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College of the Environment



Carbon Storage in Forests and Wood Buildings: Myths, Misconceptions or Reality?

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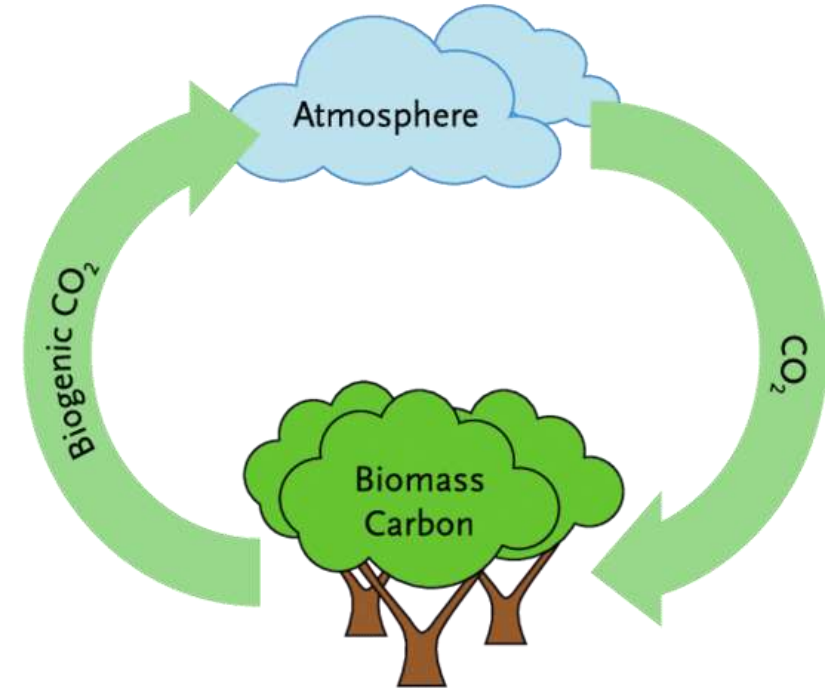
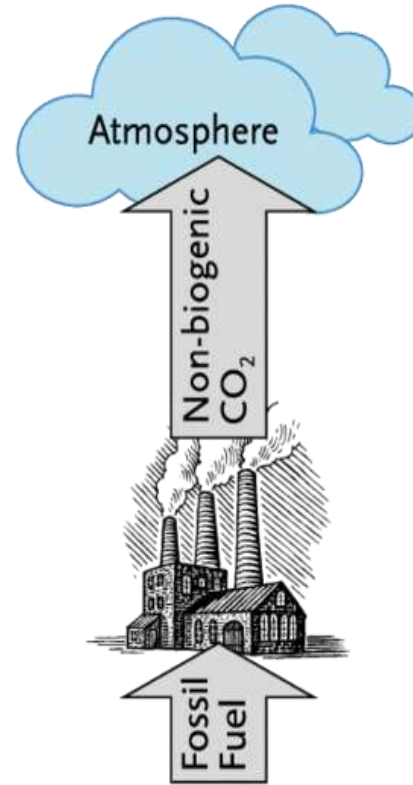
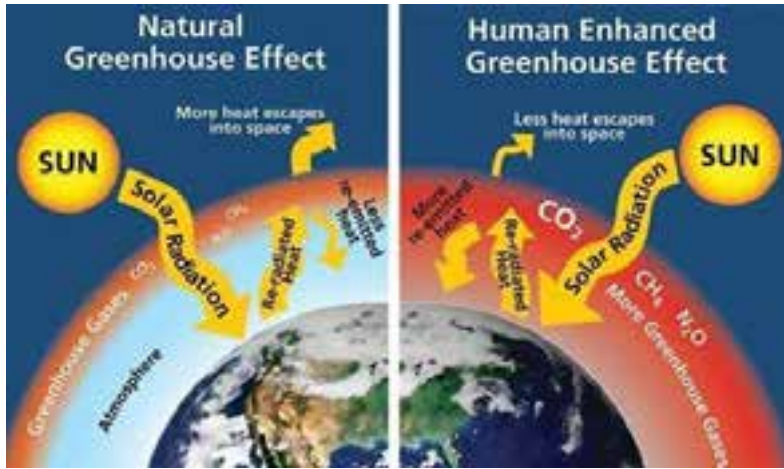
BUILDING SUSTAINABLY: FROM FORESTLAND MANAGEMENT TO CARBON-POSITIVE, HEALTHY BUILDINGS

ORGANIZED BY: WOODWORKS

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Disclaimer: This presentation was developed by Dr. Ganguly and is not funded by WoodWorks or the Softwood Lumber Board.

Anthropogenic Climate Change



Anthropogenic Emission

The tale of Two Carbons:
Fossil Carbon and Biogenic Carbon

(MorR 1): Myths/Misconceptions or Reality:
Biogenic Carbon Neutrality

The carbon neutrality assumption of biogenic carbon is greenwashing as **fossil carbon** is exactly same as **biogenic carbon**

Answer: Oversimplified and/or wrong --
Misconception.

