Different approaches of accounting for Harvested Wood Products

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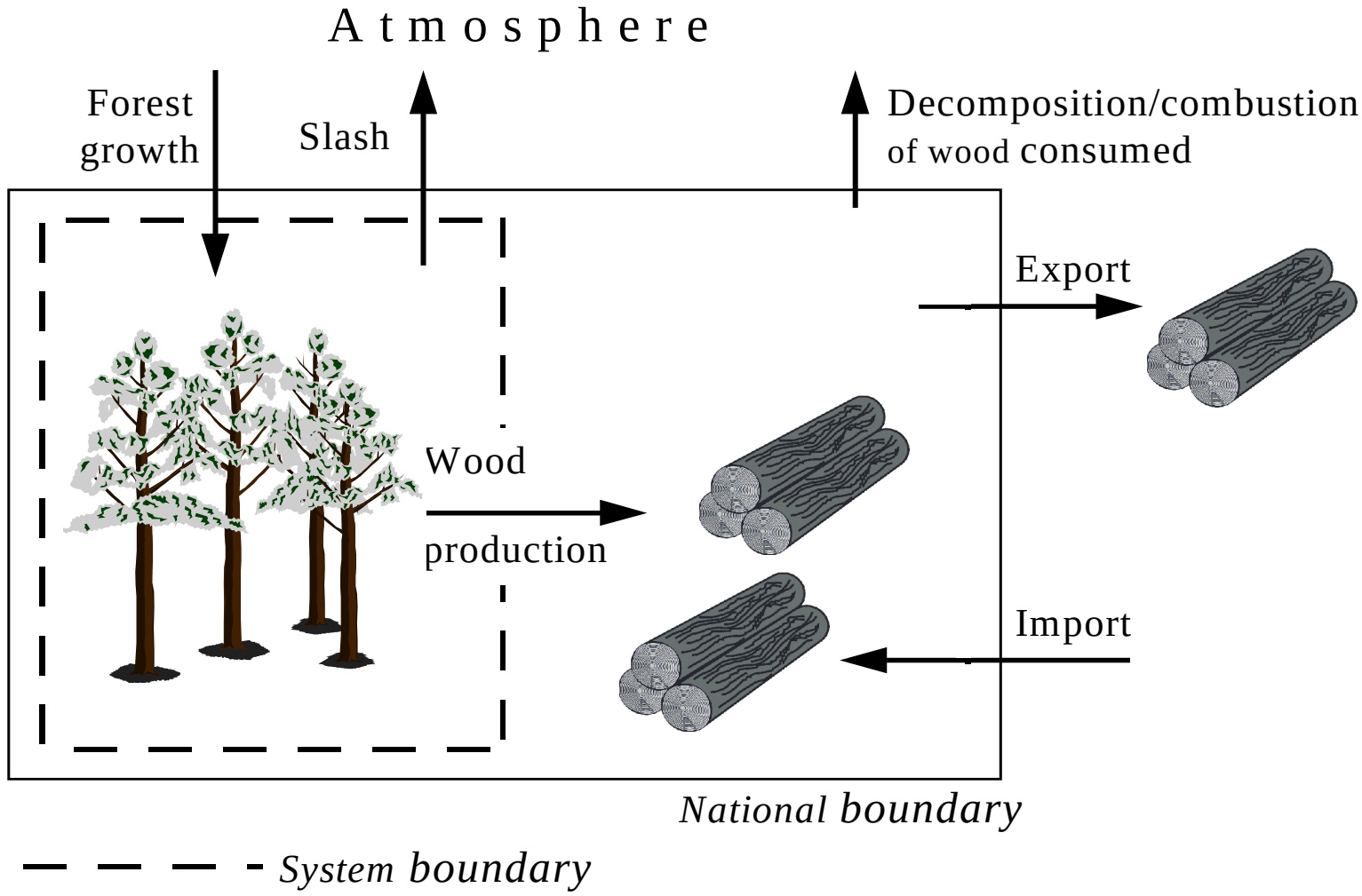
Outline

- Basic accounting approaches for C balance of HWP
- Which approach would be feasible in practice?
- Incentives/disincentives of the approaches
- Inclusion of HWP to the accounting system of the LULUCF sector
- Estimation of national HWP balance in practice - tools and data
- Example of a direct inventory of HWP stock: Finland

