D3.1 Generic methods for non-CO2 emissions from fires

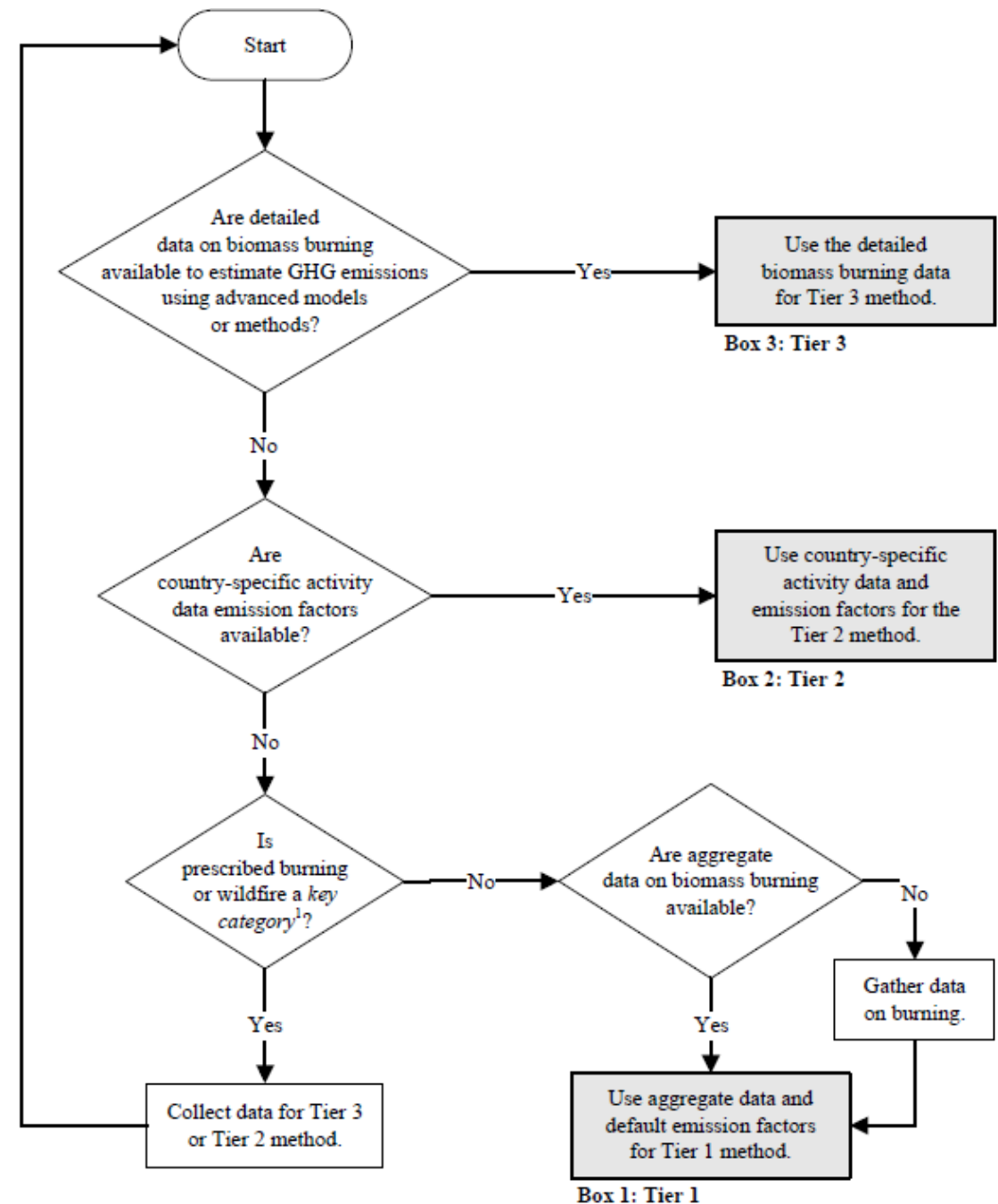# Emissions from fires (CO_2 and non-CO_2 gases)

Description of sources

(1) grassland burning (which includes perennial woody shrubland and savanna burning)

(2) agricultural residues burning

(3) burning of litter, understory and harvest residues in Forest Land

(4) burning following forest clearing and conversion to agriculture

(5) other types of burning (including those resulting from wildfires)

Emissions from fires: CO2 and non-CO2 gases

Estimating/reporting principles

- CO2 and non-CO2 need to be reported for **all fires on managed lands**, with **the exception of CO2** from Grassland and annual crops on Cropland

- **Wildfire of unmanaged land not to be reported**, unless a land-use change

- **Synchrony of CO2 emissions and removals**: CO2 emissions should be reported where the CO2 emissions and removals for the biomass pool are not equivalent in the inventory year

- Fuels available for combustion – account for **true burned amount of biomass**

- Reporting of **annual fire** events

Decision tree for identification of **appropriate tier** to estimate greenhouse gas **emissions from fire** in a land-use category

Emissions from fires: CO2 and non-CO2 gases

Assumptions under Tier 1

Emissions of CO2 from **dead organic matter**

a) **= 0 if forest stands do not die** because of fire, or,

b) C contained in the killed biomass is assumed to be **immediately released to the atmosphere**, if fire kills at least portion of stand (unless salvage logging ?)

Emissions from fires: CO2 and non-CO2 gases

EQUATION 2.27
ESTIMATION OF GREENHOUSE GAS EMISSIONS FROM FIRE

$$L_{fire} = A \bullet M_B \bullet C_f \bullet G_{ef} \bullet 10^{-3}$$

L_{fire} = amount of greenhouse gas emissions from fire, tonnes of each GHG e.g., CH4, N2O, etc.

A = area burnt, ha

M_B = mass of fuel available for combustion, t ha-1. This includes biomass, ground litter and dead wood (default values provided)

C_f = combustion factor, dimensionless (default values provided)

G_{ef} = emission factors, g kg^{-1} dry matter burnt (default values provided)

Practice: estimation of total emission (in CO2eq) from a forest fire, sheet "Emissions from fires"

Emissions from fires: higher tiers

Tier 2 methods employ the same general approach as Tier 1 but make use of more **refined country-derived emission factors** and/or more refined estimates of **fuel densities and combustion factors**

Tier 3 methods are more comprehensive and include considerations of the dynamics of fuels (biomass and dead organic matter)