

# GHG reporting and accounting rules for wood products including biomass for energy



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- National GHG reporting framework under the UNFCCC: forthcoming IPCC 2006 Guidelines
- The "Harvested Wood Products (HWP) approaches"
- Implications to reporting of CO<sub>2</sub> emissions from bioenergy
- Inclusion of HWP in emission accounting in forthcoming commitment periods?

# Estimation and reporting of national emissions under the UNFCCC

- The forthcoming 2006 IPCC Guidelines for national GHG emission inventories
  - Final draft (about 2000 pages!) under governmental consideration, to be approved by IPCC plenary in April 2006
- Sectoral reporting:
  - Energy
  - Industrial Processes and Product Use (IPPU)
  - **Agriculture, Forestry and Other Land Use (AFOLU)**
    - C balance of Harvested Wood Products (HWP) incl bioenergy under AFOLU
  - Waste

# Estimation and reporting of national emissions under the UNFCCC (cont.)

## Basic structure for reporting of C emissions from AFOLU:

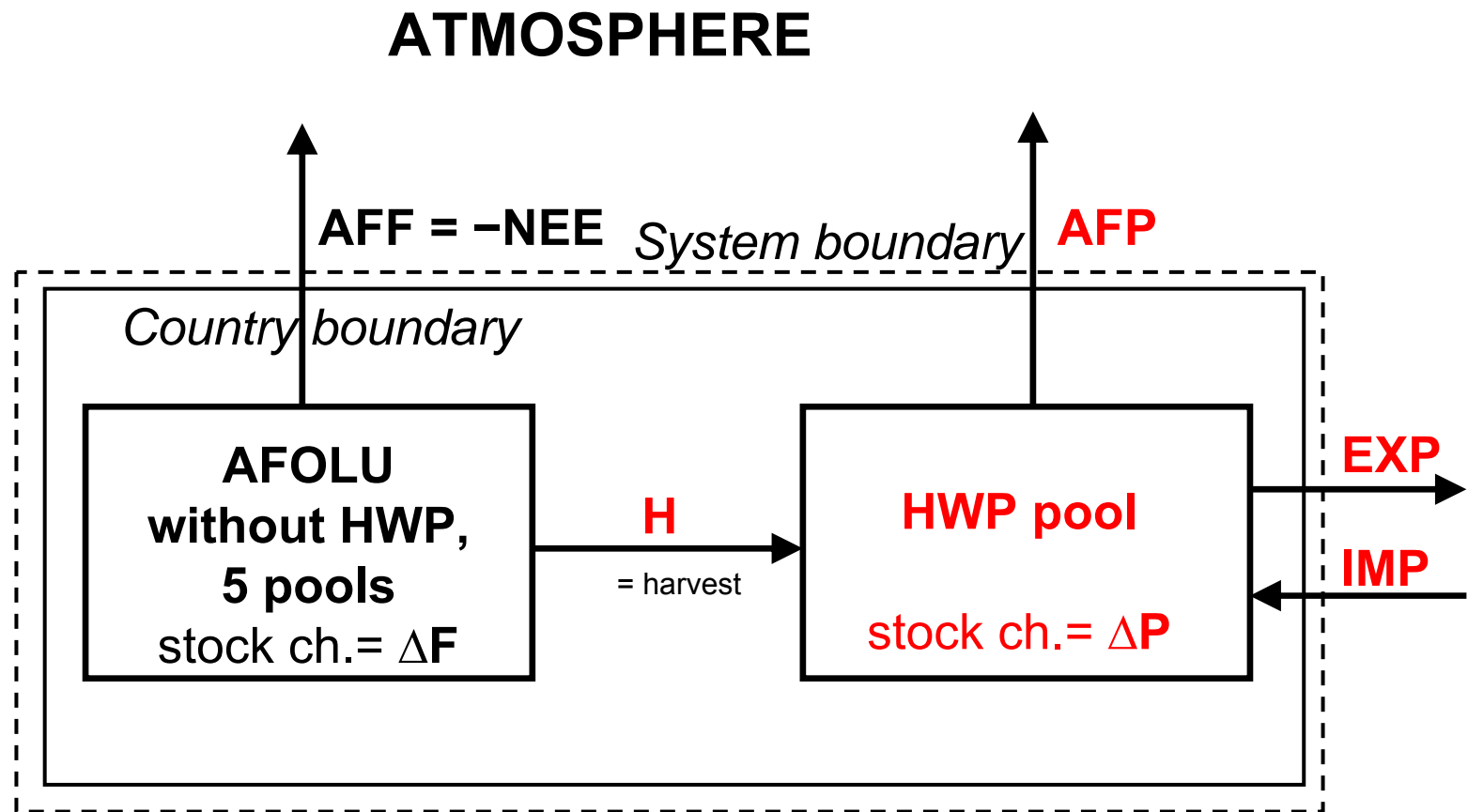
- Land divided in 6 land use categories (forest land, cropland, grassland, wetlands, settlements, other land)
- 5 C pools in each category: above-ground biomass, below-ground biomass, deadwood, litter, soils; stock changes added up
- **C stock changes** in all categories added up
- **HWP the sixth C pool**, its "contribution" to the rest of AFOLU added up
- The overall sum is reported as C emission, if negative, and as C removal, if positive
- **NOTE: Implicitly, C stock changes in any other biomass pools assumed to be = 0**