Basic accounting approaches for C balance of HWP and forests

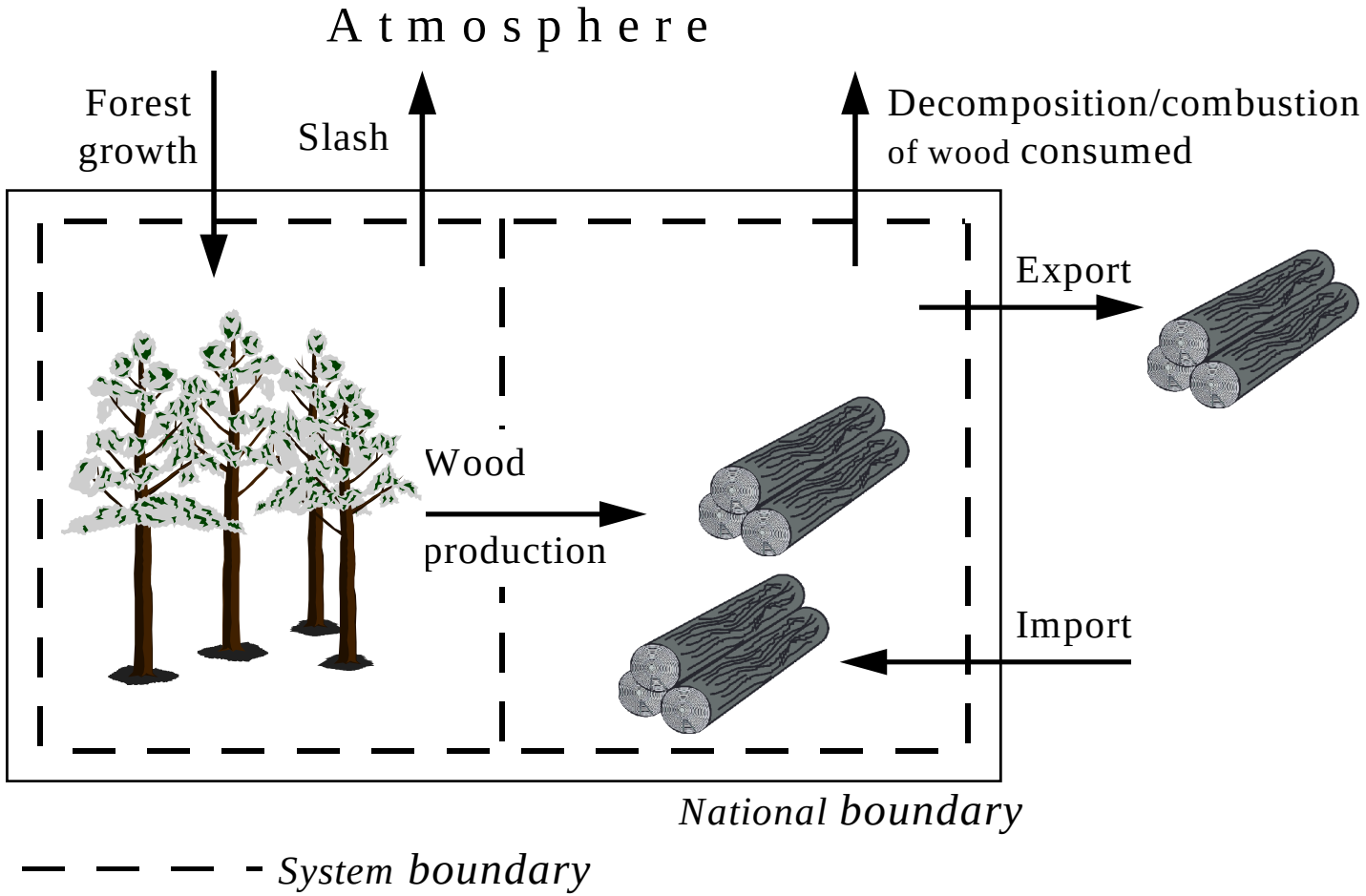
IPCC default approach

(considers only stock changes in forests: proposes, that stock changes in HWP =0)



Removal = *Stock change* = *(stock change forest)*
= *(forest growth - slash -wood production)*

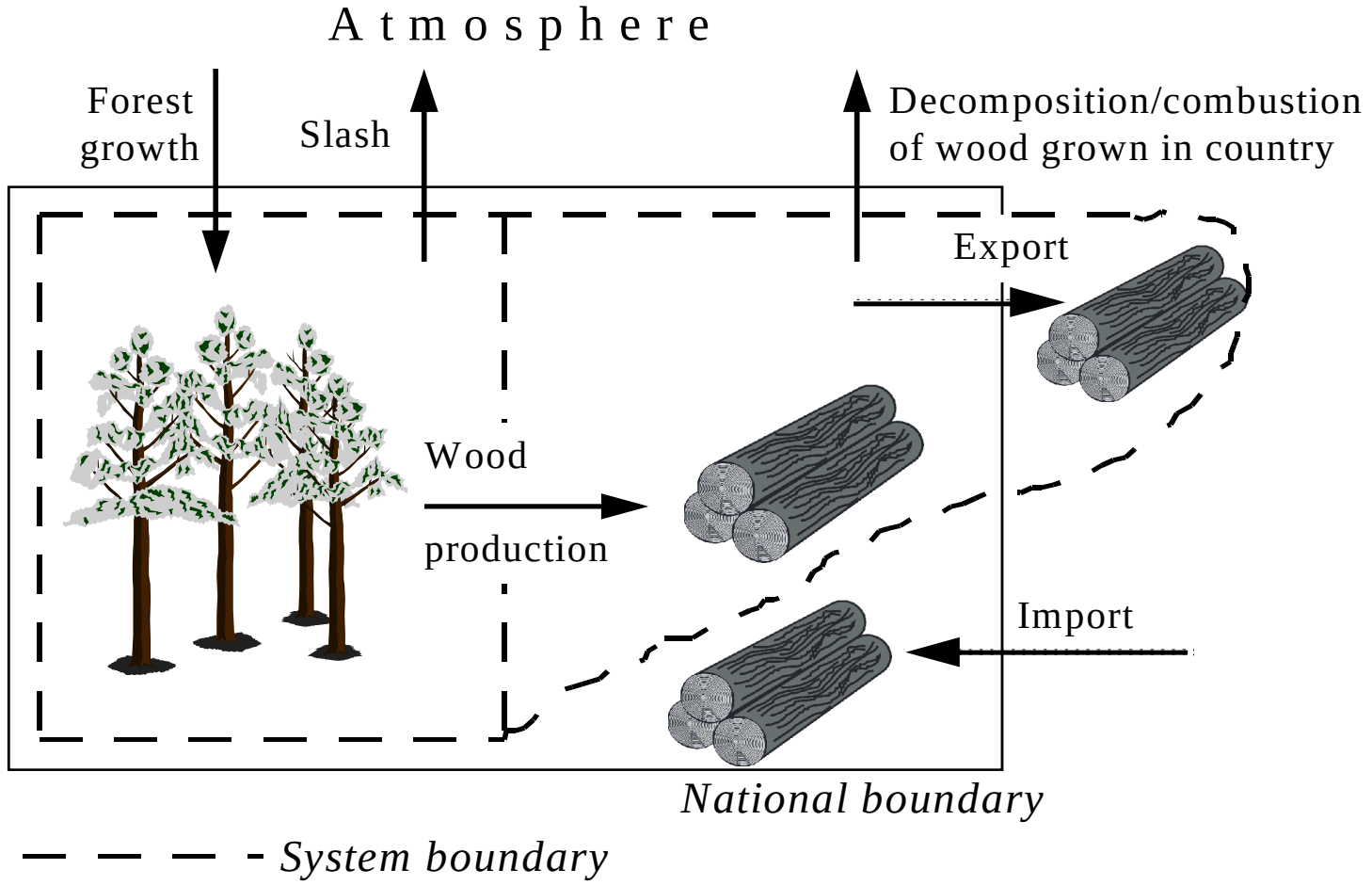
Stock change approach (SCA) (Brown et al. 1999, Lim et al. 1999)