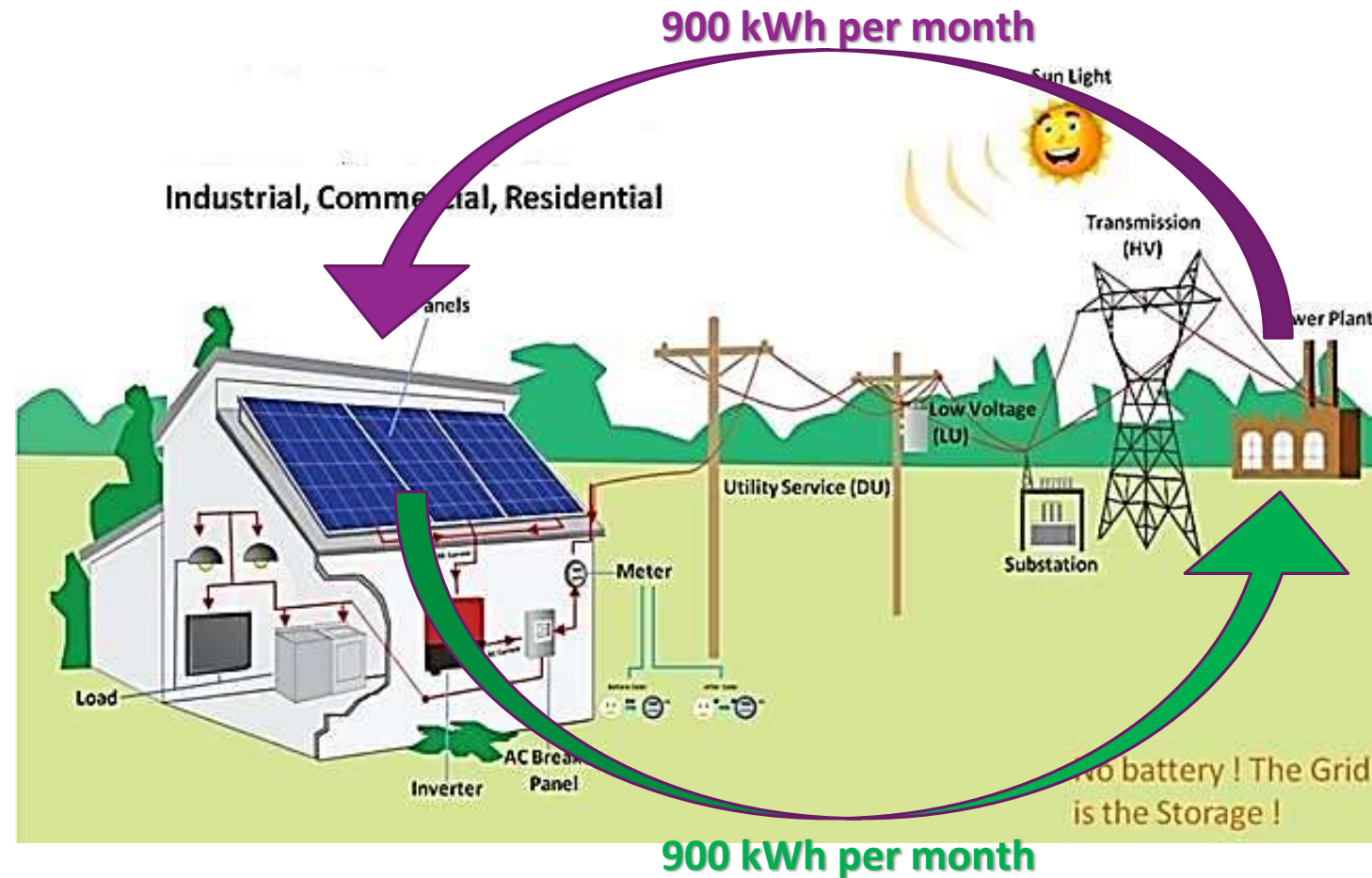
MoR1: Biogenic Carbon Neutrality

Definition of Biogenic Carbon Neutrality:

1. **Carbon neutrality** as a property of wood or other biomass harvested from forests where **new growth completely offsets** losses of carbon caused by harvesting.
2. As carbon is released from harvested wood back into the atmosphere, usually as biogenic CO₂, growing trees are removing CO₂ from the atmosphere at a rate that completely offsets these emissions of biogenic CO₂, resulting in ***net biogenic CO₂ emissions of zero or less***.
3. A forest producing carbon neutral wood will have ***stable or increasing stocks of forest carbon***.
4. Forestland should continue to be forestland, either through plantation or natural regeneration (ensure no land use change).

