Biomass feedstocks and the climate implications of bioenergy

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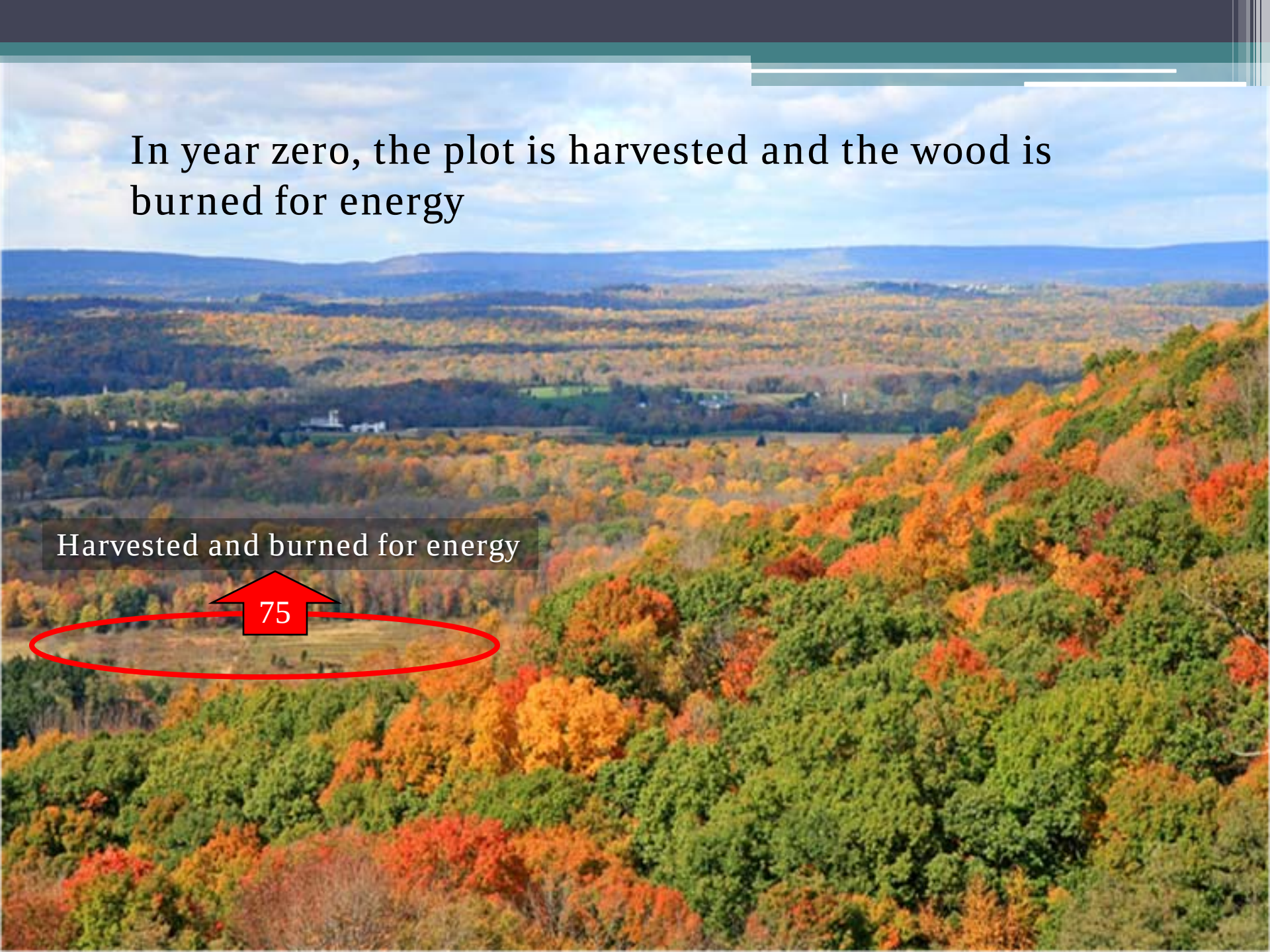
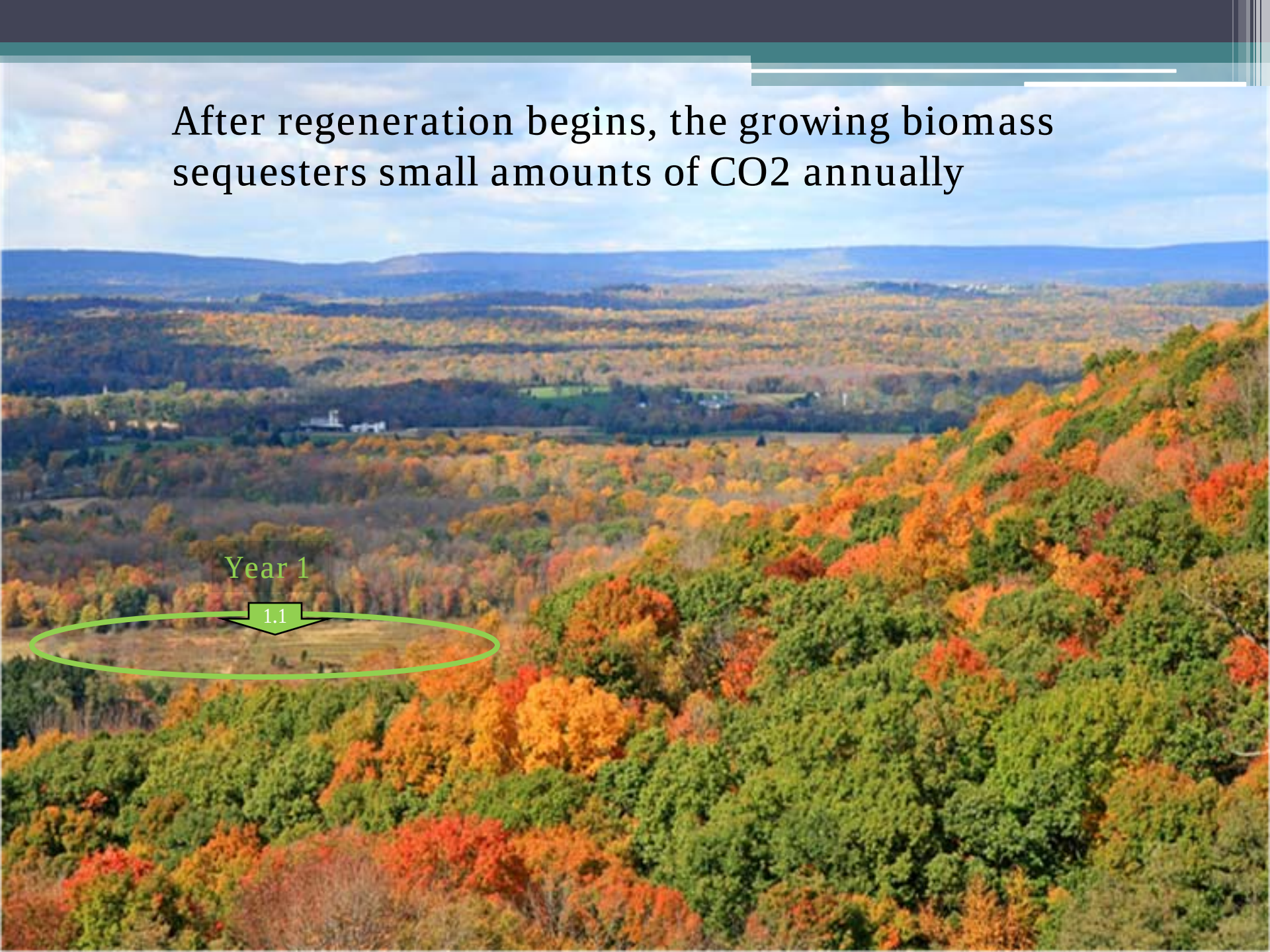
Slides adapted from Reid Miner NCASI