Removal = *Stock change* = *(stock change forest) + (stock change consumed products)*
= *(forest growth - slash -wood production)*
+ *(wood consumption*
- decomposition/combustion of wood consumed)

Additional removal with respect to IPCC default = *stock change consumed products*

Production approach (PA) (Brown et al. 1999, Lim et al. 1999) = **Simple decay** approach (SD) (Ford-Robertson, 200x)

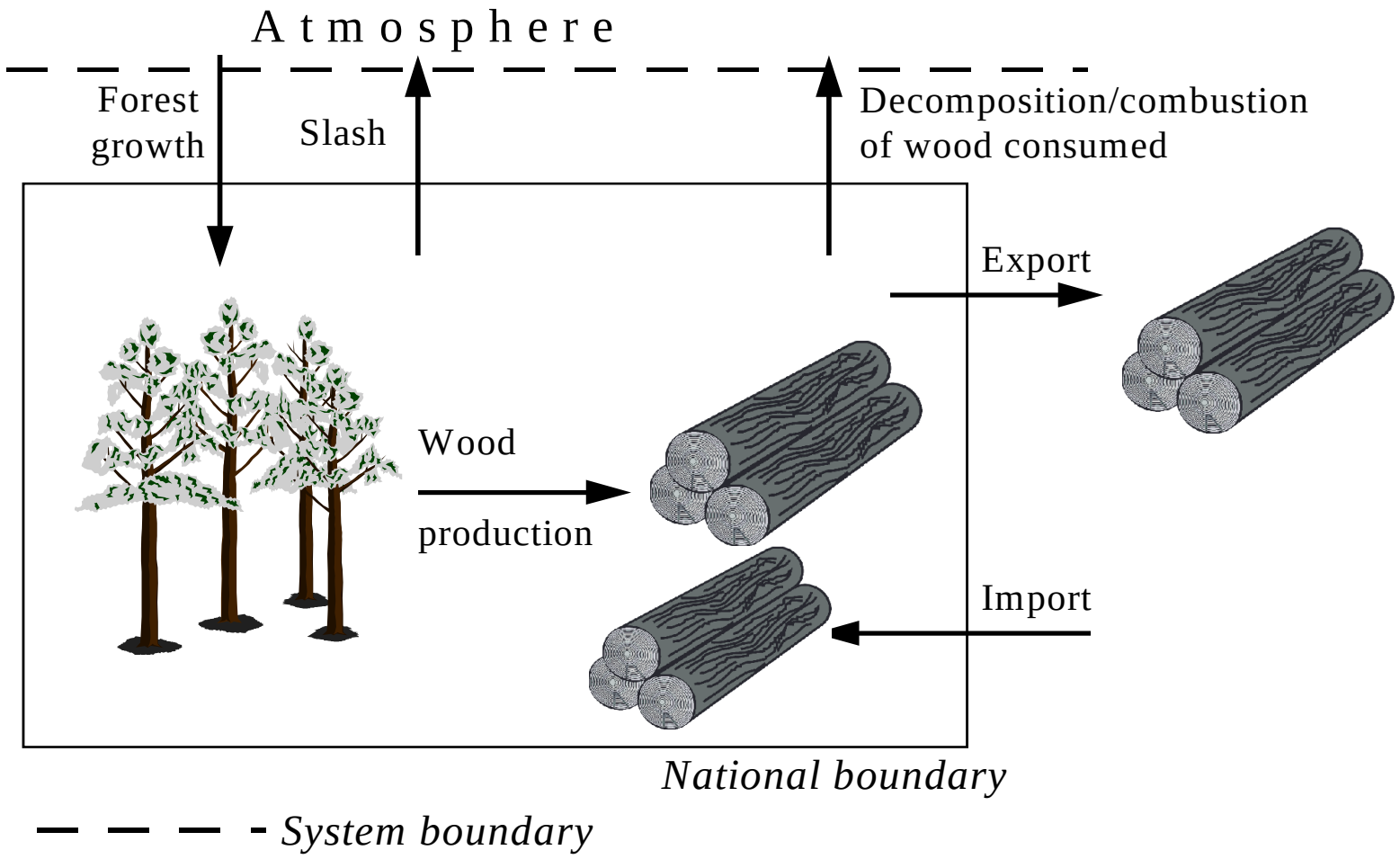


Removal = *Stock change = (stock change forest) + (stock change domestic-grown products)*
= (forest growth - slash -wood production) + (wood production - decomposition/combustion of wood grown in country)

= forest growth - slash - decomposition/combustion of wood grown in country

Additional removal with respect to IPCC default = *stock change domestic-grown products*