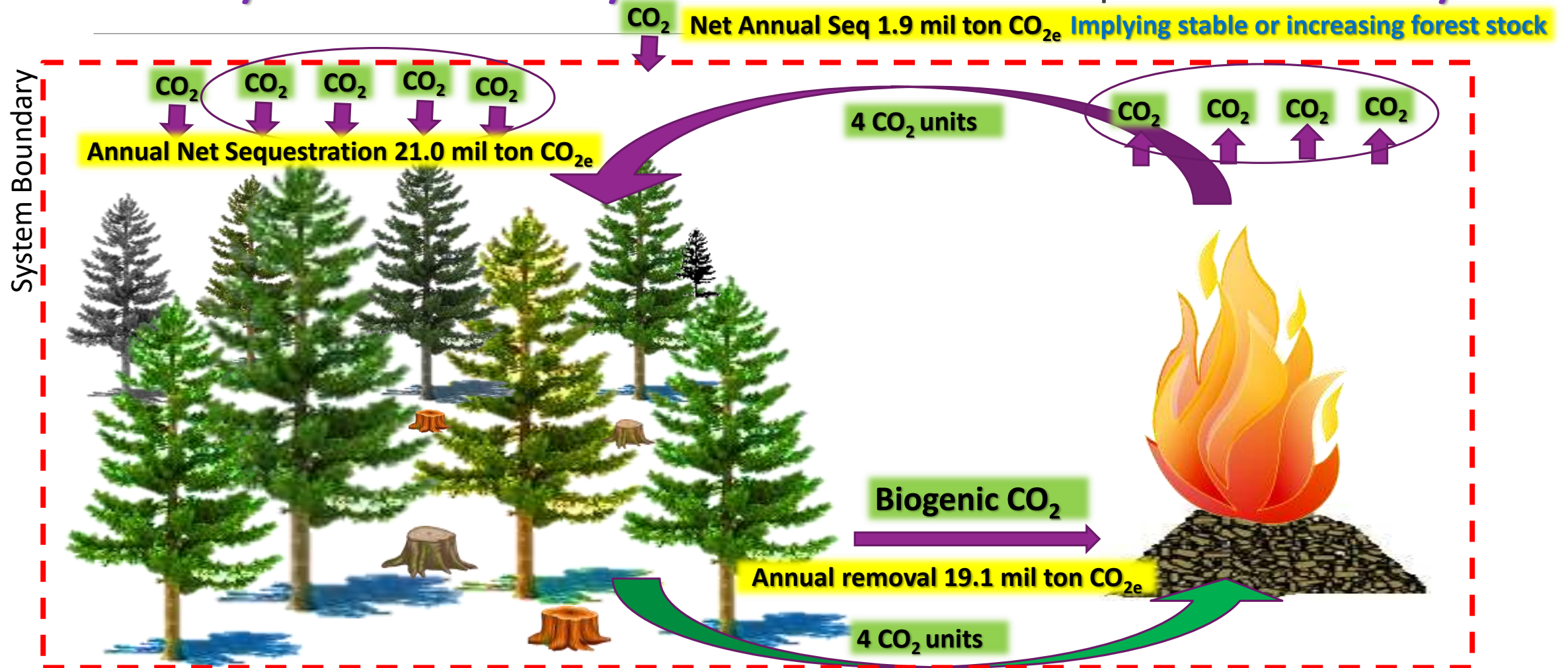
MoR1: Biogenic Carbon Neutrality

System Boundary and the LCA concept of neutrality



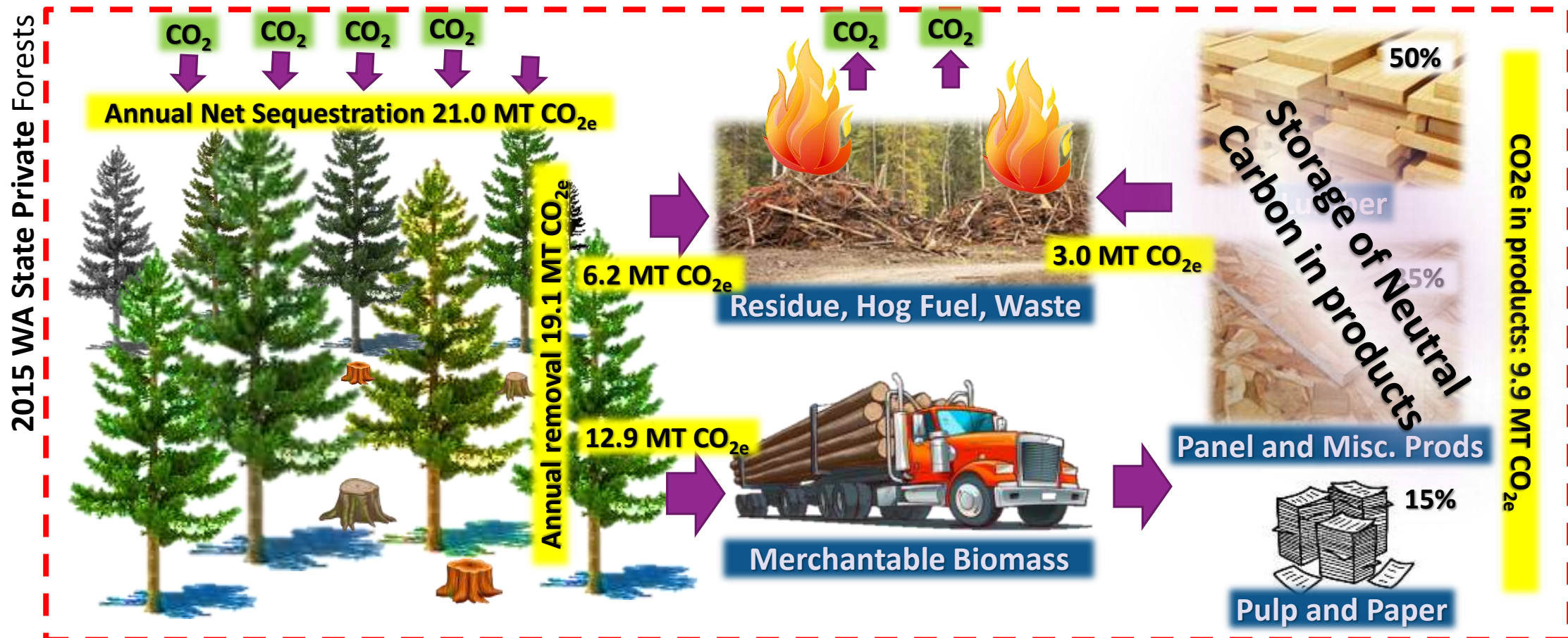
MoR1: Biogenic Carbon Neutrality

MoR1: System Boundary and the LCA concept of neutrality



MoR1: Biogenic Carbon Neutrality

MoR1: Biogenic Carbon **Neutrality** and Biogenic Carbon **Storage**



MoR1: Biogenic Carbon Neutrality

Why do we hear conflicting information?

Biomass carbon pool aspects: Windows of our perception



(MorR 2): Myths/Misconceptions or Reality:
Wait for Forest to Grow

Alternate explanation of carbon neutrality:
We harvest today, then replant seedlings and wait for 40 years (anything between 20 to 80) to recoup the loss in forest biomass.

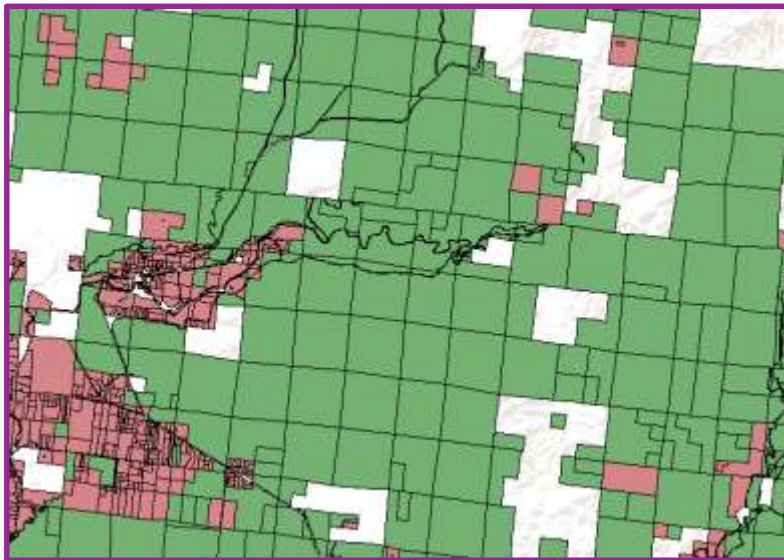
Answer: This is a widely circulated **misunderstanding/myth**.

MorR 2: Wait for Forest to Grow

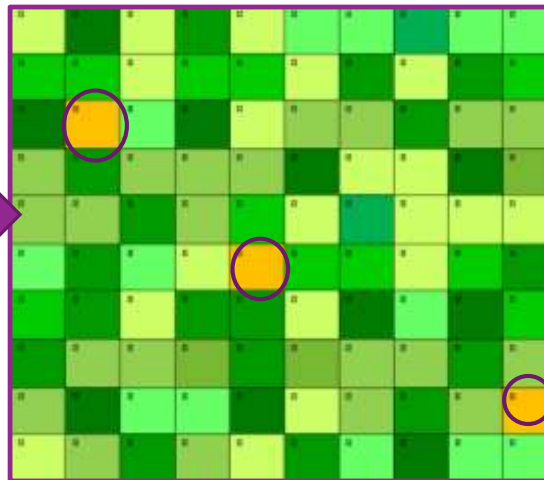
Tree vs Plot vs Landscape

Sustainable Forest Management: Forests managed for timber production are considered sustainable if the harvests are planned to **not remove more wood than is grown** (i.e., the forest inventory is not declining over time). In other words, on an average the yearly harvest from an administrative landscape unit is lower than the annual growth

A section in the Grays Harbor county (intensively managed forests)



Simplified Representation



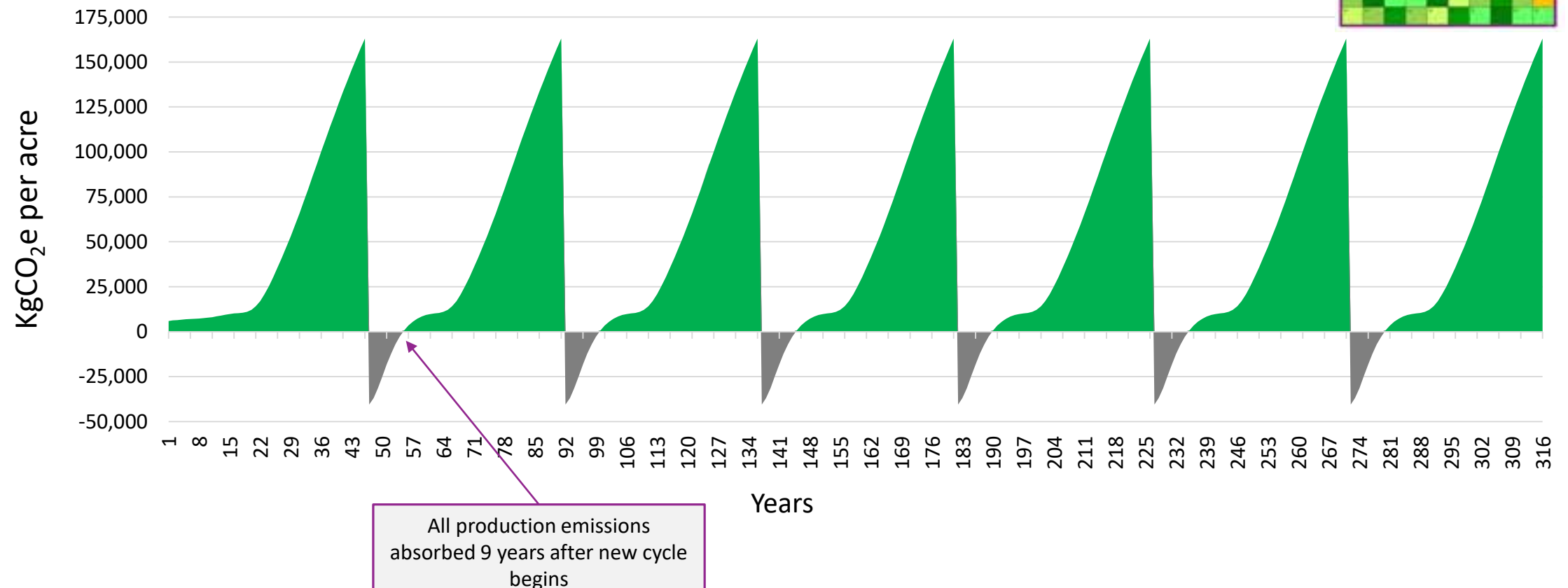
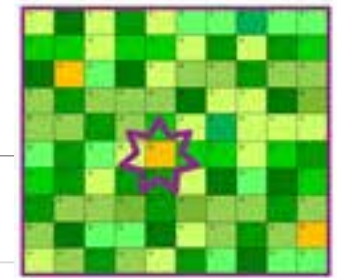
Plots different age classes distributed across the landscape