# Estimation and reporting of national emissions under the UNFCCC (cont.)

## HWP guidance in the IPCC 2006 Guidelines

- Noticed: several competing "HWP approaches", no international agreement on the approach
- Guidance will be approach-neutral
- Estimation methods presented enabling national reporting of HWP by any of the approaches
- Before international agreement countries can use *any* of them (but not sum to total C emissions)
- Approaches differ in their **system boundaries** ⇒

# "HWP approaches": Stock Change Approach (SCA)

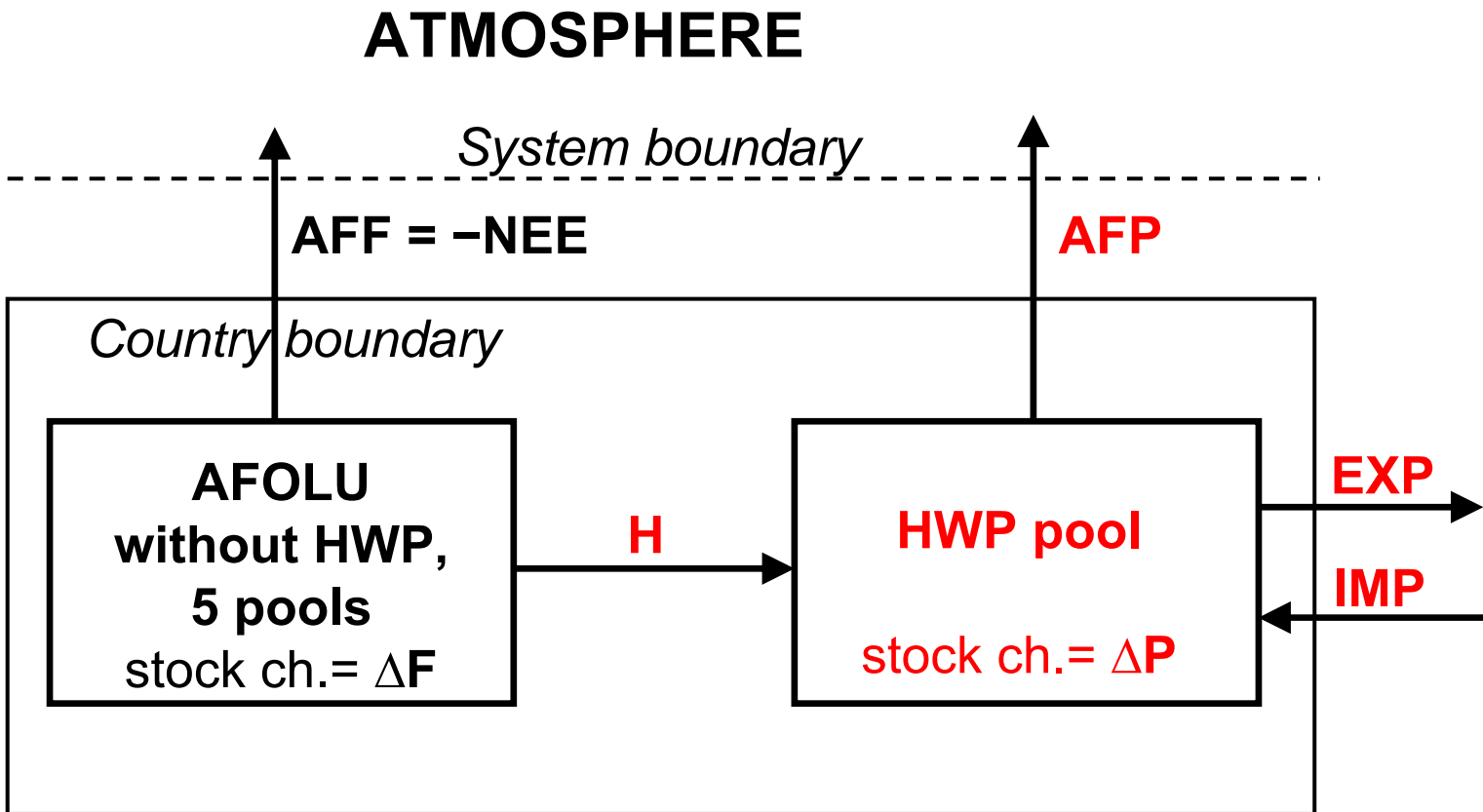


**NEE** = net ecosystem exchange

**SCA:**  $\text{CO}_2$  emissions from AFOLU =  $-44/12 * (\Delta F + \Delta P)$

**"HWP contribution" =  $-44/12 * \Delta P$**

# "HWP approaches": Atmospheric Flow Approach (AFA)

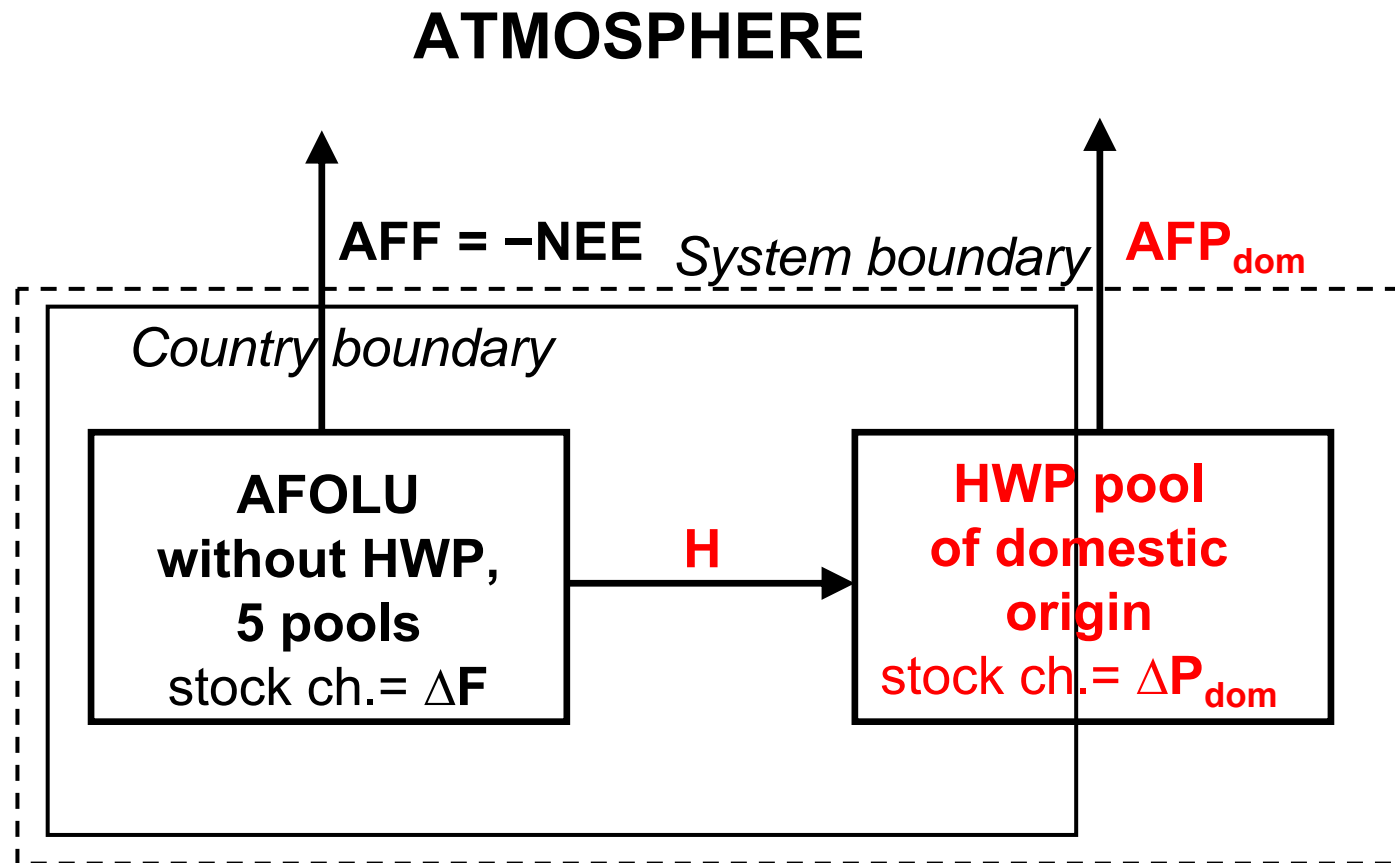


**NEE** = net ecosystem exchange

**AFA:**  $\text{CO}_2$  emissions from AFOLU =  $44/12 * (\text{AFF} + \text{AFP})$   
 $= -44/12 * (\Delta F + \Delta P + \text{EXP} - \text{IMP})$