Atmospheric flow approach (AFA) (Brown et al. 1999, Lim et al. 1999)

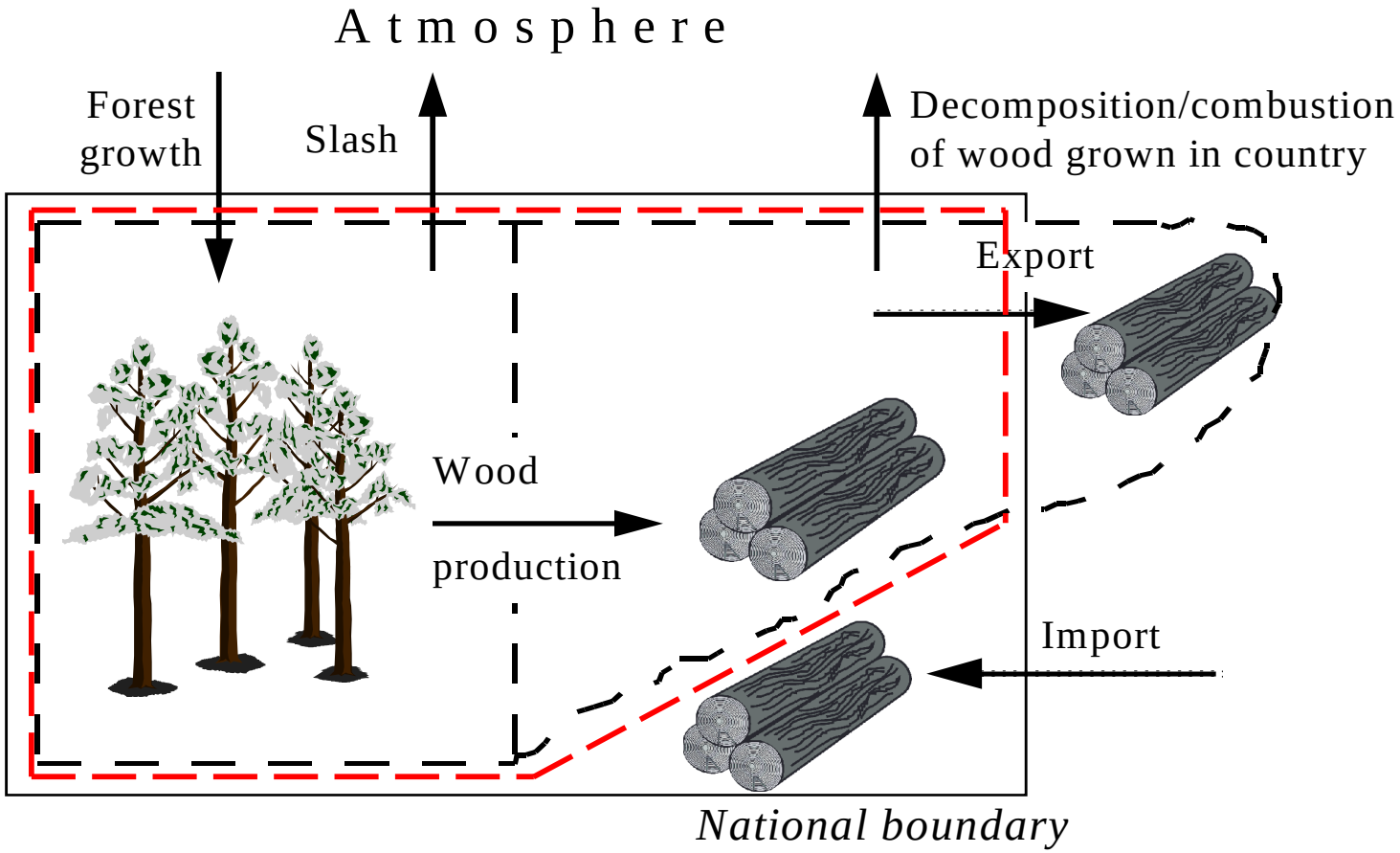


Removal =

Atmospheric flow = forest growth - slash - decomposition/combustion of wood consumed
= (stock change forest)+(stock change consumed products)+ export - import.

Additional removal with respect to IPCC default
= stock change consumed products + export - import

Stock change approach for HWP of domestic origin (SCAD) (Cowie, Pingoud, Schlamadinger 2006)



Removal =

Stock change = (stock change forest) + (stock change domestic-grown products in domestic use)
= (forest growth - slash -wood production) + (wood production - decomposition/combustion of wood grown ***and*** *in use in country)*

Additional removal with respect to IPCC default
= stock change domestic-grown products in domestic use

Which approach would be feasible - with respect to the existing GHG reporting system and the data available?

Which approach would be feasible? (1)

IPCC default approach:

- Pros:
  - No new reporting systems required
  - The substitution benefits (=displacement of fossil C emissions due energy and material substitution) are already now in the accounting system of Kyoto Protocol.
  - Other alternatives could be worse: 1) "cheating" in HWP accounting by exaggerating the C sequestration, because cross-checking of the model results against direct HWP stock inventories is seldomly possible, 2) creating accounting systems with calculatory removals without any true climate benefits
- Cons:
  - The reporting system should reflect the real C balance as much as possible; **IPCC default approach ignores the global C sequestration into HWP that in reality occurs at the moment** - no full C dynamics and correct timing of emissions
  - Even the present system does not prevent use of imported wood from unsustainable sources like illegal loggings

Which approach would be feasible? (2)

Stock-change approach (SCA):

- Pros:
  - As regards required data, **simplest** of the approaches considering the full carbon dynamics of HWP stocks (timing of emissions described correctly).
  - Every country reports on their HWP stocks within their borders - something that is **under the control of the country**
  - Direct stock inventories could be practicable, if supported by national statistics (e.g. building statistics), enabling more robust estimates

- Cons:
  - Imported wood from deforestation or other unsustainable sources like illegal loggings could also be used to achieve removals in national GHG inventories. (However, even the present system does not prevent it.)