Assuming a 45-year harvest cycle, 2.2% of the plots are harvested every year

9-11% of the total aboveground biomass is harvested every year

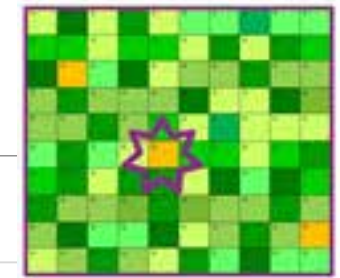
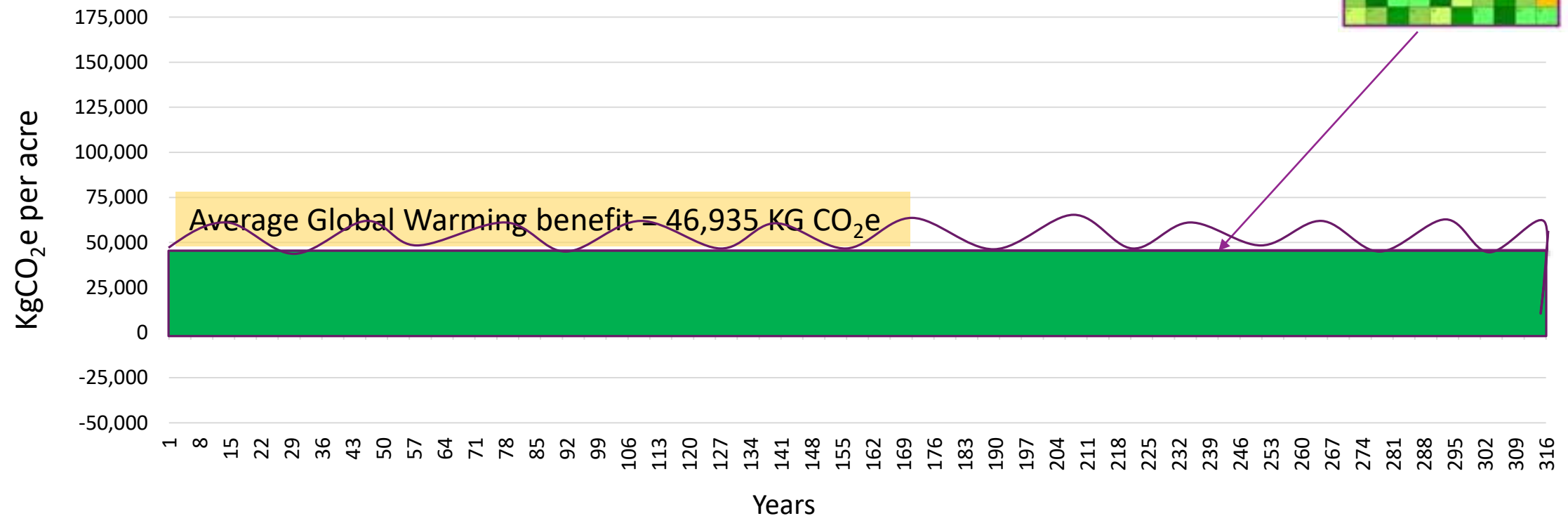
MorR 2: Wait for Forest to Grow

Story of Single Plot Vs Landscape



MorR 2: Wait for Forest to Grow

Story of Single Plot Vs Landscape



(MorR 3): Myths/Misconceptions or Reality:

Anti Harvest

We will be better-off environmentally, if we don't harvest and let the trees grow.

Answer: False/based on faulty assumptions/myth.

Rate of carbon sequestration in mature forests vs younger forests

Some Definitions:

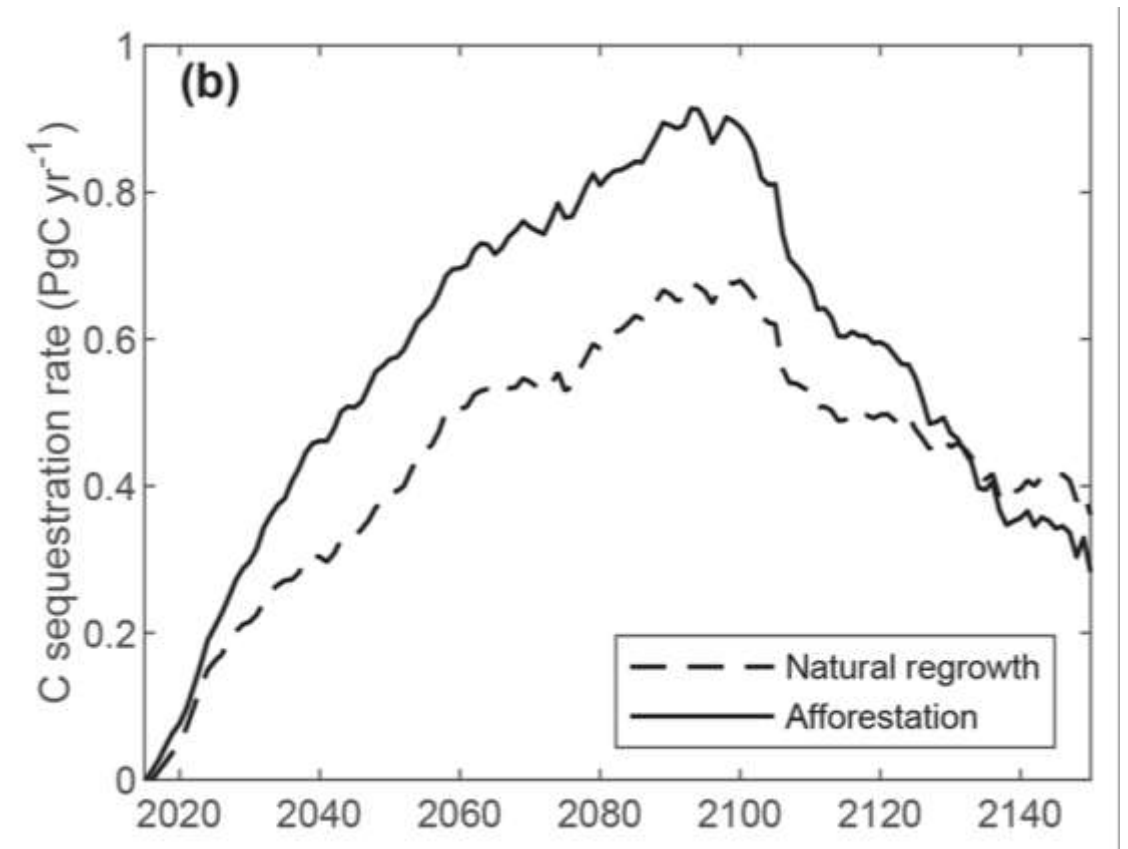
Carbon pool: A reservoir of carbon.

