

The Natural Boom & Bust Cycle of Forest Carbon

Carbon **uptake** & **storage** (growth)

Carbon **uptake** & **storage** (re-growth)

CARBON

Carbon **release** (fire)

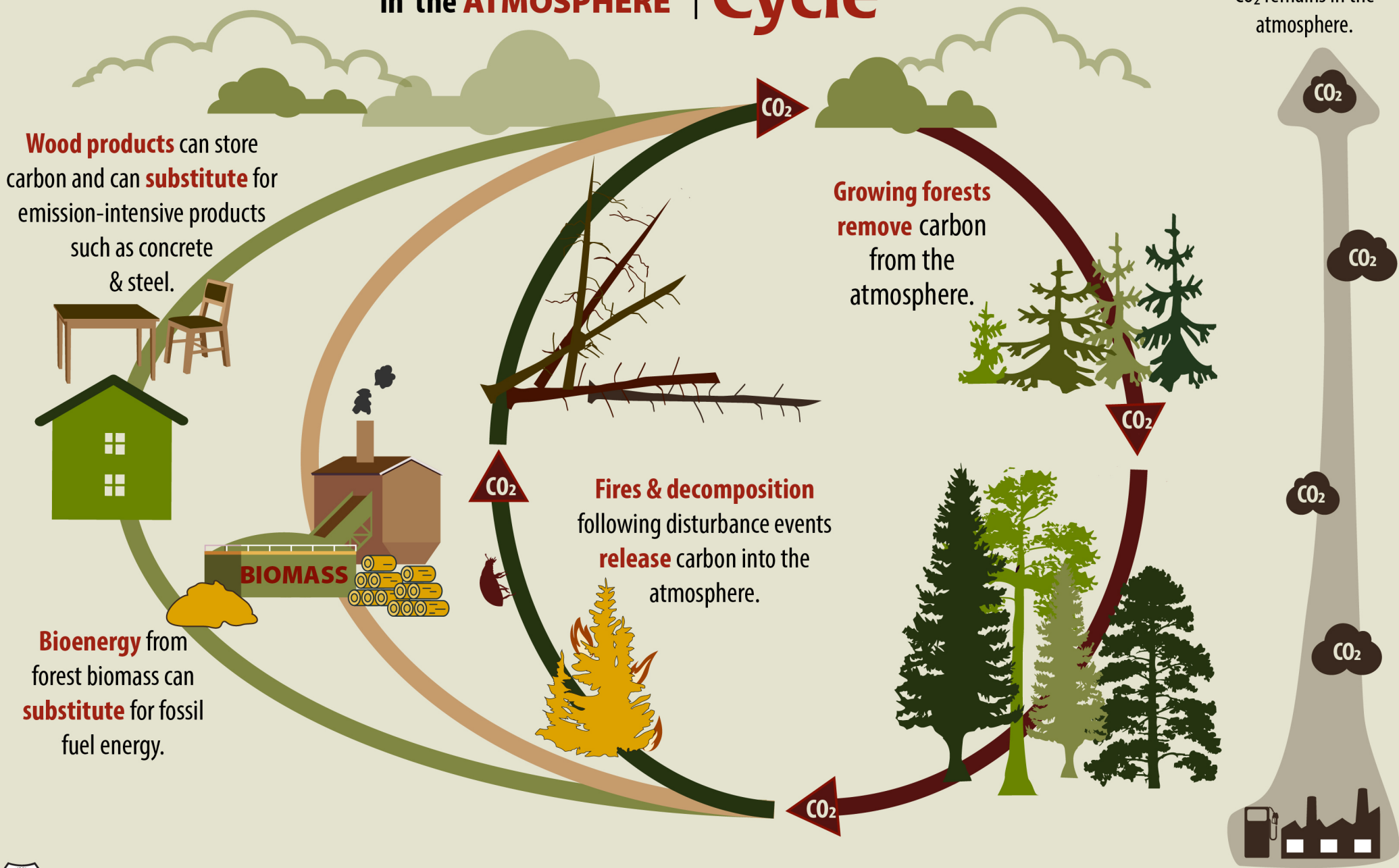
Carbon **release** (decomposition) & **storage** in dead trees

