

# Understanding the carbon footprint of wood and paper products

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# NCASI

- North American non-profit environmental research institute
  - Funded primarily by the forest products industry
- Carbon and greenhouse gas activities with...
  - IPCC (Intergovernmental Panel on Climate Change)
  - International Finance Corporation of the World Bank Group
  - World Resources Institute
  - US Forest Service
  - World Business Council for Sustainable Development
  - United Nations Food and Agriculture Organization
  - Etc.

# The greenhouse gas and carbon profile of the US forest products sector

- A collaborative effort between NCASI and the U.S. Forest Service

**ncasi**

NATIONAL COUNCIL FOR AIR AND STREAM IMPROVEMENT

THE GREENHOUSE GAS AND  
CARBON PROFILE OF THE  
U.S. FOREST PRODUCTS SECTOR

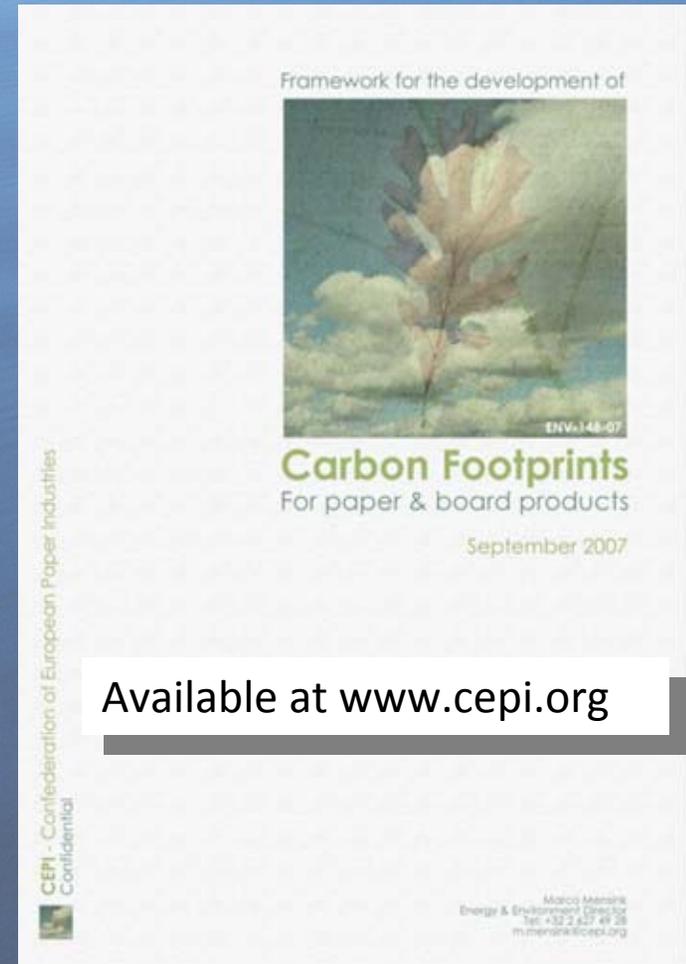
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# A Footprint Framework for Forest Products