On the landscape, the single-plot looks like this

In year zero, the plot is harvested and the wood is burned for energy



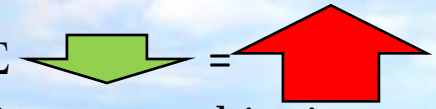
After regeneration begins, the growing biomass sequesters small amounts of CO2 annually




Year 2
2.1


Year 3
2.8

Over time, if carbon stocks are returned to pre-harvest levels...

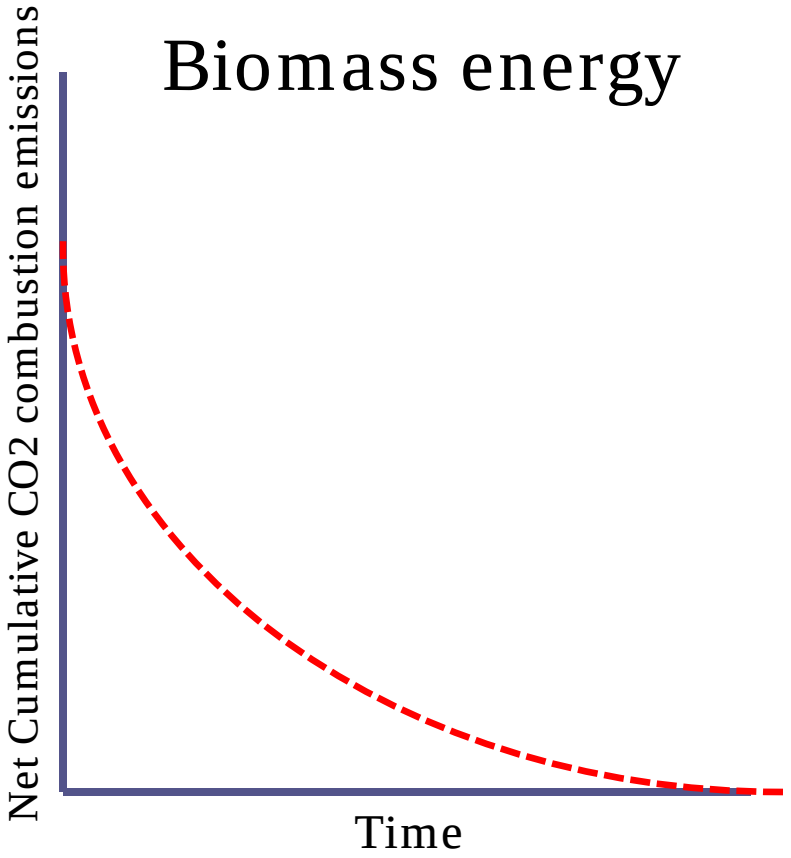


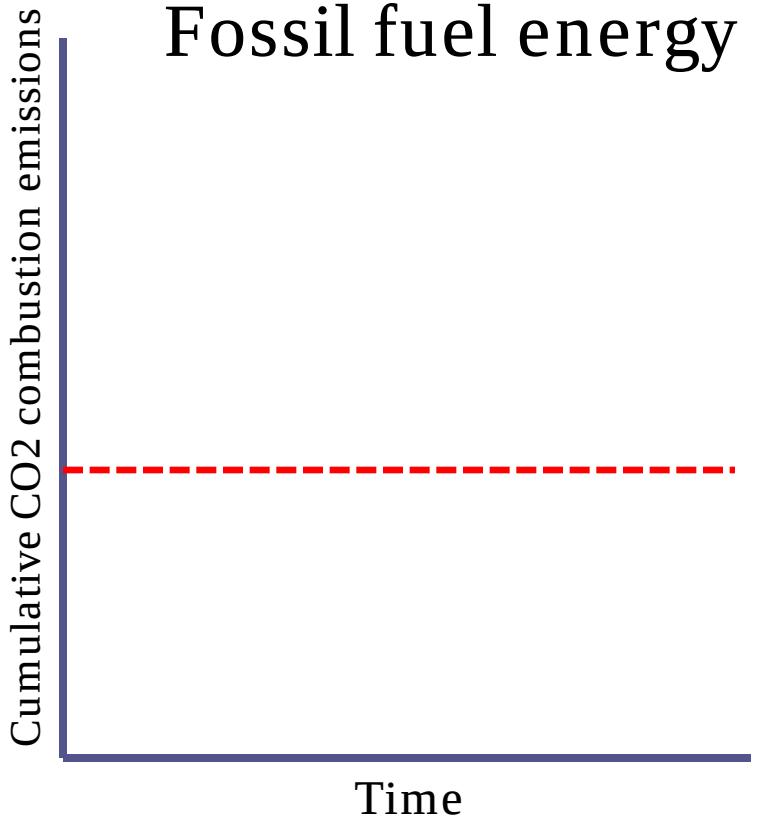
...the net emissions over this time are zero.

Year X, until next harvest

???