Carbon stock: The absolute quantity of carbon held within a pool at a specified time.

Sequestration (uptake): The process of increasing the carbon content of a carbon pool. (IPCC, 2000).

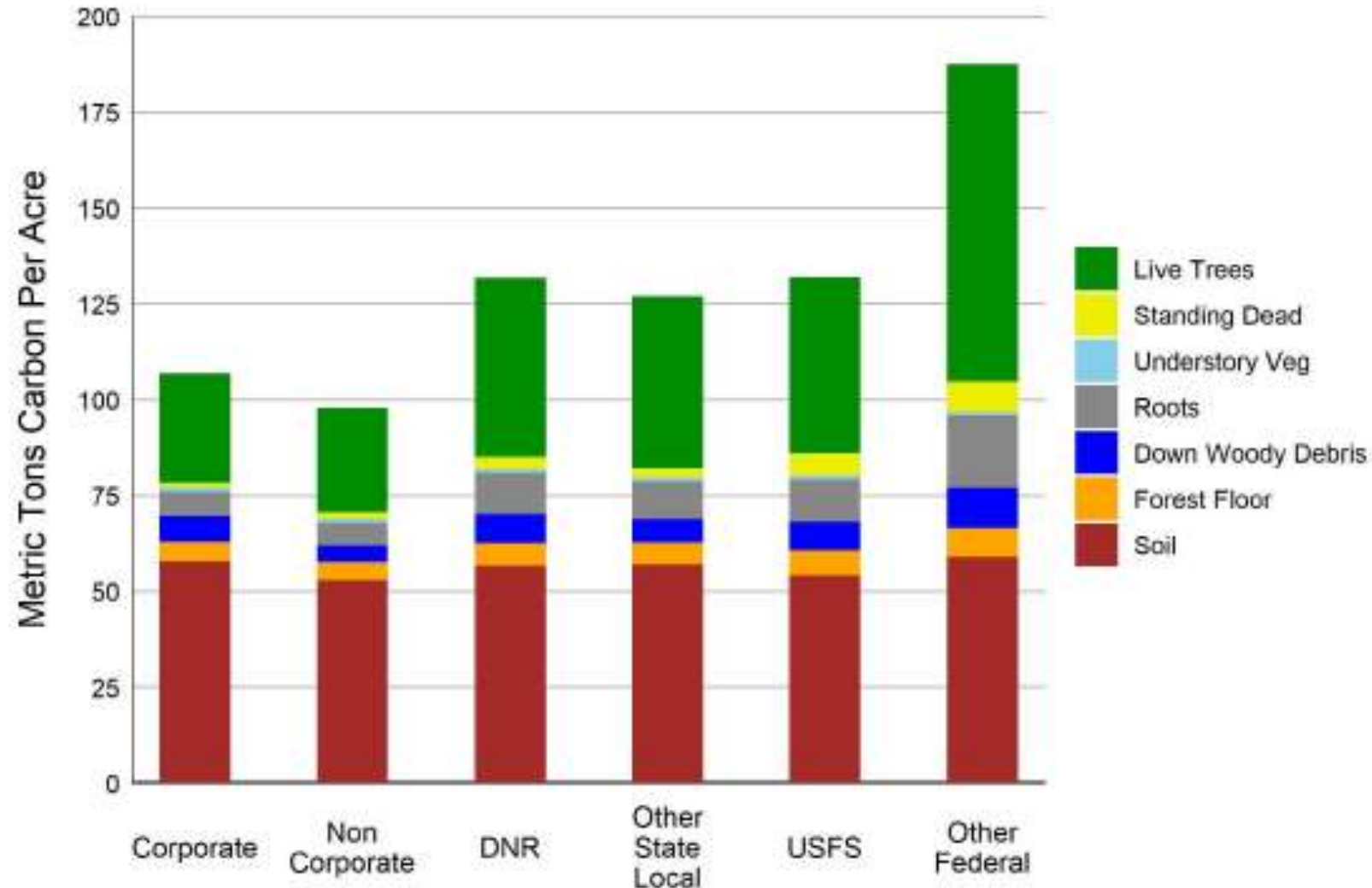
Carbon sink: A given pool (reservoir) can be a sink for atmospheric carbon if, during a given time interval, more carbon is flowing into it than is flowing out.

Carbon flux: Transfer of carbon from one carbon pool to another.