**"HWP contribution" =  $-44/12 * (\Delta P + \text{EXP} - \text{IMP})$**

# "HWP approaches": Production Approach (PA)



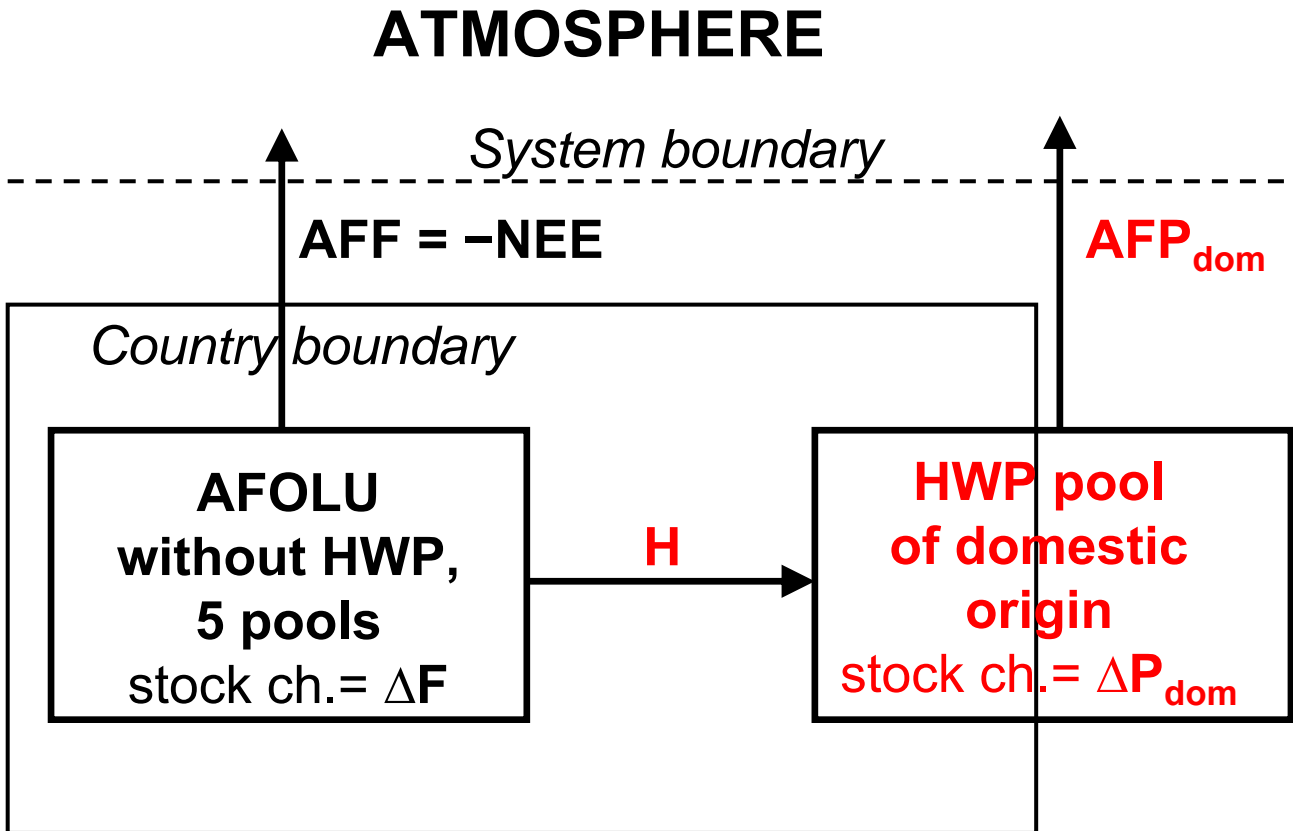
**NEE** = net ecosystem exchange

**PA:** CO<sub>2</sub> emissions from AFOLU =  $-44/12 * (\Delta F + \Delta P_{dom})$

**"HWP contribution" =  $-44/12 * \Delta P_{dom}$**



# "HWP approaches": Simple Decay (SD)



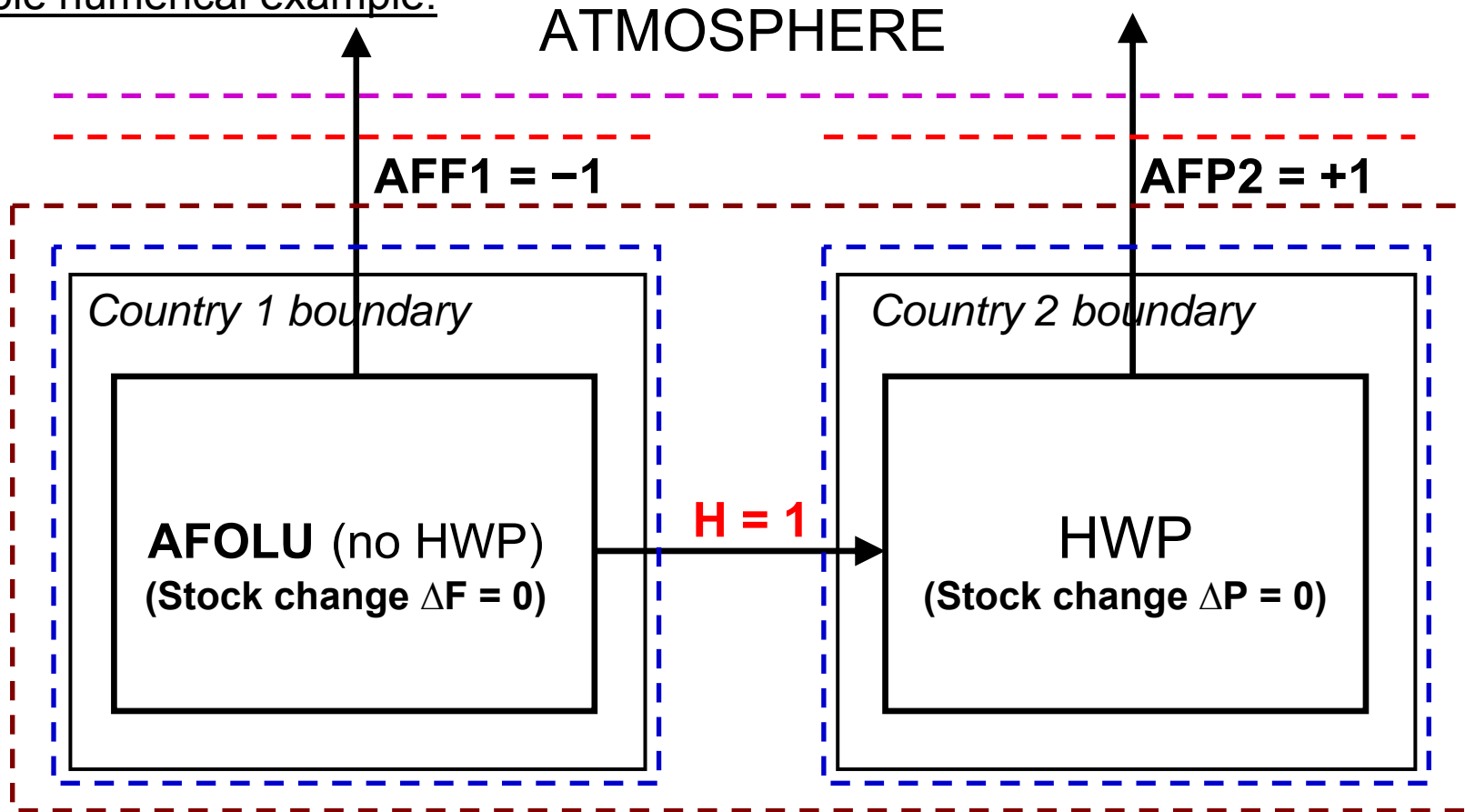
**NEE** = net ecosystem exchange

**SD**:  $\text{CO}_2$  emissions from AFOLU =  $44/12 * (\text{AFF} + \text{AFP}_{dom})$   
 $= -44/12 * (\Delta F + \Delta P_{dom})$