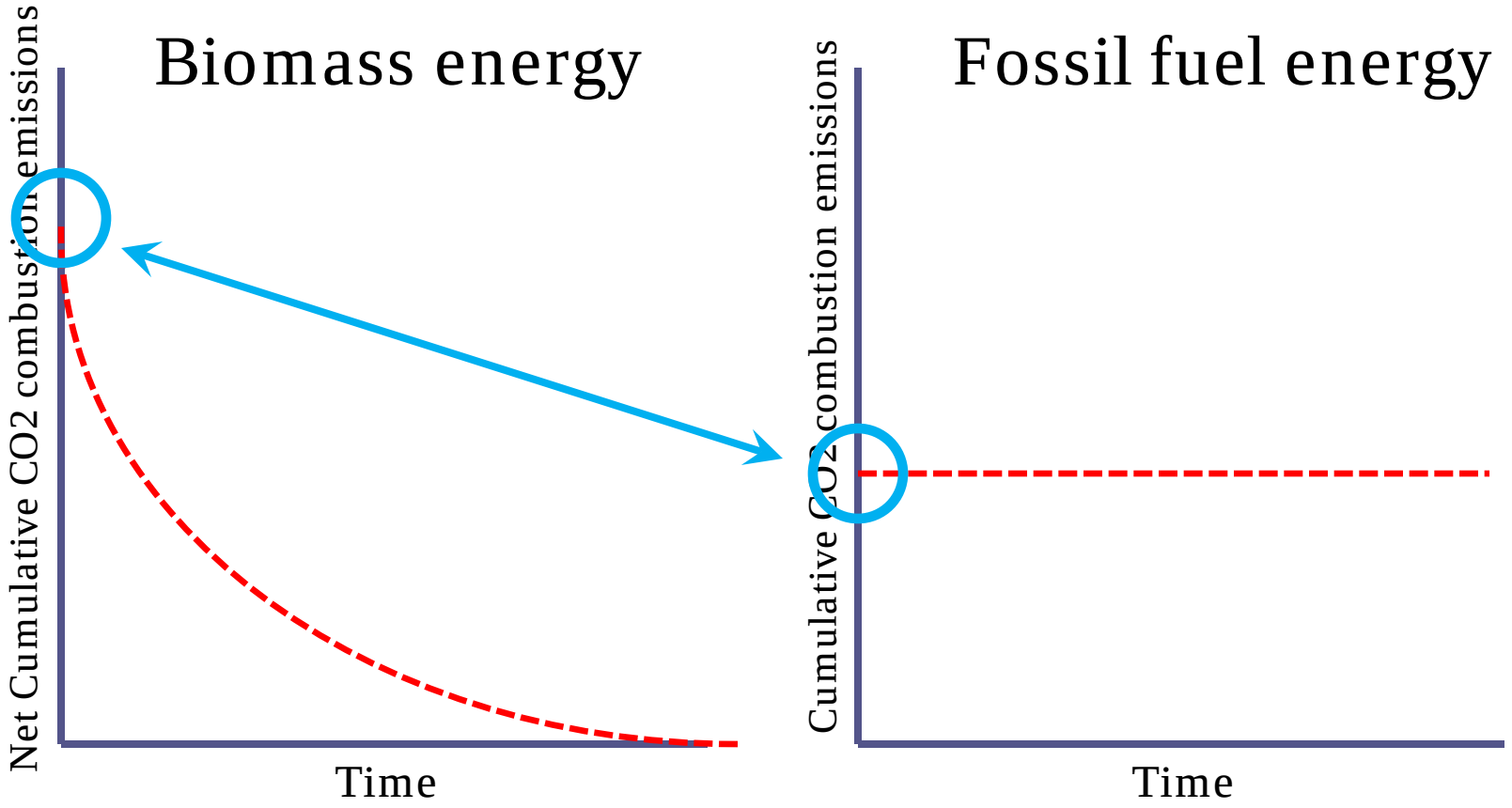
single plot analysis



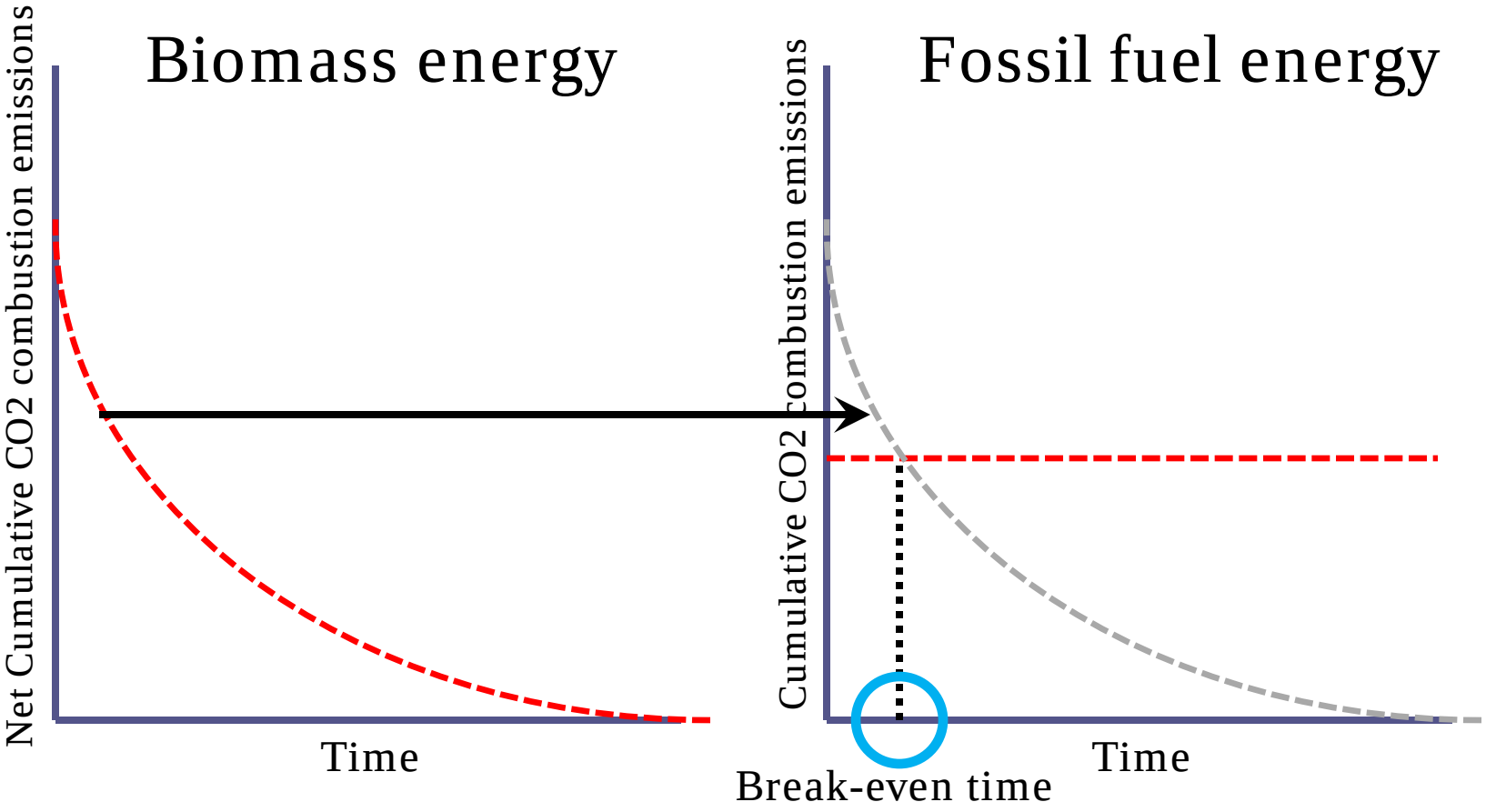


single plot analysis

Biomass emissions will be higher initially because more fuel is needed to generate the same amount of usable energy