Source: Braakhekke 2019. <https://doi.org/10.5194/esd-10-617-2019>

Forest carbon pool by ownership for the 2016 WA inventory period

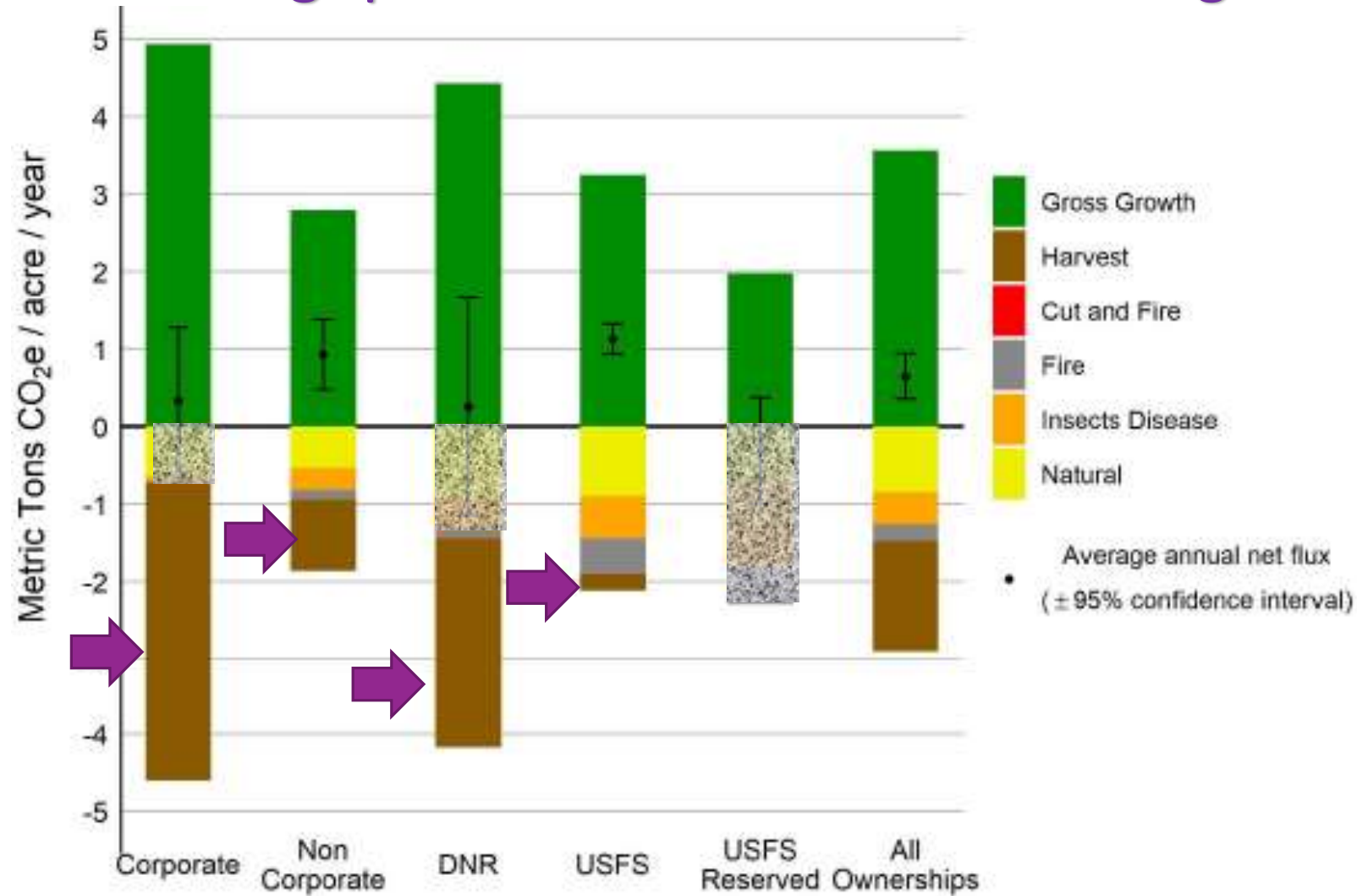


Carbon pool in Forests



MorR 3: Anti Harvest

Annual change per acre in live tree carbon from growth, removals and mortality

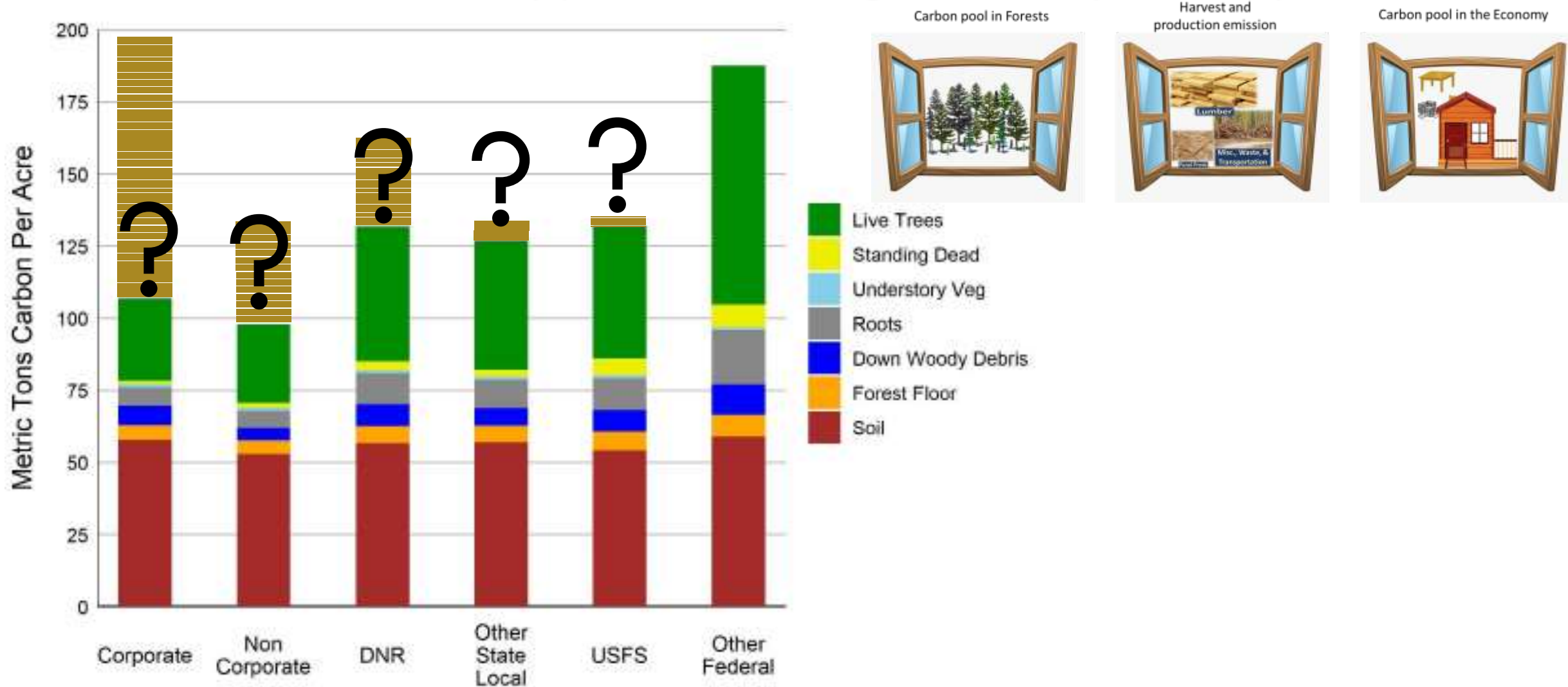


Carbon pool in Forests



MorR 3: Anti Harvest

Pool for the 2016 inventory period, including the wood products pool

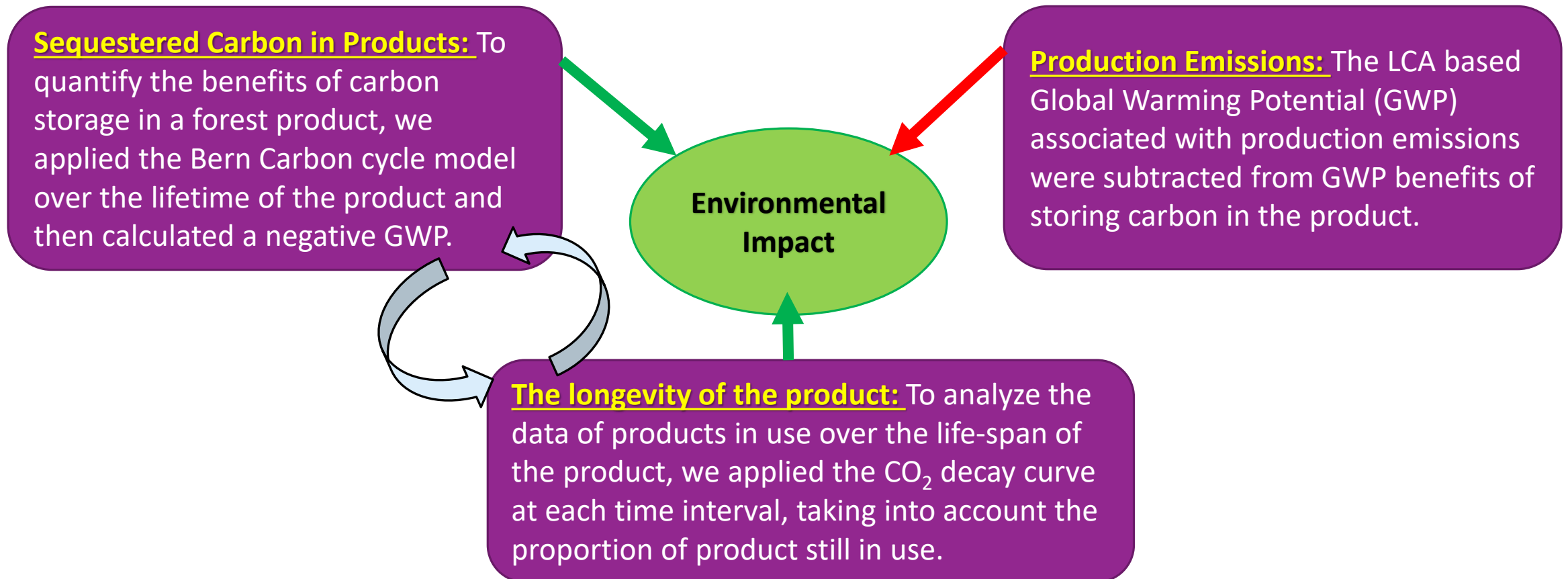


Global warming mitigating impacts (or, benefits) of carbon stored in wood products