**"HWP contribution" =  $-44/12 * \Delta P_{dom}$**

# "HWP approaches": INTERNATIONAL TRADE

Simple numerical example:



## REPORTED EMISSIONS:

	COUNTRY 1	COUNTRY 2
Stock change approach	0	0
Atmopheric flow approach	-1	+1
Production approach	0+0=0	0 (no reporting in country 2)
Simple decay	-1+1=0	0 (no reporting in country 2)

## Notes on approaches in bioenergy reporting

- CO<sub>2</sub> emissions from bioenergy are reported under **AFOLU**, Non-CO<sub>2</sub> still under Energy sector
- In **AFA** CO<sub>2</sub> emissions from imported wood fuels; **not any more emission-free**
- On the other hand, **exporter gets a national removal**
- **Inconsistency** of **AFA**: wood-based biomass and other biomass treated **in different manner**; imported non-wood biofuels remain emission-free
- (If applied at **micro-level**, wood fuels are emission-free by neither **AFA** nor **SD**; forest owner vs biomass user)

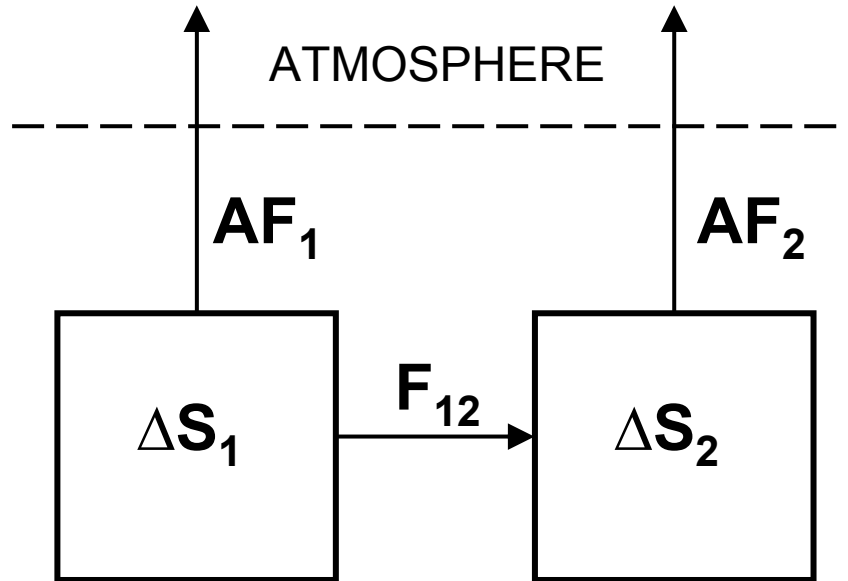
# HWP accounting?