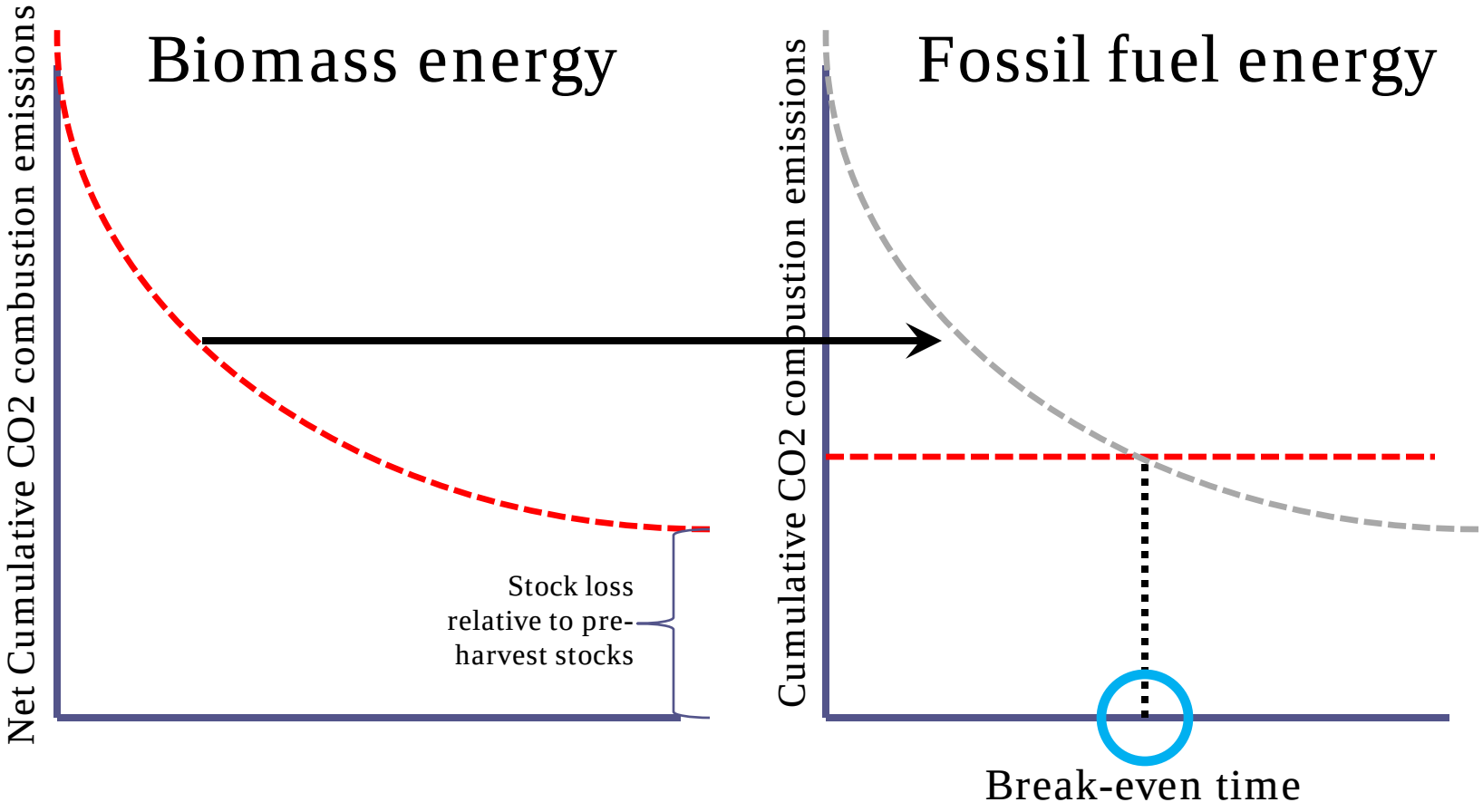


single plot analysis

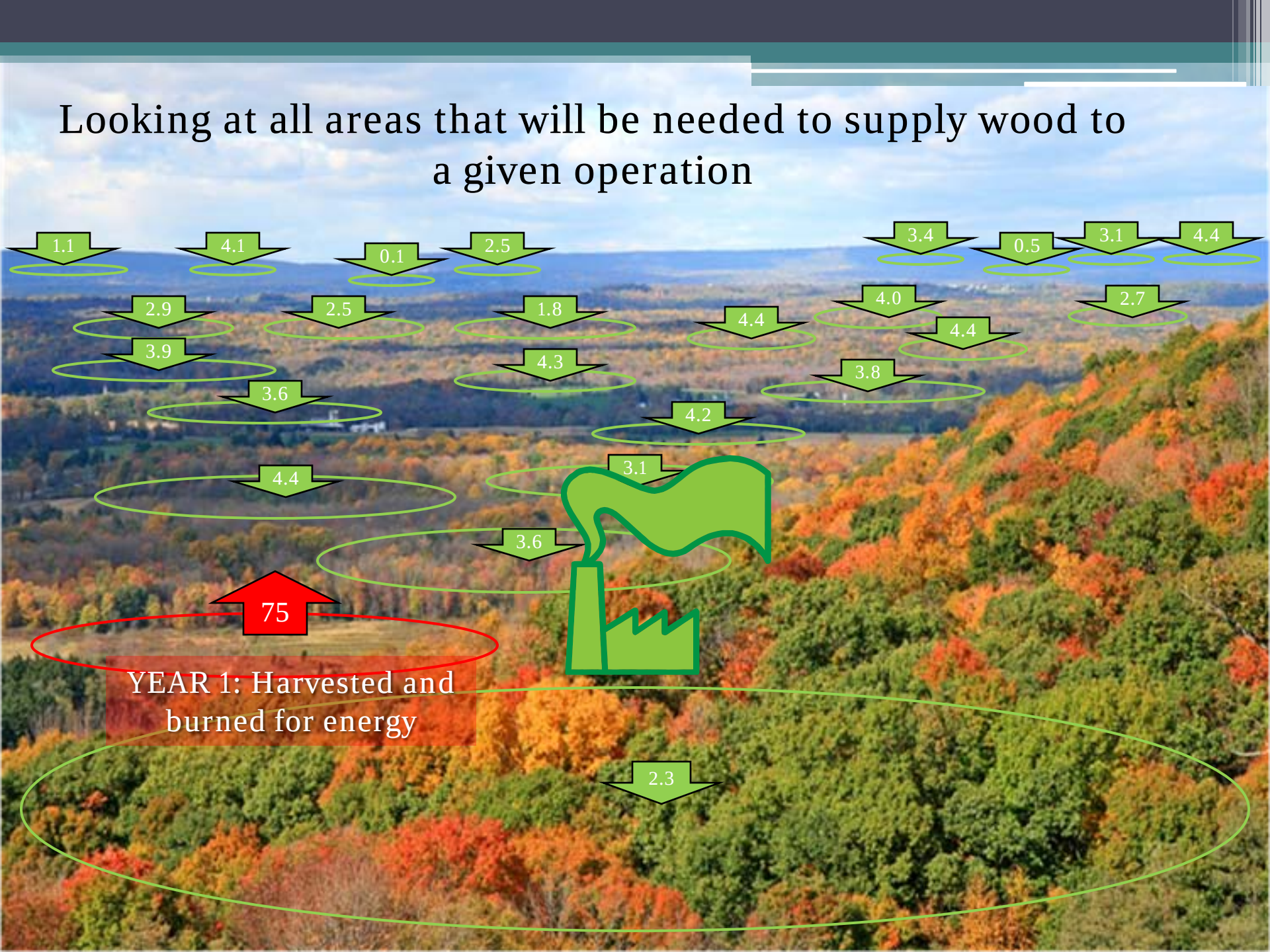


single plot analysis