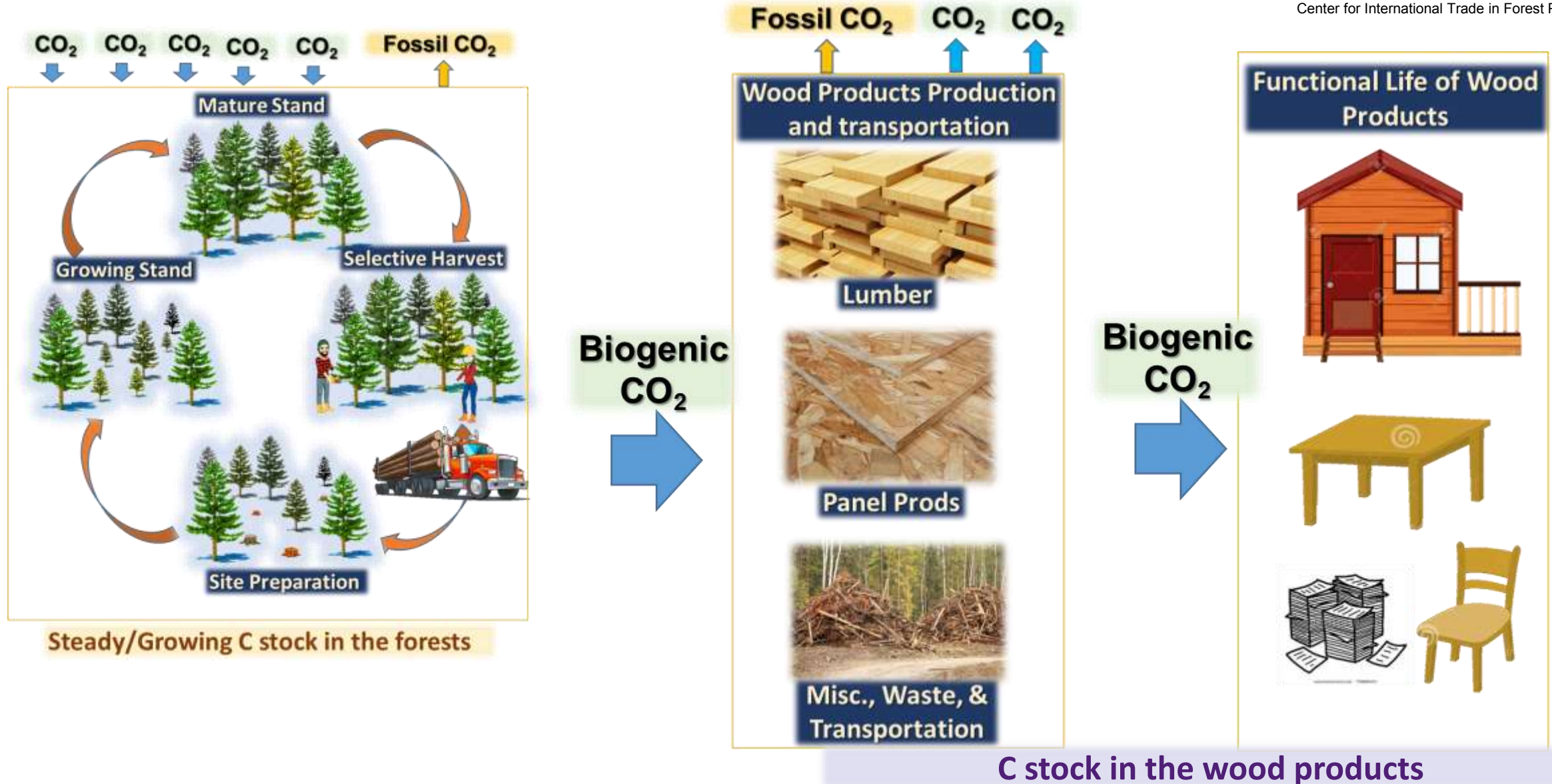
This section is based on a paper published in *'Forests'*:
<https://www.mdpi.com/1999-4907/11/2/194>

How is radiative forcing used to measure impact of carbon stored in wood products?

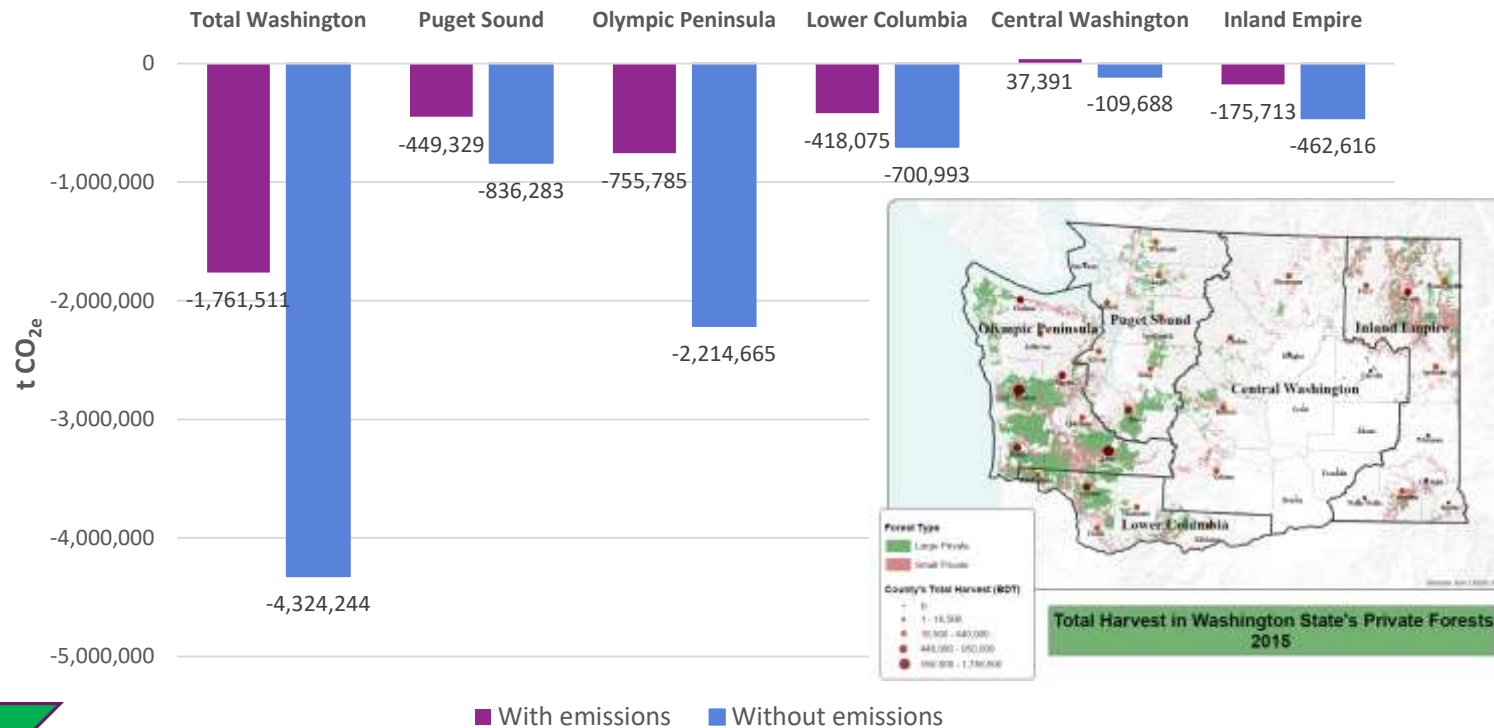
Methodology for factoring-in impacts of wood products