## The Ten CEPI Footprint Elements

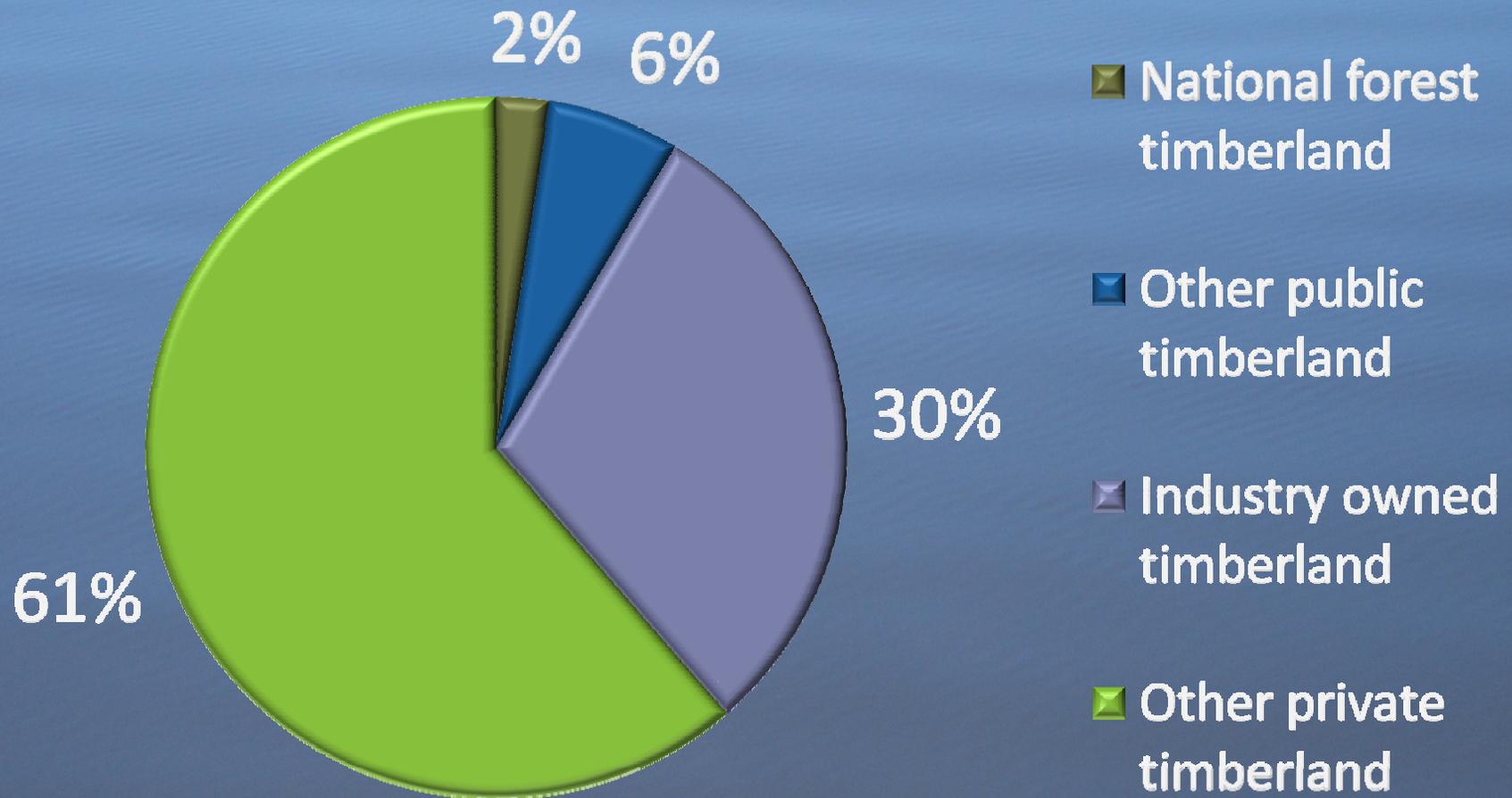
1. Carbon in forests
2. Carbon stored in products
3. Emissions from manufacturing
4. Emissions associated with producing fiber
5. Emissions associated with producing other raw materials/fuels
6. Emissions associated with purchased electricity
7. Transport-related emissions
8. Emissions associated with product use
9. Emissions related to product end-of-life
10. Avoided emissions and offsets



Available at [www.cepi.org](http://www.cepi.org)