Which approach would be feasible? (3)

Production approach (PA) and simple decay (SD):

- Pros:
  - Considers the full carbon dynamics of HWP stocks (timing of emissions described correctly)
- Cons:
  - The **system boundary differs from national border**, unlike reporting/accounting of other emission sources - inconsistency within the GHG reporting framework
  - The reporting country has a responsibility of carbon stocks that **are not under control of the country** (i.e. exported HWP).
  - **Difficult to utilise the existing national and international statistics**: HWP of imported roundwood excluded, but exported HWP from domestic roundwood included, in addition the HWP stocks in the export markets have be estimated.
  - Consequently, approximate methods must be used and the estimates on C stock changes of HWP **basically much more uncertain** than in the Stock Change Approach (SCA).

Which approach would be feasible? (4)

Atmospheric flow approach (AFA):

- Pros:
  - Considers the full carbon dynamics of HWP stocks (timing of emissions described correctly)
- Cons:
  - **Inconsistency with the whole existing reporting/accounting system of LULUCF**, based on a stock-change philosophy
  - As a consequence, **wood trade would be treated in totally different manner compared to other biomass**. For instance, imported wood-based biofuels would form a C emission in the importing country, whereas all the other imported biofuels would remain C neutral ("discontinuity").
  - Wood exporting countries could account all their wood export flux as a C removal.

Which approach would be feasible? (5)

Stock change approach for HWP of domestic origin (SCAD):

- Pros:
  - A modification of SCA in which **the cons of SCA with imported, potentially unsustainable wood could be avoided**.

- Cons:
  - Does not provide the full picture of C balance of HWP.
  - Complexity and uncertainties of estimates higher than in SCA; in practice could be difficult to judge from HWP end use, what proportion is of domestic origin, what is imported
  - Estimation of HWP balance in landfills even more difficult.

Incentives/disincentives of the 4 basic approaches

Table 1. Summary of potential impacts of the main different HWP accounting approaches

	IPCC default approach	Stock-change approach	Production approach	Atmospheric-flow approach
Promotion of sustainable forest management	discourages harvesting of forests	incentive to import HWPs, possible inclusion of wood products from non-sustainably managed forests	possible increase in national production and exports of long-life products	wood exports might be promoted, imports reduced, possible focus on national wood production
Impacts on recycling	incentives for recycling of products,		least incentive for recycling of products	greatest incentives for recycling of products
Use of wood fuels	incentives to switch from fossil-fuels to domestically-produced wood fuels, and to import wood fuels			
Internalizing the carbon value of wood and national planning	no specific incentives	incentives to improve national wood products inventories		
Trade	minor influence on international wood prices			?

Incentives/disincentives of the different approaches, cont.

Addional factors having an impact on the incentives in total:

- The asymmetry of the global GHG accounting system (e.g. Annex countries with commitments vs. non-Annex countries).
- Fossil emissions that can be displaced by using HWP instead of their competitors (**substitution impacts**). The displacement factors vary dependent on wood end-uses (energy, different material uses). These factors together with the HWP approach determine the incentives (in quantitative terms).
- The potentially rising price of CO_2 in emissions-trading will have a growing impact on the incentives and competitiveness of HWP in longer run (depending on the approach).

Including HWP to GHG accounting of LULUCF sector (1)

- How should HWP accounting be *balanced* with the accounting rules of forests?
  - The basic HWP approaches SCA, AFA, and PA above propose a full-carbon accounting of forests and HWP; the post-2012 accounting system **could differ** from that.
  - However, the basic HWP reporting under the UNFCCC could still be on full carbon.
  - Activity-based accounting continuing after 2012? HWP could be connected to forestry activities (such as Article 3.4 under Kyoto).
  - Similar rules for forests and HWP to avoid bad incentives such as unsustainable forestry: e.g. inclusion of HWP only if forests included in the accounting, combined caps/discounting etc with forests?
  - Gross-net vs net-net accounting after 2012?
  - Annex vs non-Annex countries and HWP trade?

Including HWP to GHG accounting of LULUCF sector (2)

- Accounting and uncertainties of HWP models?
  - Based on models, validation/verification could be problematic. Direct inventories of HWP stocks would be desirable, but practicable only in few countries.

- Just HWP in use, or *also* in landfills?
  - An additional uncertainty factor, especially in production approach (PA). Creating artificial removals in national inventories?
  - If HWP in landfills accounted for, why not other biomass?
  - Wrong incentives for landfills? Contradictory with the EU waste directive.

Estimation of national HWP balance in practice - tools and data

Generally applicable HWP calculation tool (1)

- Basic HWP calculation tool included in the 2006 IPCC Guidelines (Chapter 12. Harvested Wood Products. 33 p.+ HWP Worksheet MS Excel. In: *2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4, Agriculture, Forestry and Other Land Use*. http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol4.htm).
- Activity data for each country downloaded from **ForesSTAT** of the FAO.
- **In principle, C balance of *HWP in use* for all countries can be estimated, and using any* of the approaches.** The C balance is given with respect to the *IPCC default approach.*
- An extended version (of Kim Pingoud) includes also the SCAD approach.