Below-ground carbon **storage** (in roots & soil) is about 50% of forest carbon

The closed loop of
FOREST CARBON
in the **ATMOSPHERE**

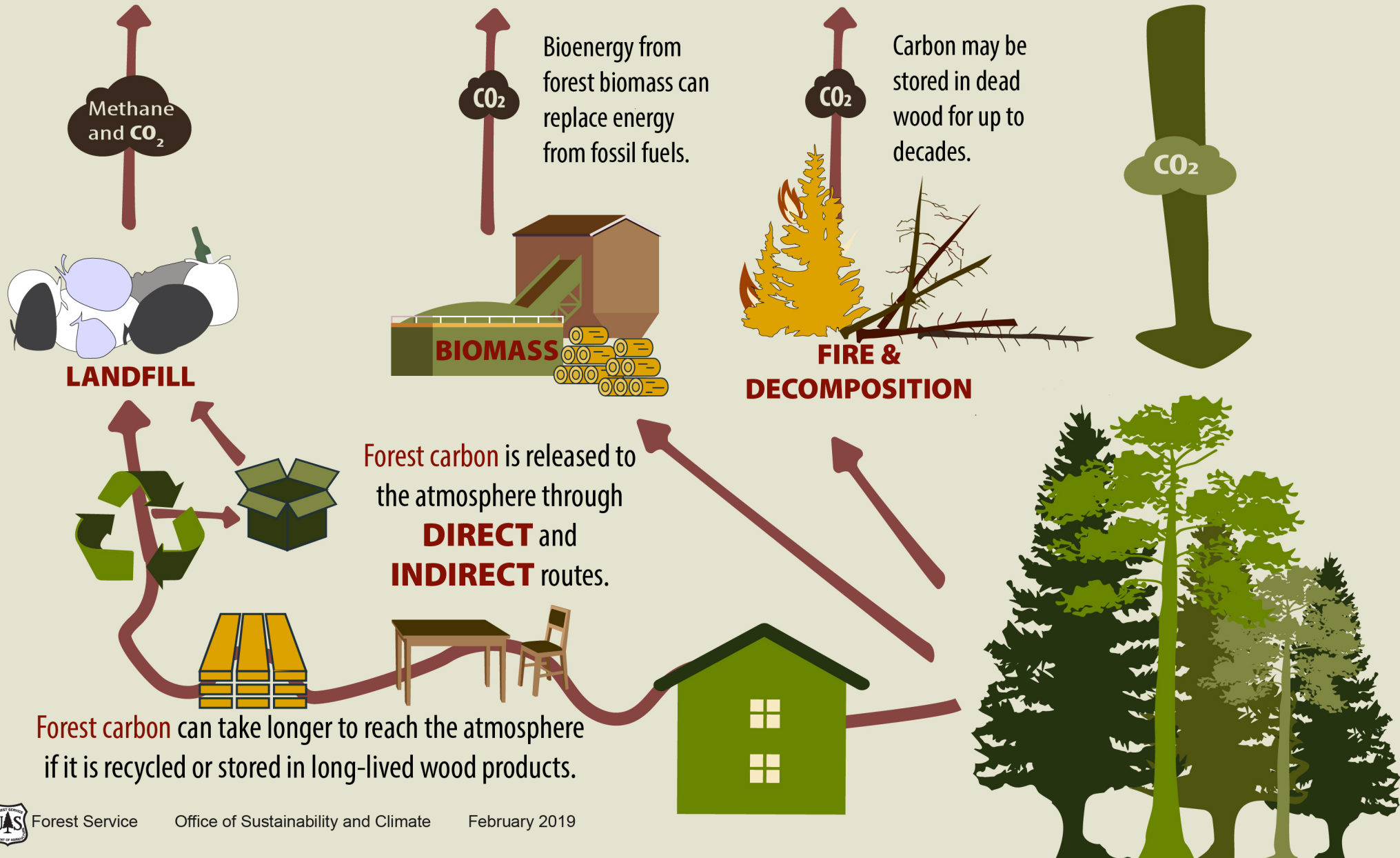
Carbon Cycle

Fossil fuel use is an
OPEN SYSTEM where
CO₂ remains in the
atmosphere.