- HWP **accounting** = inclusion of HWP in national obligations in future commitment periods
- Appears most unlikely at the moment
- Prerequisite consensus on HWP **reporting** approach
- Accounting rules highly political, based on reporting, but could include other elements e.g. caps, certification of biomass etc.
- HWP/biomass trade problematic for accounting rules: e.g. how to treat imported biomass that might be produced unsustainably

# Supplementary material

# Basics: Two generic approaches to define emissions from terrestrial C pools

## GLOBAL CARBON BALANCE:



$AF_1, AF_2$  = C fluxes into the atm.  
 $F_{12}$  = lateral C flux between pool 1 and 2  
 $\Delta S_1, \Delta S_2$  = stock changes in C pools 1 and 2

### 1) Stock change approach (SCA):

$$\text{Global emission (SCA)} = -\sum \Delta S_i = -\Delta S_1 - \Delta S_2$$

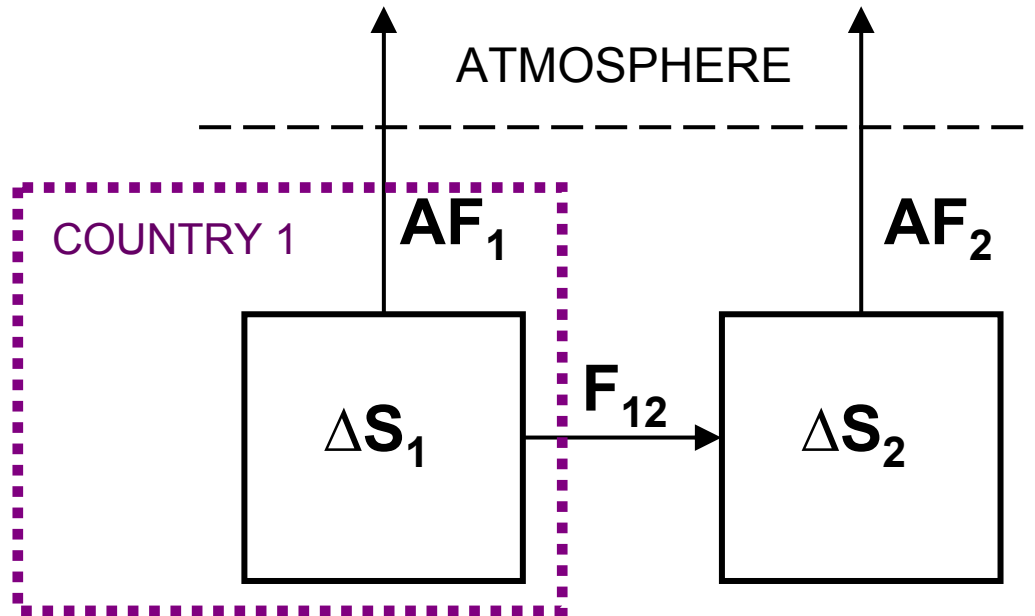
### 2) Atmospheric flow approach (AFA):

$$\begin{aligned} \text{Global emission (AFA)} &= \sum AF_i = AF_1 + AF_2 \\ &= (-\Delta S_1 - F_{12}) + (-\Delta S_2 + F_{12}) = -\Delta S_1 - \Delta S_2 = \text{Global emission (SCA)} \end{aligned}$$

⇒ SCA AND AFA GIVE THE SAME C BALANCE GLOBALLY

# Basics: Two generic approaches to define emissions from terrestrial C pools (cont.)

## NATIONAL CARBON BALANCE:



$AF_1, AF_2$  = C fluxes into the atm.  
 $F_{12}$  = lateral C flux between pool 1 and 2  
 $\Delta S_1, \Delta S_2$  = stock changes in C pools 1 and 2

### 1) Stock change approach (SCA):

Country 1 emission (SCA) =  $-\Delta S_1$

### 2) Atmospheric flow approach (AFA):

Country 1 emission (AFA) =  $AF_1$   
=  $-\Delta S_1 - F_{12} \neq -\Delta S_1$  = Country 1 emission (SCA)

⇒ SCA AND AFA GIVE DIFFERENT C BALANCE AT THE NATIONAL LEVEL

# Basics: Two generic approaches to define emissions from terrestrial C pools (cont.)

## Notes:

- A mixed application of the above two approaches leads to inconsistencies and can also lead to violation of mass balance
- A major source of confusion: the word "emission" is used, based on the above generic approaches, in two meanings without seeing their difference:
  - 1) as negative C stock change
  - 2) as C flux into the atmosphere
- Careful consideration required when developing the international reporting framework for GHG emissions
- Depending on the approach biomass combustion can either be interpreted as C emission or not