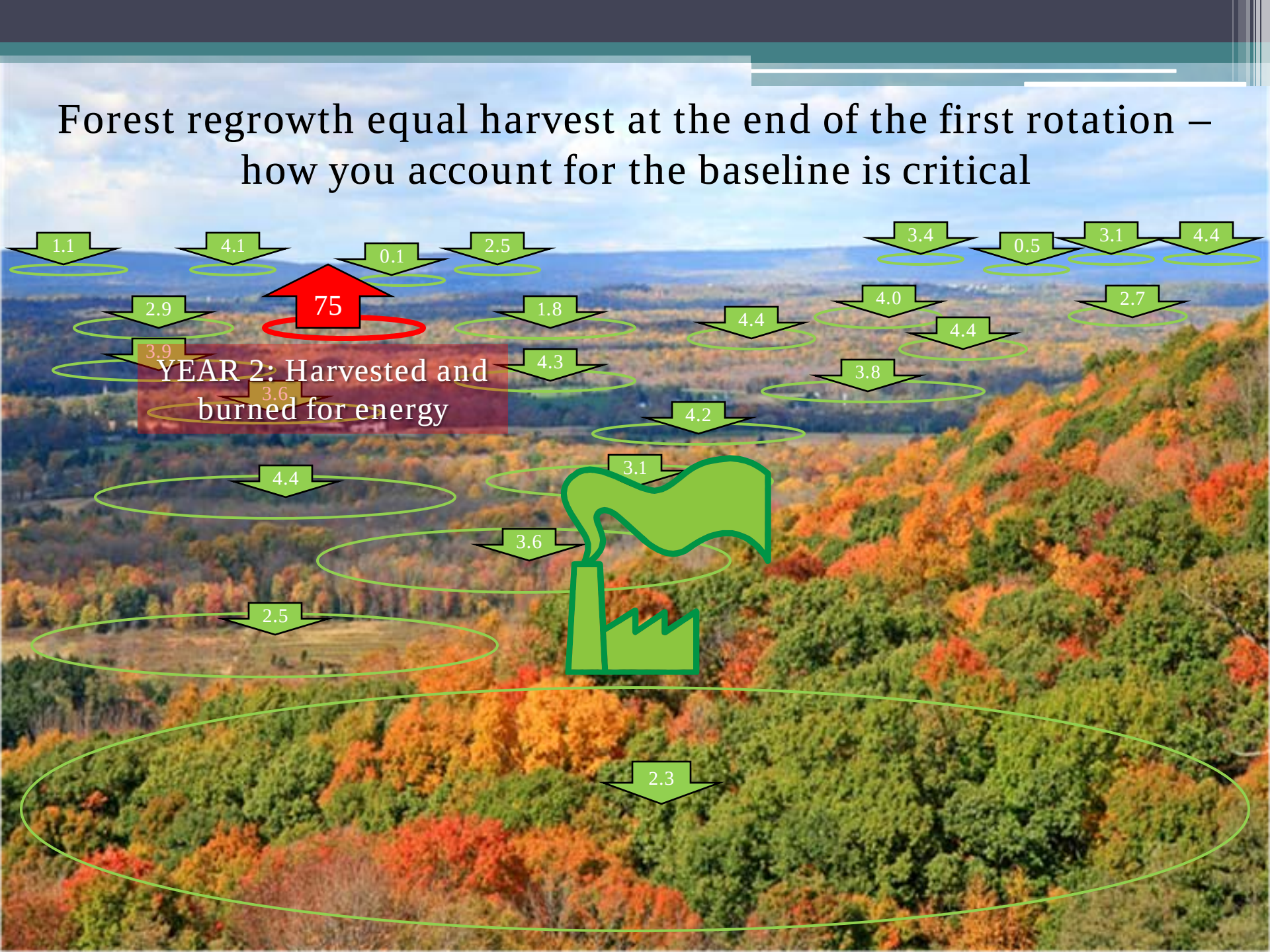
If carbon stocks decline because biomass feedstocks are being removed