# Element 1: Carbon in forests

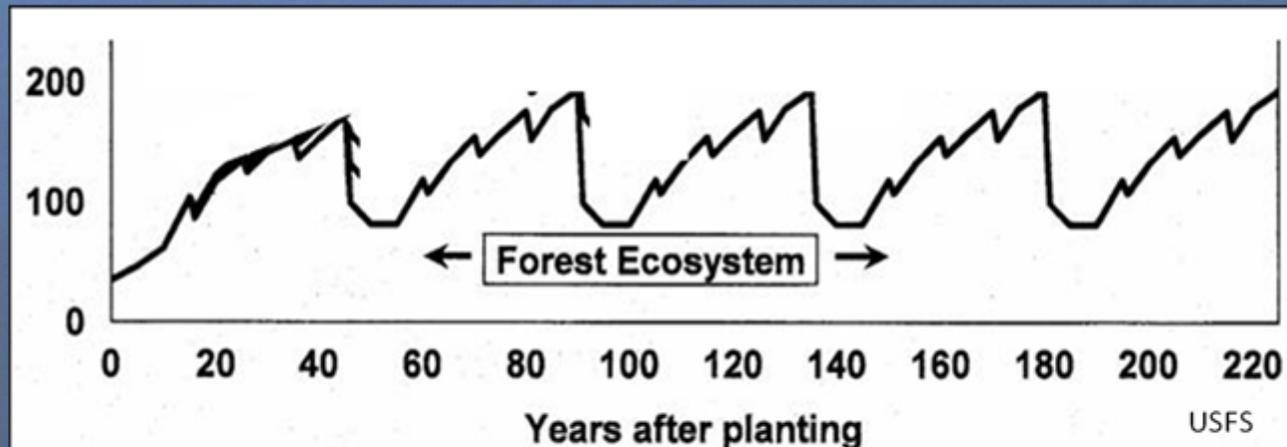
## Sources of wood for the US industry



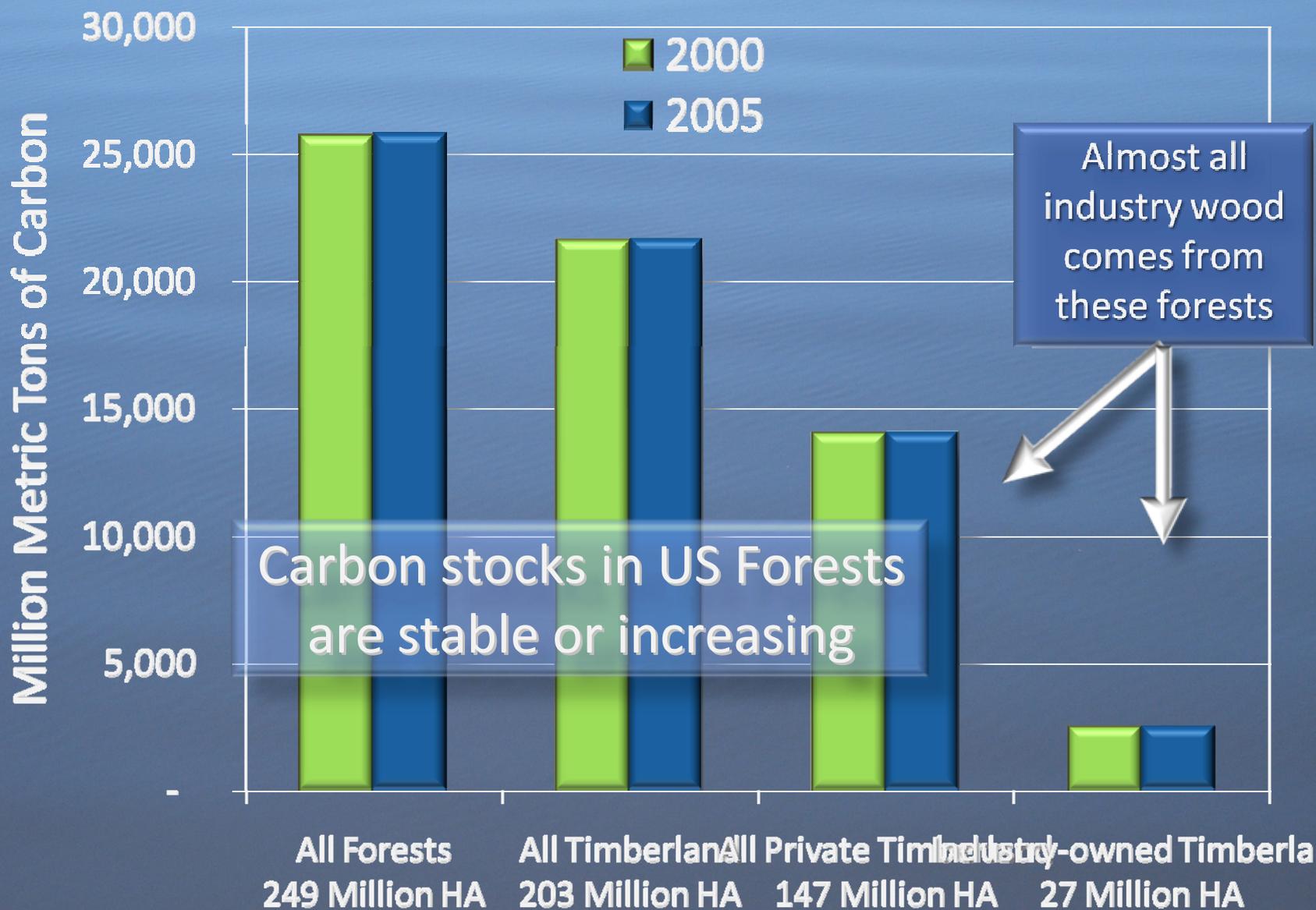
Source: 2005 RPA, Table 13

# Carbon in sustainably managed forests

- Carbon stocks in managed forests go up and down in response to harvesting and regrowth, but over long time periods and areas, carbon stocks are relatively stable



# What is happening to forest carbon?



Does not include soil carbon

# Element 1: Carbon in the forest

- Sustainable forest management practices are consistent with stable forest carbon stocks
- There is no evidence that the harvest of wood for the forest products industry is causing forest carbon stocks to decline. Indeed , these stocks are stable or increasing
- This means that uptake of carbon from the atmosphere is matched by losses of carbon from the forest, with a net impact at the national level of zero.