Various pathways of **FOREST CARBON** into the **ATMOSPHERE**

Carbon Flux



The Change from a Wood-based to a Fossil Fuel-based Economy

Carbon Stocks

The United States **lost 60%**
of its pre-European forest carbon
stocks during settlement and into the
industrial revolution.

About **40%** of the carbon lost
during the industrial revolution has
been **recovered** via re-growth.

CARBON

Wood-based

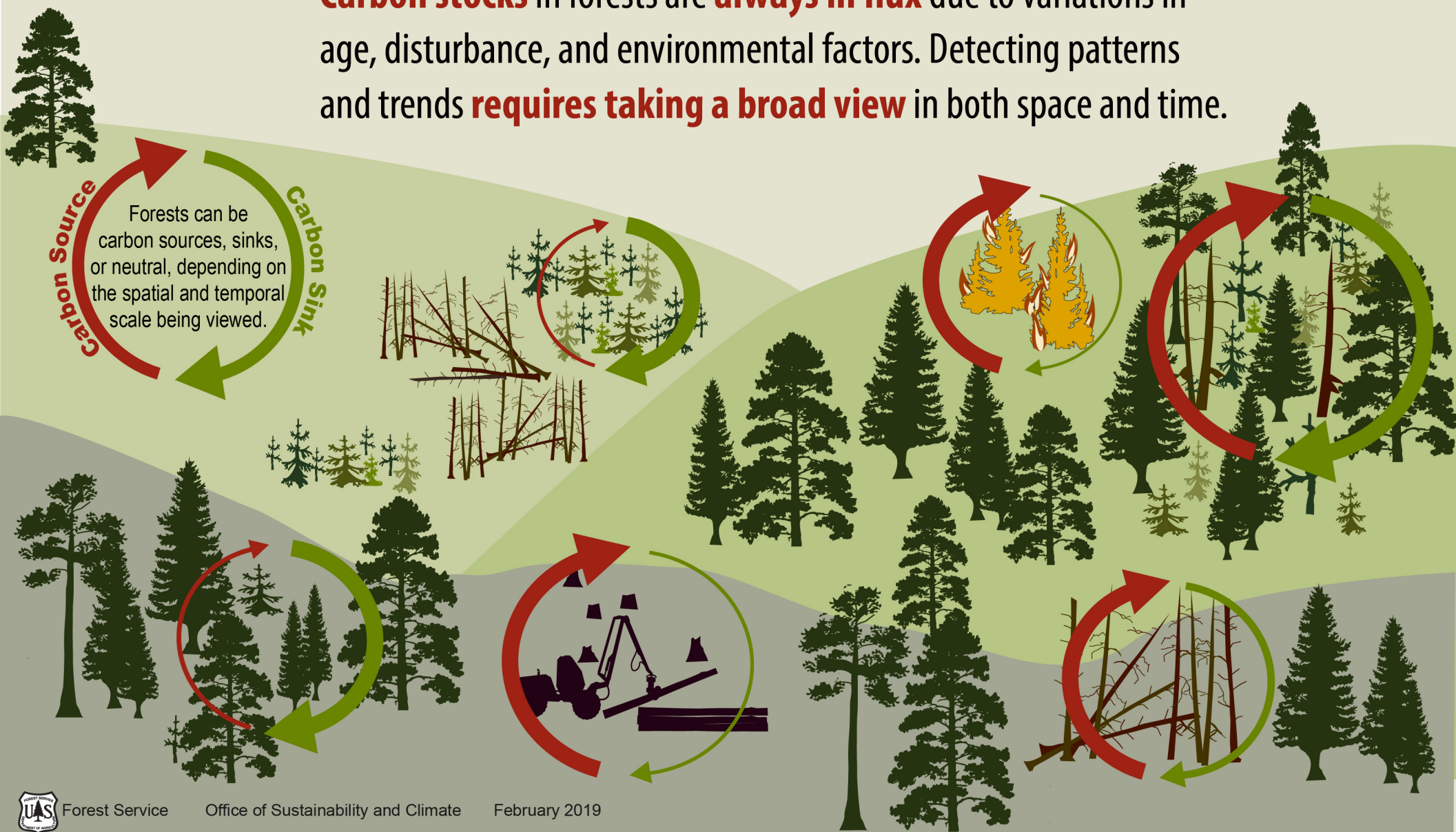
1915

Fossil fuel-based

A spatial and
temporal view

Carbon in Time and Space