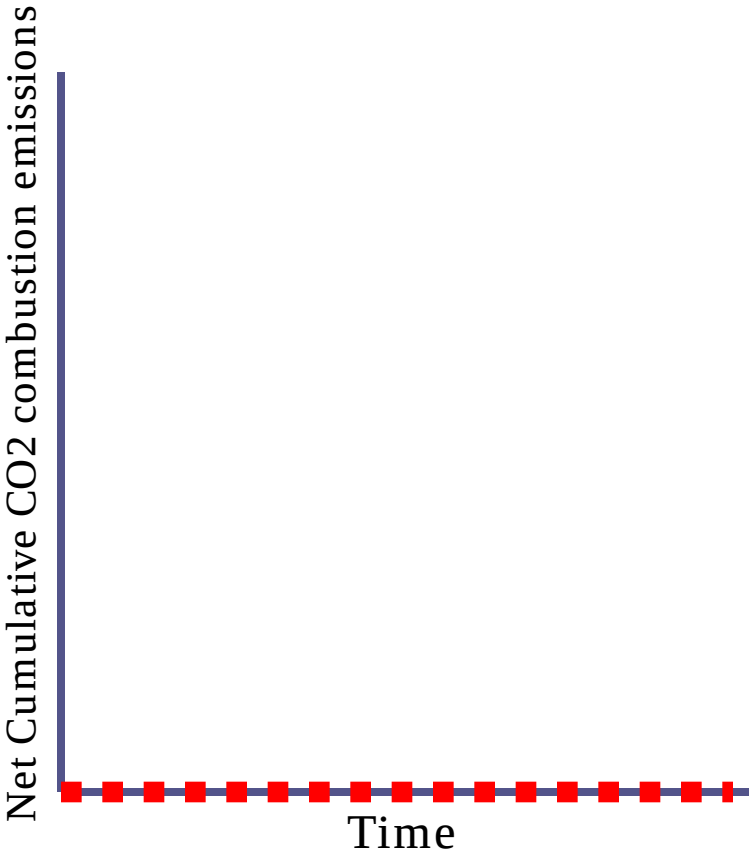
Looking at all areas that will be needed to supply wood to a given operation



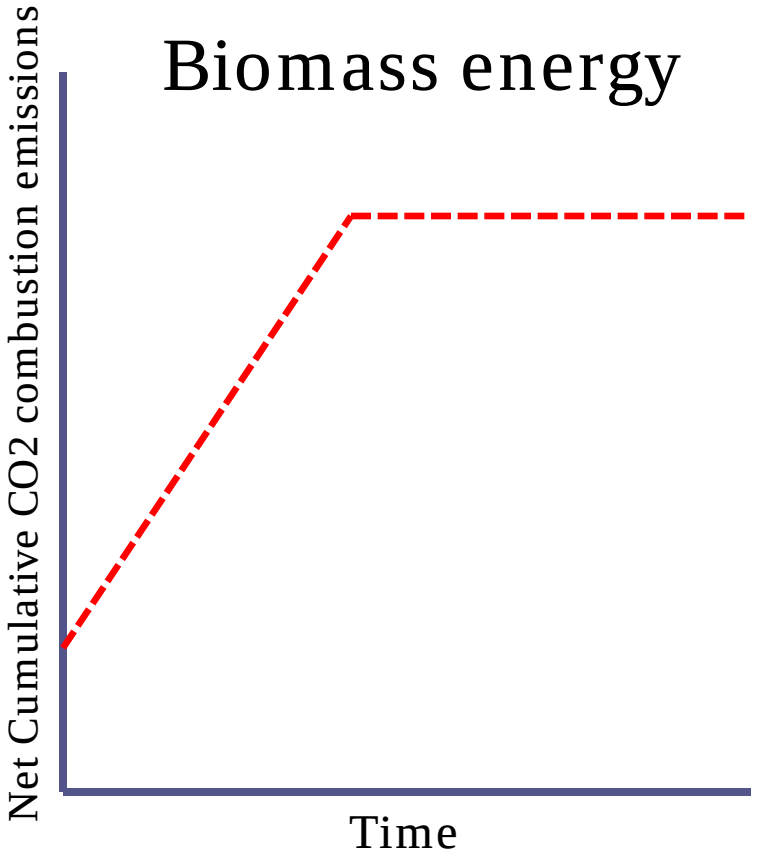
Forest regrowth equal harvest at the end of the first rotation – how you account for the baseline is critical