## Element 2: Carbon in products

- Much of the carbon removed from the forest returns to the atmosphere quickly
  - E.g. material burned for energy
- Some is stored in products for periods ranging from years to centuries

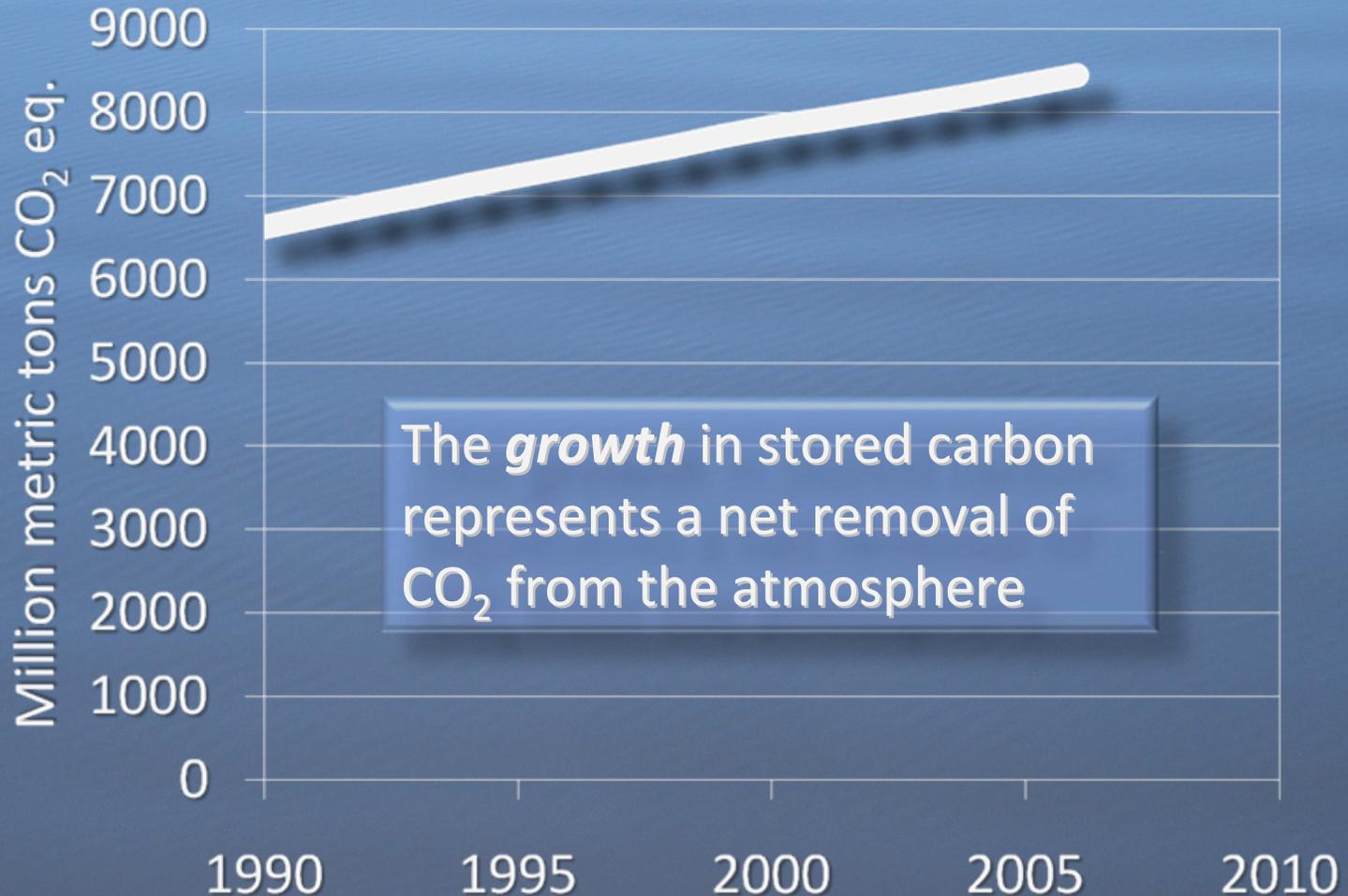


# The role of carbon in products

- The amounts of carbon going into new products is more than is coming out of old products and returning to the atmosphere
  - Because some products remain in use for long times, and
  - Because some products end up in landfills where some of the carbon remains stored for long times
- The growth in stored carbon represents a net removal of carbon from the atmosphere