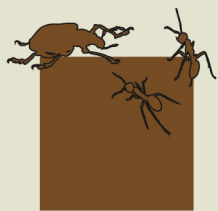
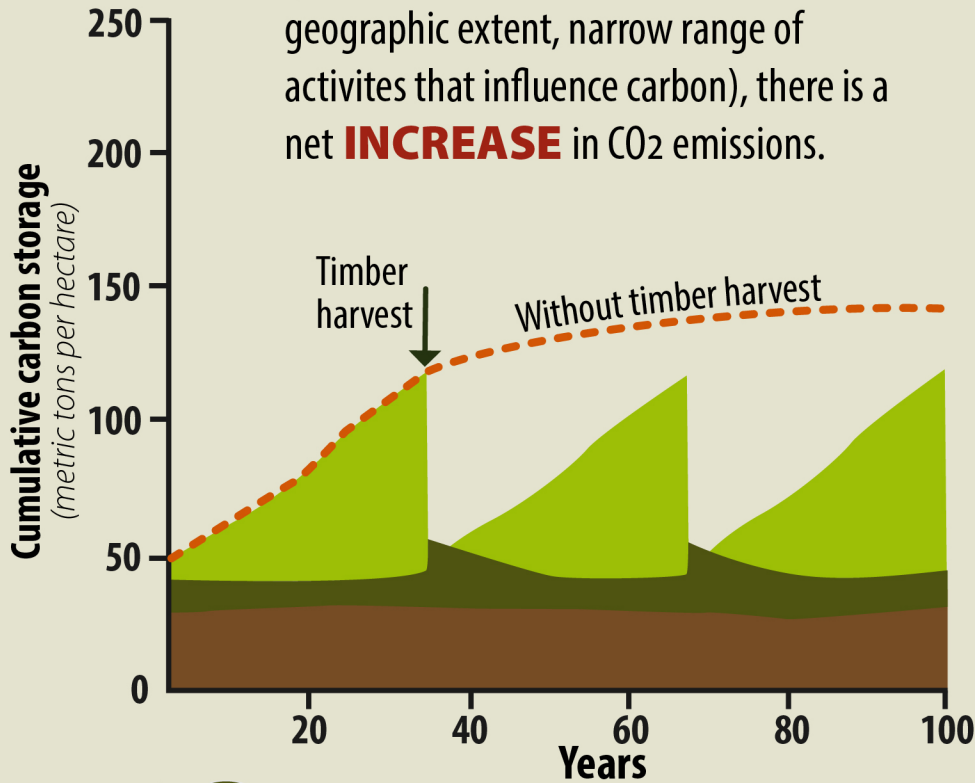
Carbon stocks in forests are **always in flux** due to variations in age, disturbance, and environmental factors. Detecting patterns and trends **requires taking a broad view** in both space and time.



Carbon
BENEFITS
in the Broad View

How Carbon Stacks Up

In the **NARROW VIEW** of the forest system (shorter time scale, smaller geographic extent, narrow range of activities that influence carbon), there is a net **INCREASE** in CO₂ emissions.