* The uncertainties of the results vary depending on the approach

Generally applicable HWP calculation tool (2)

- In the calculation tool the stock and decay of ***semi-finished products* (sawnwood, wood-based panels, paper products) *in use*** is estimated.
- **First-order** (=exponential) **decay** is assumed.
- **Most critical parameter** is the **half-life of products** (different value for solid wood and paper products).
- Other essential parameters C conversion factors (e.g. t C/m^3).
- A submodel for *HWP in landfills* is not included, as there is no international database available. However, their balance could be calculated elsewhere from national statistics and the total HWP balance is summed up in the calculation tool.

Generally applicable HWP calculation tool (3)

Sources of uncertainties:

- Half-lifes of different HWP basically uncertain. Experiences from direct national HWP inventories and more elaborated HWP models could be utilised to improve the accuracy of half-life values.
- The quality of activity data in the FAO database varies by country.
- FAO time series of production and trade of HWP basically starting from 1961, but for some "new" countries (e.g. Russian Federation) only from the early 90s.
- Consequently, the history must in some cases be approximated very roughly (e.g. constant exponential growth) leading to uncertain estimates of long-lived HWP stocks.

Generally applicable HWP calculation tool (4)

Sources of uncertainties:

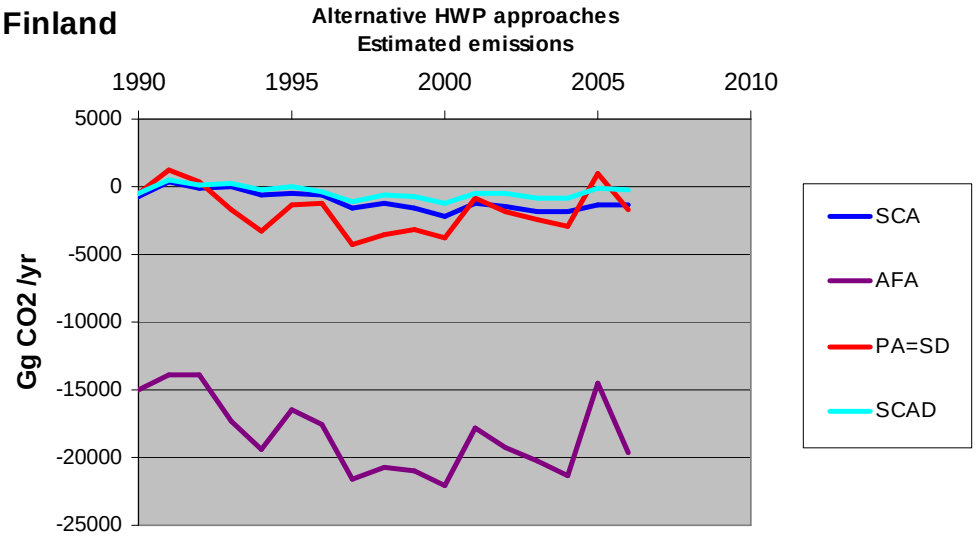
- International trade of **final** products excluded (e.g. pre-fabricated houses) due to lack of data, which can lead to errors in estimation of national HWP stocks.
- However, national statistics could be use to refine the activity data series needed in the calculation tool.
- Production approach (PA) leads basically to much higher uncertainties: difficult to estimate HWP carbon stocks and their changes accurately in the export markets.

SET 1: Half-life of solid wood products **15 yrs** (=average lifetime 22 yrs), paper products **1 yr**

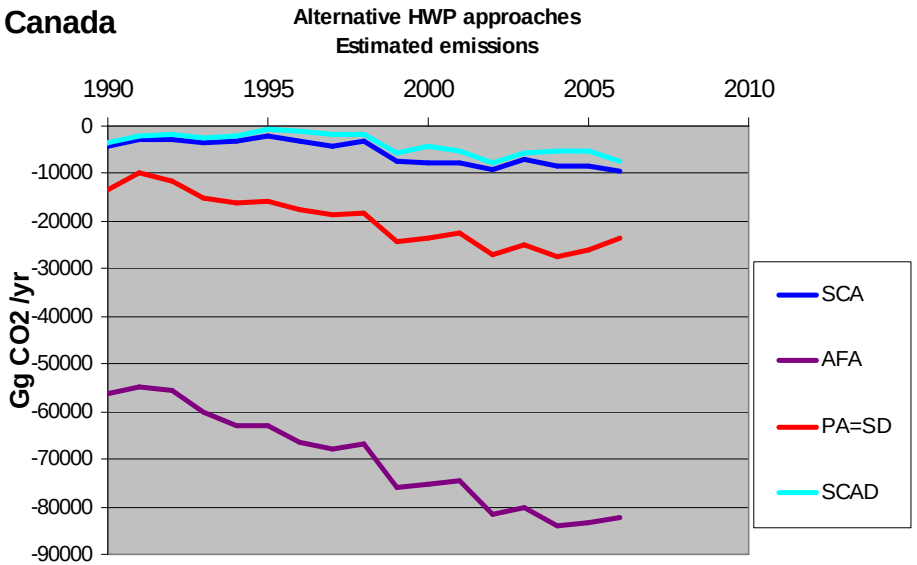
Examples of individual countries:

Some HWP **exporters**

Finland

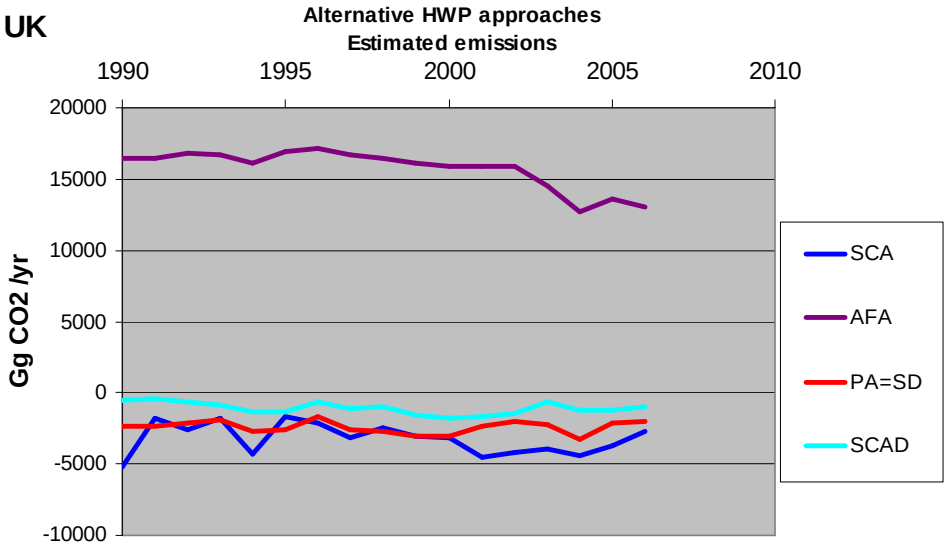


Canada

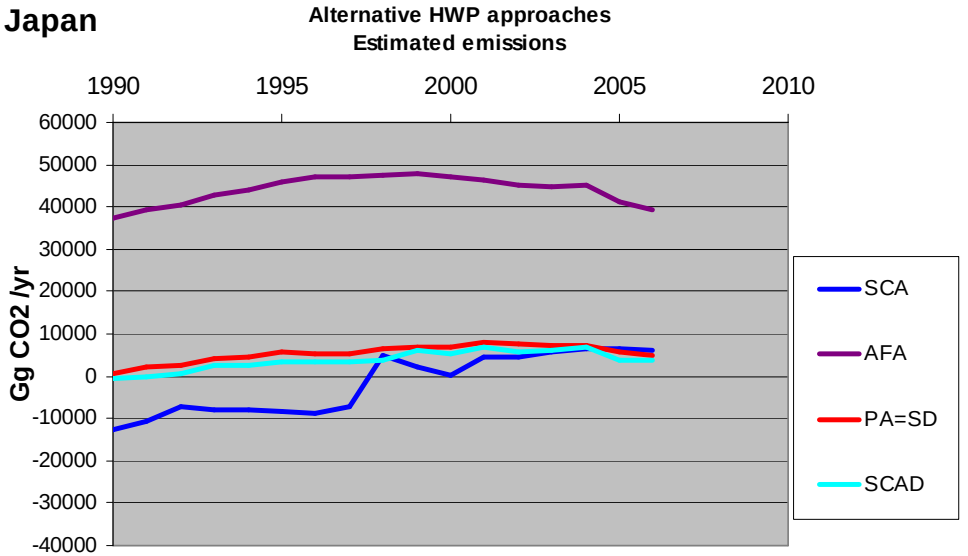


Some HWP **importers**

UK

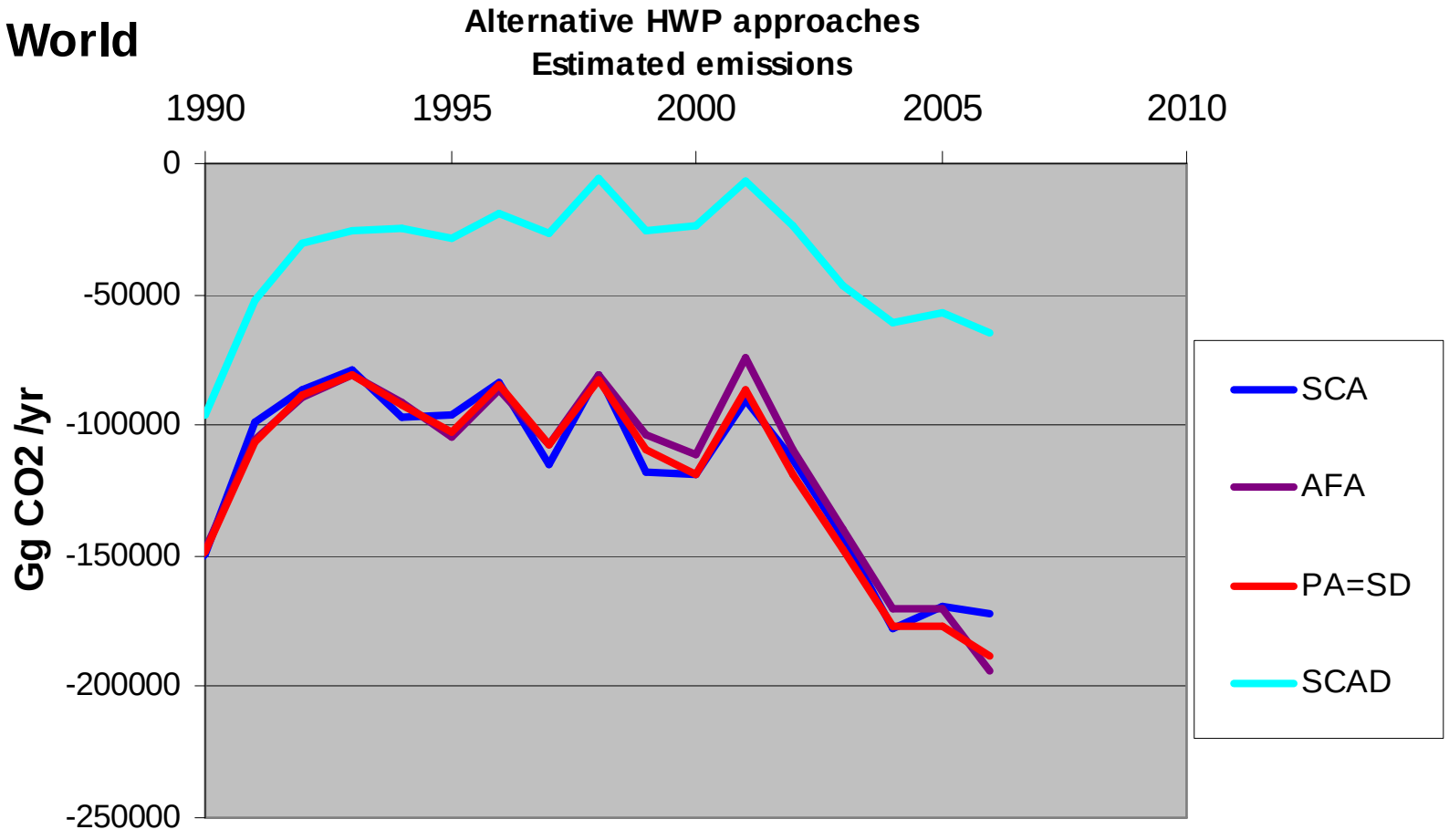


Japan



Global example:

- Estimation of global HWP balance applying different approaches
- Note: For an individual country the alternative approaches differ significantly from each other, whereas globally SCA, AFA and PA give a similar result.

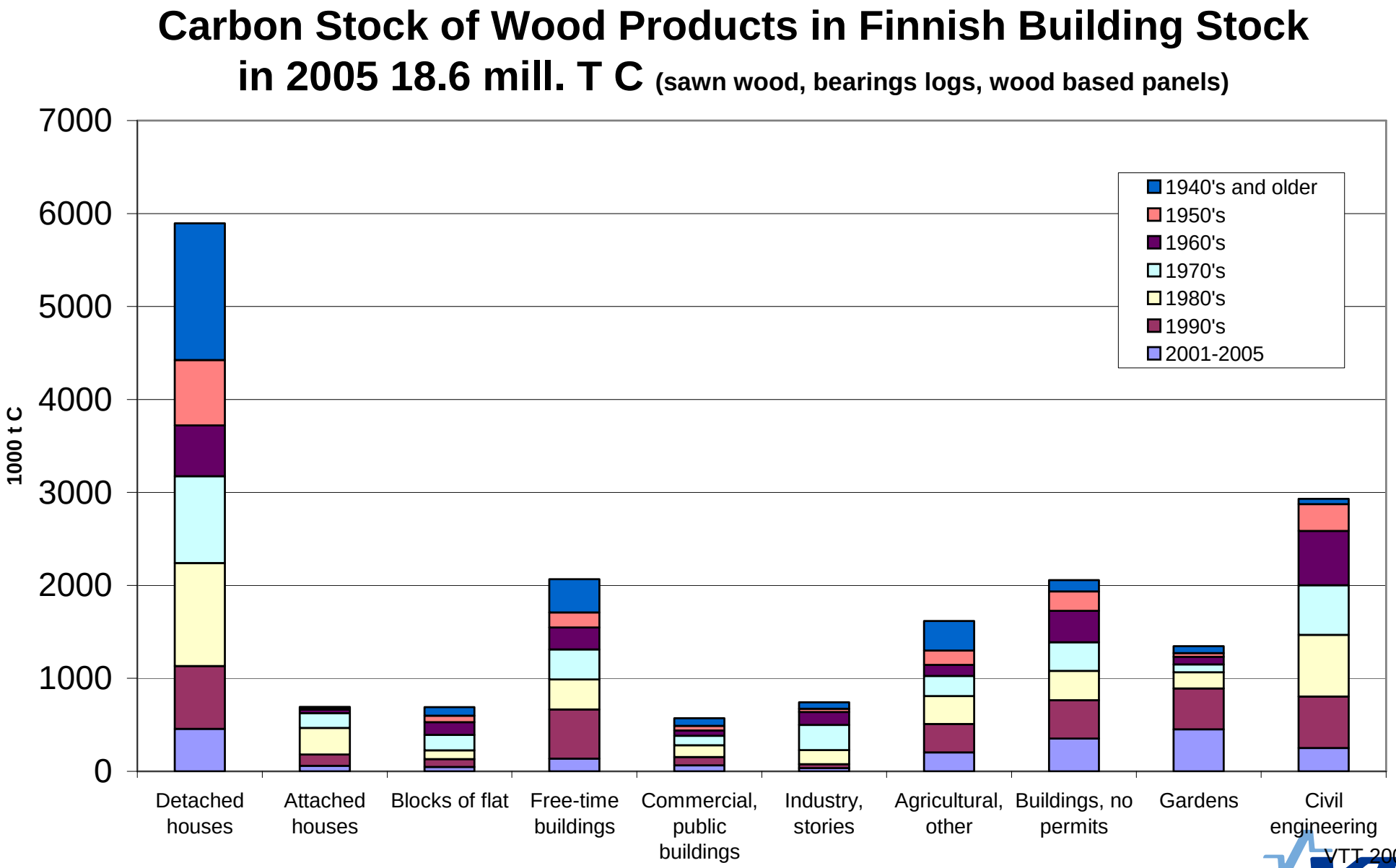


Assumptions: Half-life of solid wood products **15 yrs** (=average lifetime 22 yrs), paper products **1 yr**

Conclusions on the numerical calculations

- The global removal due to increasing C stocks of HWP in use could be more than **0.5 %** of of global GHG emissions in 2004, according to estimates (excluding landfills).
- For some specific countries, HWP are much more important.
- Especially AFA has strong impact on national carbon balance of some countries: for instance in Finland, removal due to HWP applying AFA would **nearly 30%** of the sum of all the other GHG emissions in 2005.

Example of a direct inventory of HWP stock: Finland



Thank you for your attention!