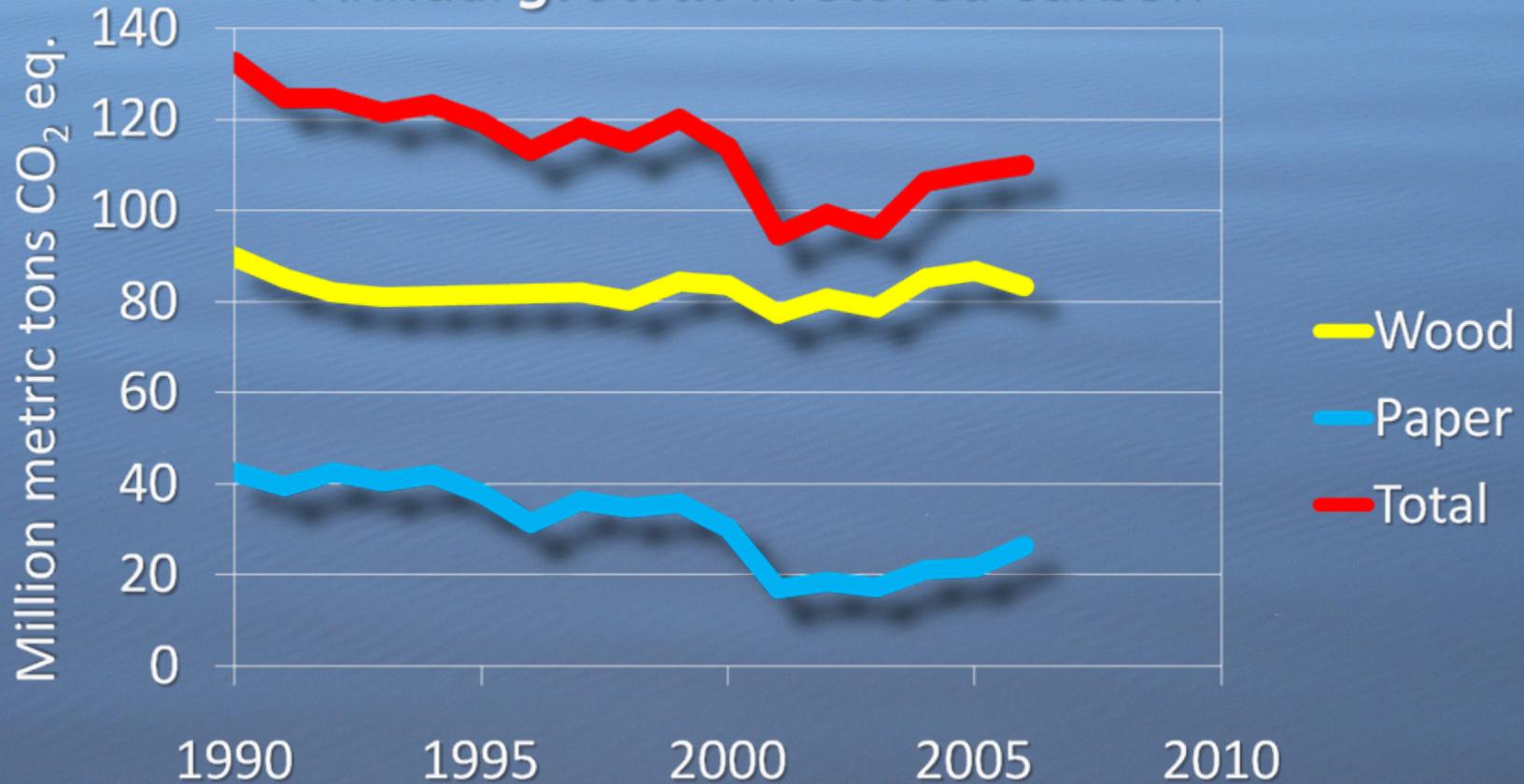
# Element 2: Carbon in products

## Carbon stored in products



# Element 2: Carbon in products

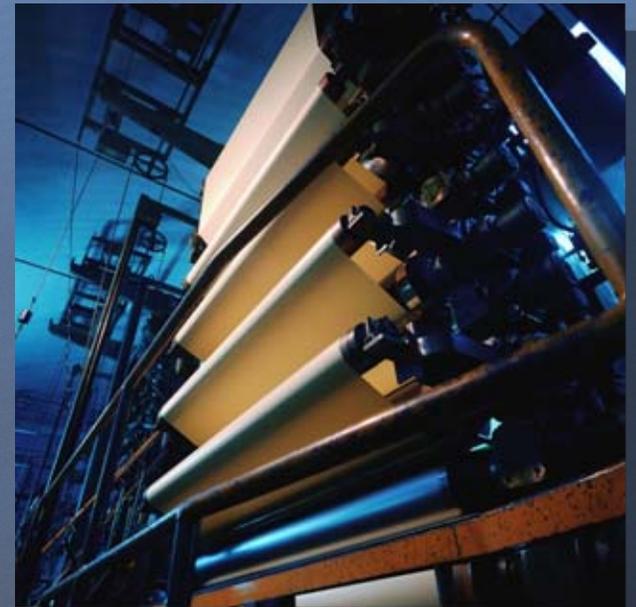
Annual *growth* in stored carbon



- The growth in carbon stored in products is equivalent to removing about 100 million tons of CO<sub>2</sub> from the atmosphere each year

# Element 3: Manufacturing emissions

- More than one-half of the fuel used by the forest products industry is biomass
- But fossil fuels are still needed
- Manufacturing-related emissions equal to 69 million metric tons CO<sub>2</sub>
  - Pulp and paper emissions equal to 58 million tons/yr



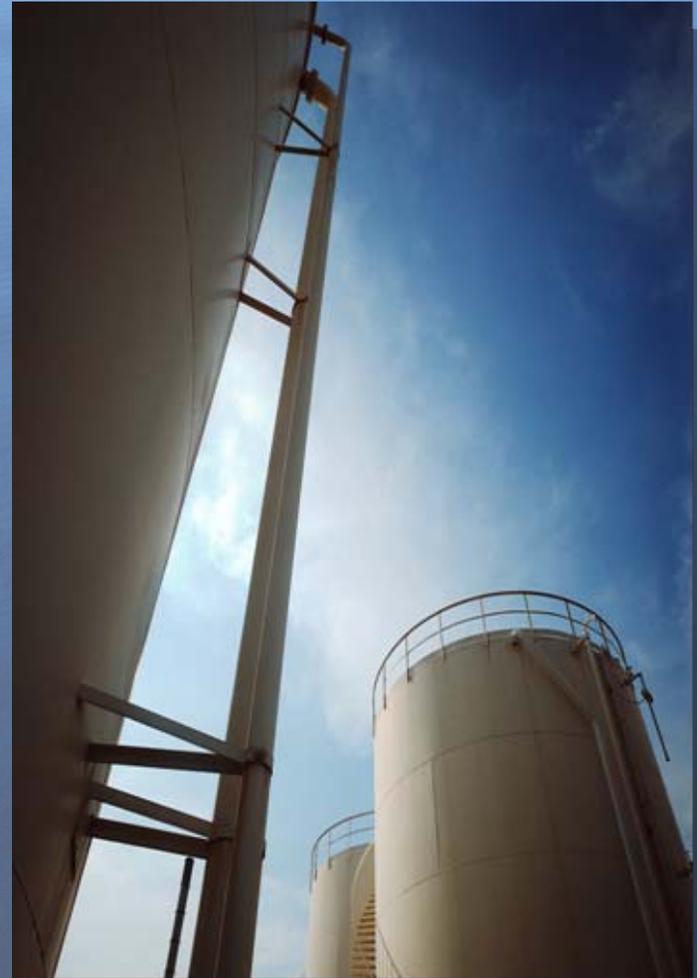
# Element 4: Producing fiber



- Emissions from forest management
  - Harvesting equipment, etc.
  - Small part of footprint
- Very few emissions required to process recovered fiber
- Total estimated to be 4.2 million metric tons CO<sub>2</sub> equivalents per year.

# Element 5: Non-fiber inputs

- Producing forest products requires chemicals and other inputs
- The production of these releases GHGs
- Estimated to be 24 million metric tons of CO<sub>2</sub> equivalents per year



# Element 6: Purchased power



- The industry generates much of the electricity it needs
  - Most by co-generation which is much more efficient than methods used by power companies
- But some must be purchased
- Emissions associated with the power purchased by the industry equal to 43.6 million tons CO<sub>2</sub> per year.