Soil



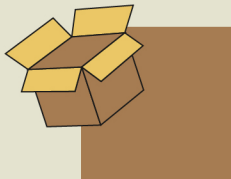
Litter



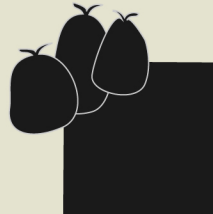
Trees



Long-lived
forest products



Short-lived
forest products



Landfill

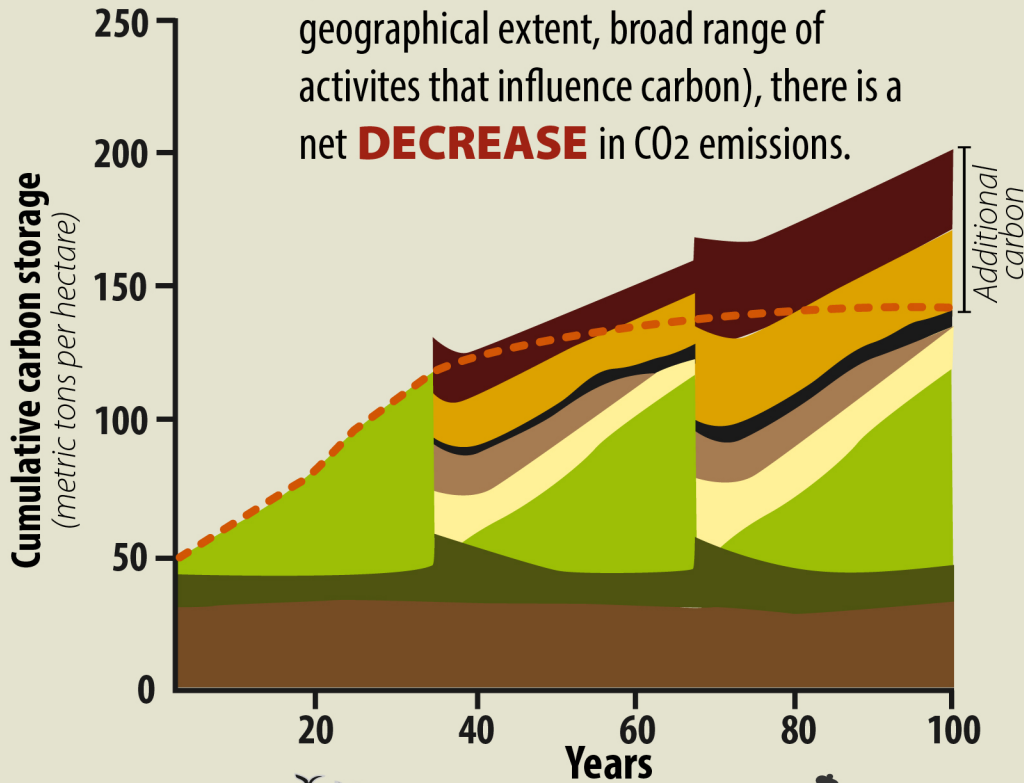


Product
substitution
(building materials)



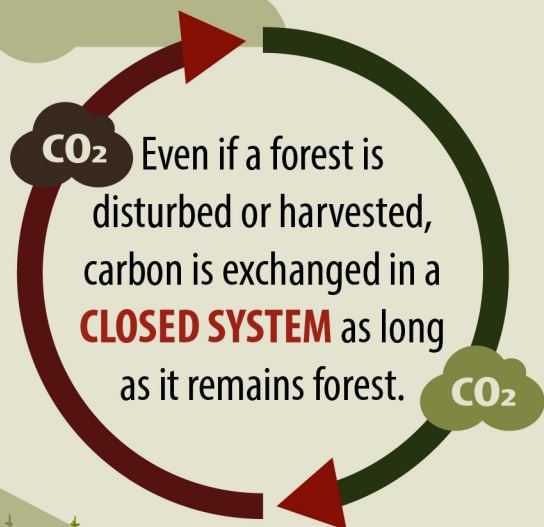
Energy
substitution
(bioenergy)

In the **BROAD VIEW** of the forest system (longer time scale, broader geographical extent, broad range of activities that influence carbon), there is a net **DECREASE** in CO₂ emissions.