Aspects of environmental assessment of wood products



Global warming mitigating potential Washington state's wood products from private lands



The **overall benefit** on global warming of storing carbon in wood products from private land in Washington state is:

- Without production emissions: **~ 4.3 million tCO_{2e}**
- With production emissions: **~ 1.8 million tCO_{2e}**

Ganguly et al., 2019, <https://www.mdpi.com/1999-4907/11/2/194>

WA State Law: *State's forests and forest products sector as part of the state's global climate response*

From WFPA website: On average, the private forest industry, including growing, harvesting, transportation and milling wood is *Below Net Zero* as it sequesters 12% of WA state's carbon emissions (Source: [University of Washington Forest Carbon Study, 2020](#)).

"On March 25, 2020, Governor Jay Inslee signed HB 2528 into law which recognizes the contributions of the state's forests and forest products sector as part of the state's global climate response." (National Law Review, Oct 14th, 2020)

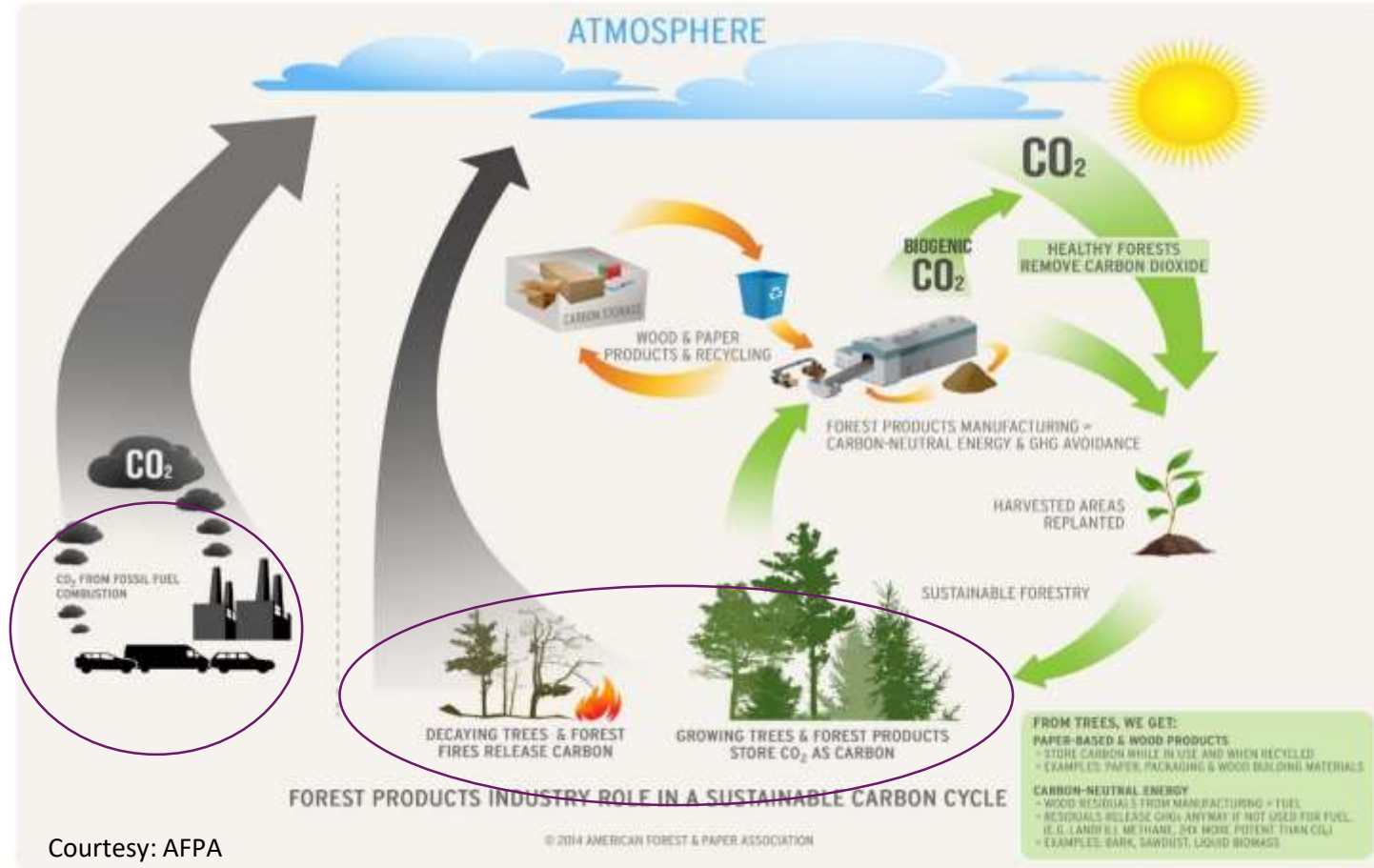
"The enactment of this law provides an opportunity for the forestry and forest products sector to expand its services and contribute to the state's climate goals." (National Law Review, Oct 14th, 2020)

National Law Review (<https://www.natlawreview.com/article/forests-recognized-contributors-to-washington-state-s-response-to-climate-change>)

Discussion on the bill: <https://opportunitywa.org/reducing-washingtons-carbon-emissions-by-promoting-washingtons-forest-product-industry/>

MoR: Concluding Remarks

‘Fossil Carbon’ is different from ‘Biogenic Carbon’ with respect of global warming and climate change



Courtesy: AFPA

Bottomline:

1. Awareness about sourcing of wood. Softwood lumber sourced in the North America should be okay.
2. Sustainable forestry doesn't have to be eco-certified (FSC, SFI etc.). However, most of the softwood lumber (90% plus in WA) produced in North America is certified by one of the third-party agencies.
3. Yes, biogenic carbon and fossil carbon are identical in their elemental form, but one of them does not increase the abundance of GHGs in the atmosphere, if our terrestrial ecosystem is managed sustainably.
4. Acknowledging, the passionate concerns of individuals and groups, however, some of the misunderstanding may stem from an incomplete view of the biogenic carbon flow.
 - Its important to differentiate between valid concerns and economically vested propaganda.

Thank you for your attention!

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