# Element 7: Transport

- Raw materials, intermediate products, final products
- Transport-related emissions estimated to be 19.6 million tons CO<sub>2</sub> per year



# Element 8: Emissions during use

- Forest products are not refrigerators, TVs or cars
- Essentially zero emissions during use

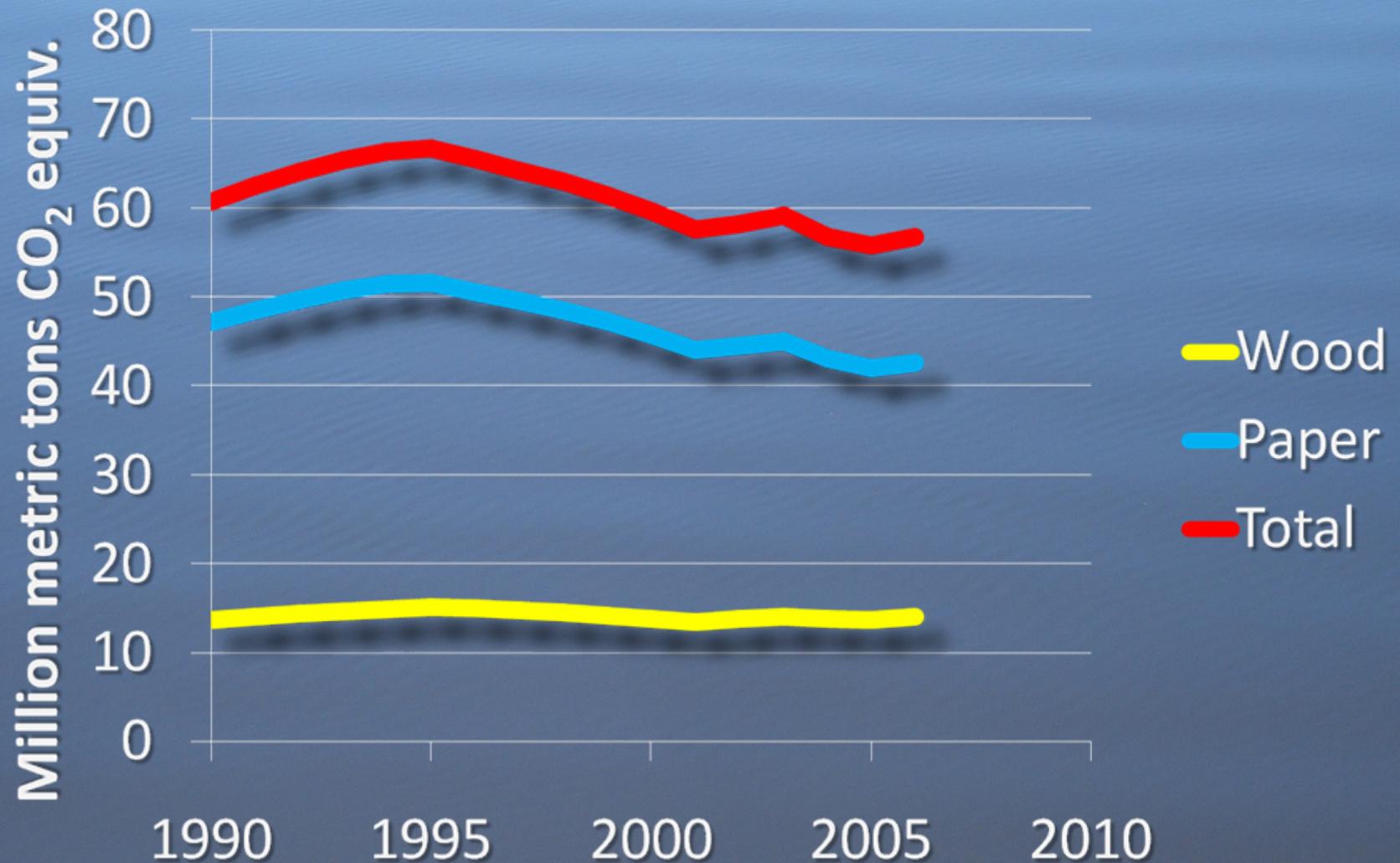


# Element 9: End-of-life

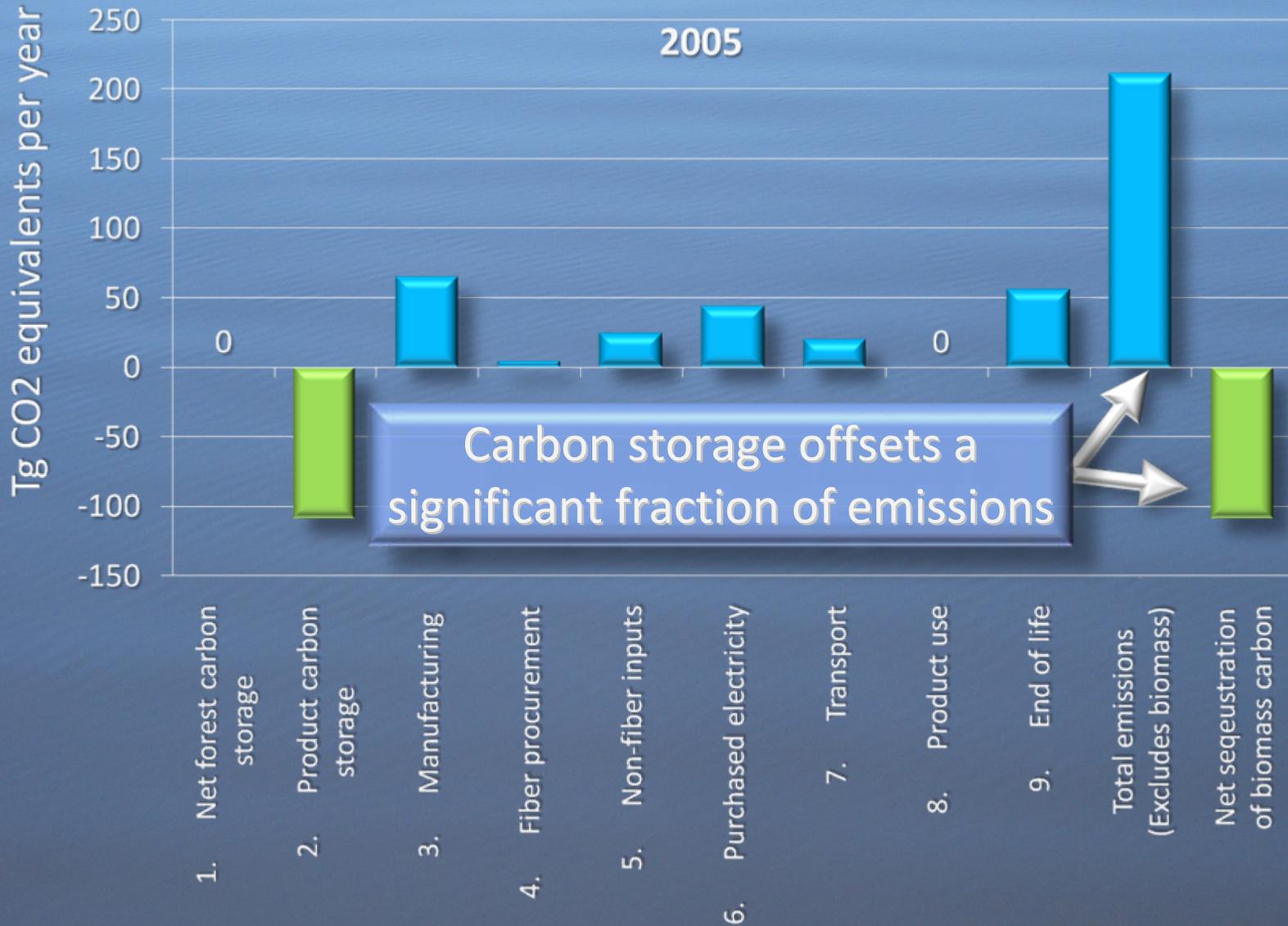
- Over 50% of paper is recovered for recycling
- Of the remainder, about 80% is landfilled
- In landfills...
  - Some carbon is stored (discussed earlier)
  - Some carbon is converted by bacteria into methane
    - A much more potent greenhouse gas than CO<sub>2</sub>



# Methane emissions from forest products in landfills



# Putting the pieces together



# A few words about recycling

- Estimating the effects of increasing recovered fiber content requires many assumptions
- Will the recovered fiber...
  - come from new supply of recovered fiber?
  - be “stolen” from an existing user in the US?
  - come from exports of recovered fiber, stealing from a foreign user?
- If “stolen” where will “victim” go for fiber and what will be the effects?
- Will the reduced demand for wood result in
  - more carbon storage in the forest?
  - wood going to other uses (energy, wood products)?
  - conversion of the land to more profitable uses?

# A few more words about recycling

- At what type of mill will the paper be made?
  - Increasing recovered fiber use at a mill that makes pulp can have a very different impact than increasing use at a stand-alone paper mill
  - Using deinked market pulp has a different impact than using on-site produced deinked pulp
- For all of these (and other) questions, there is much less uncertainty dealing with specific local situations than dealing with general ones

# Conclusions

- Carbon stocks in US forests that supply the industry are stable or increasing
- The amounts of carbon stored in products is growing fast enough to offset a significant fraction of the industry's emissions, a situation that is expected to continue
- The results for specific products, however, may look very different from the overall industry footprint
- Estimating the effects of increasing use of recovered fiber involves large uncertainties
- The uncertainties are reduced when the analysis involves a specific situation rather than a general condition