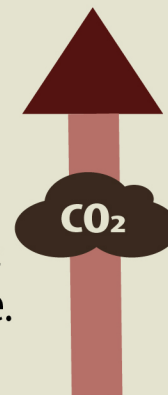


The importance of
KEEPING FORESTS
as forests

Carbon & Land Use Changes

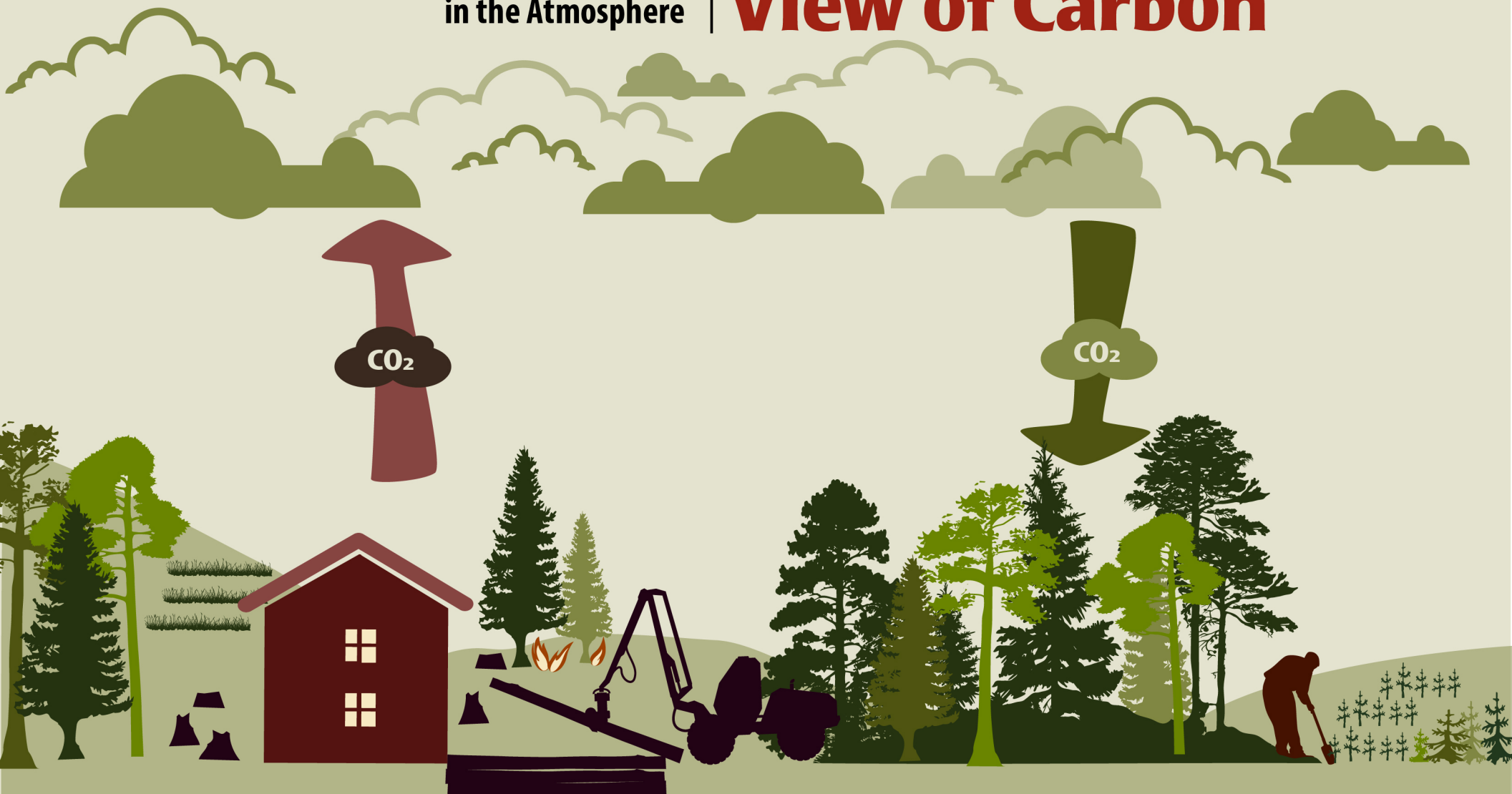


Conversion of forests to non-forest land uses is an **OPEN SYSTEM** where CO₂ remains in the atmosphere.



Carbon
EXCHANGE
in the Atmosphere

A Narrow View of Carbon



Deforestation and forest management activities (harvests, thinning, prescribed fires) **release** carbon to the atmosphere.

Growing forests and tree planting (afforestation/reforestation) **take up and store** carbon from the atmosphere.

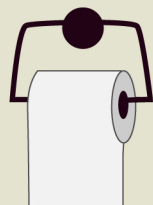
Numbers are
for national
forests only.



The Carbon Bathtub of National Forests

Carbon Dynamics

Carbon entering the
tub through tree
growth = **42 ounces.**



Total carbon stocks
in national forests
= 10,240 ounces
(an 80 gallon tub.)

Net gain of carbon (growth
minus harvest & natural disturbances)
= **31 ounces**, equivalent to a
large bottle of shampoo.



Carbon leaving the
tub from harvesting
= **3 ounces**,
equivalent to what a
washcloth can
absorb.

Carbon leaving the tub through
natural disturbances = 8 ounces.