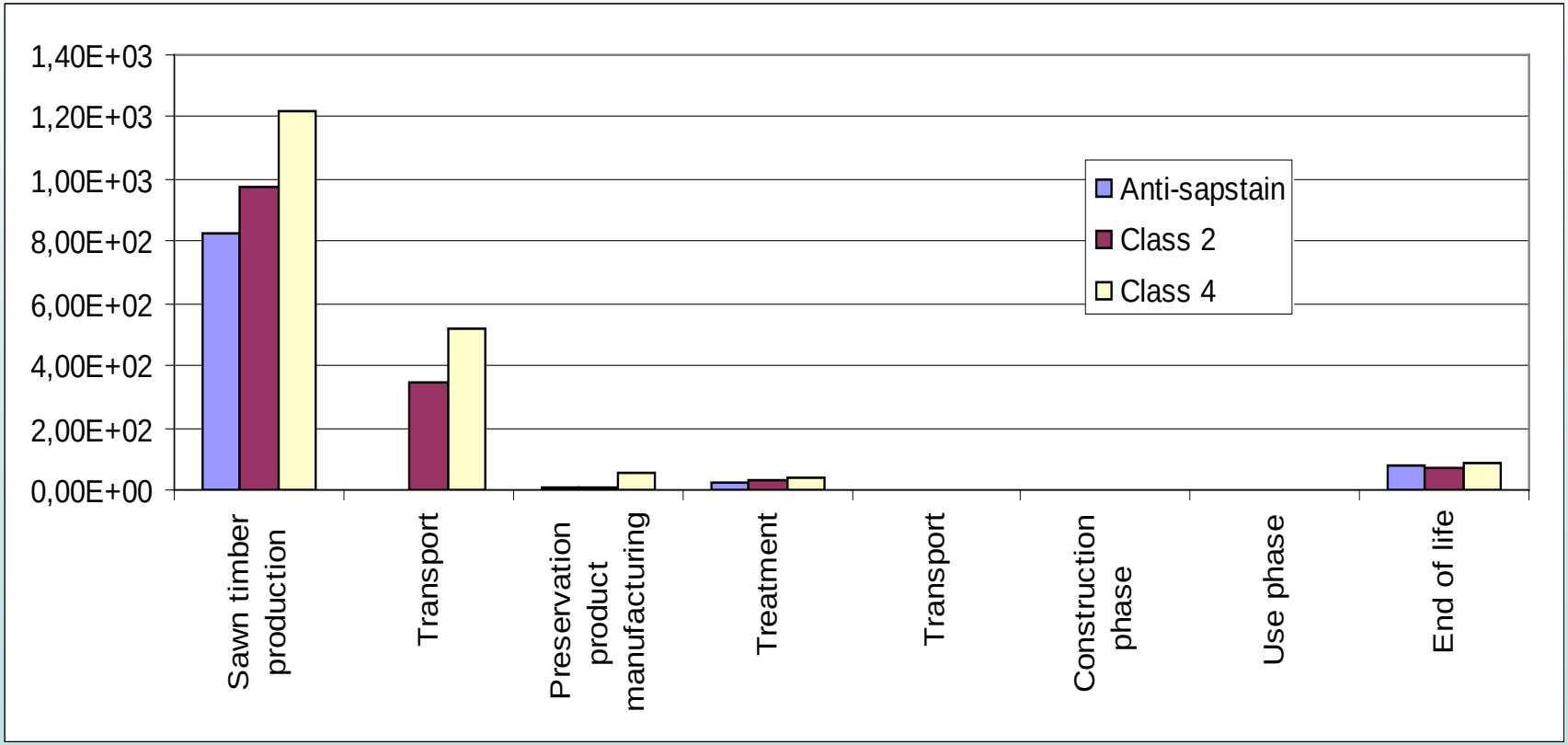
  (Bucket 2004) : LCA of French glulam beam made of imported wood : truck transportation is 38% of the GWP of the total life cycle

- Wood preservation is not a C02 emissions costly process :
  Energy for treatment and preservative manufacturing is very limited (less than 5% of total energy consumption).

Wood protection keeps and sometimes enhances the "low carbon intensity advantage" of wood products.

Wood preservation is not a C costly process :
LCA of preservative treated timber in France (Vial 2009)

Non renewable energy per m3 of treated wood



III – CONDITIONS FOR WOOD PROTECTION TO BE ACKNOWLEDGED AS A BENEFIT FOR CLIMATE CHANGE MITIGATION

- The “cascading strategy” must be applicable to treated wood too

  - Possibility to recycle is important in establishing the longer carbon storage as possible.

  - When recycling becomes technically impossible, recovering energy from biomass will be requested.

⇒ wood protection must integrate these issues in order not to be a barrier to recycling nor to energy recovery.

Tracks :

⇒ - choice of substances for chemical treatment

⇒ - development of processes for recycling or energy recovery

III - Conditions for wood protection to be acknowledged … (Cont.)

- Proactive communication on the benefits of preserved timber for climate change mitigation -> **need to document the GWP profile of the products.**

  -> establishing databases on the “carbon footprint” of treatments, products and processes,

  -> one needed data is “service life duration” : a challenge for the wood protection experts (Studies and European standardization work in progress : CEN TC38)

  -> being able to forward the information to the timber product manufacturer.

- FCBA (to be issued Sept. 2010) : Environmental Product Declarations (EPD) for treated timber produced in France, based on LCA, with GWP data for antisapstain, UC2 and UC4 treated timber.

III - Conditions for wood protection to be acknowledged … (Cont.)

- Global warming is not the sole question of sustainability that our world is facing and that the consumer wants information on.
- There is a trend for regulatory or strong market requirement for EPDs in different countries,

Ex : France : experimental study on the opportunity to establish compulsory information of consumers on carbon footprint of products and services (and other relevant impacts) for government decision in 2012.

- Precise information on health and safety aspects will certainly be needed,
- Maybe, in a sustainable development perspective, social /societal aspects of wood protection will also have to be documented

Conclusion

- **Wood protection has positive aspects for climate change mitigation**:

  - lowering the pressure on naturally durable species, making the best use of forest resources, favouring sustainable forestry, in line with carbon sequestration strategies in forests

  - helping to develop the wood products carbon sink, by extending their service life and reducing their carbon intensity and avoiding long distance transportation by the use of local non durable species.

- All these positive aspects of wood protection are certainly true in many situations,
- but there is **limited detailed scientific work to exemplify and prove it**,
- **Need to get figures to back these assertions**,

  => Comparative LCAs of treated wood and alternative options.

  => first steps : carbon footprints of treated wood.