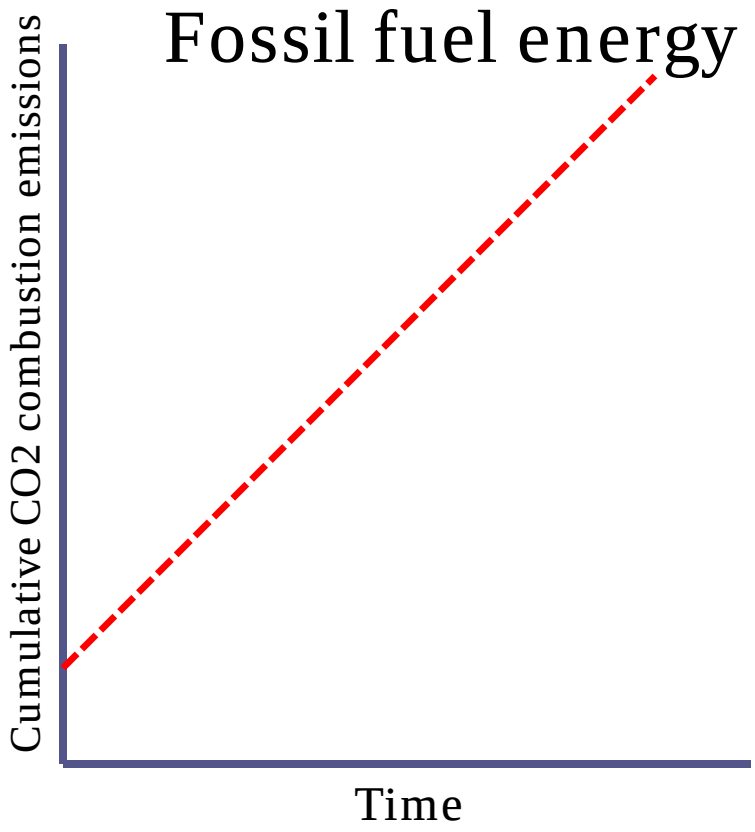


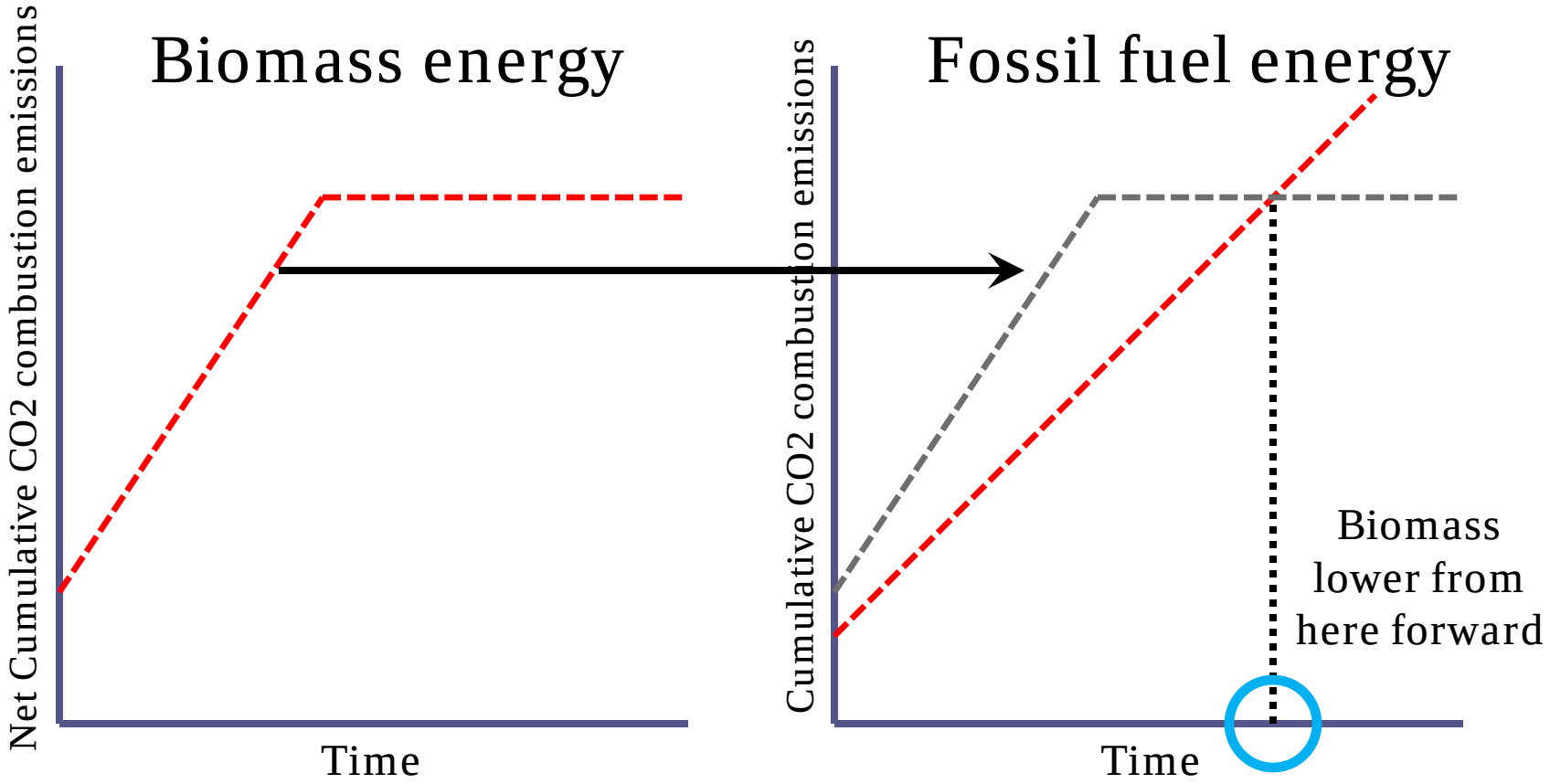
When harvesting equals uptake



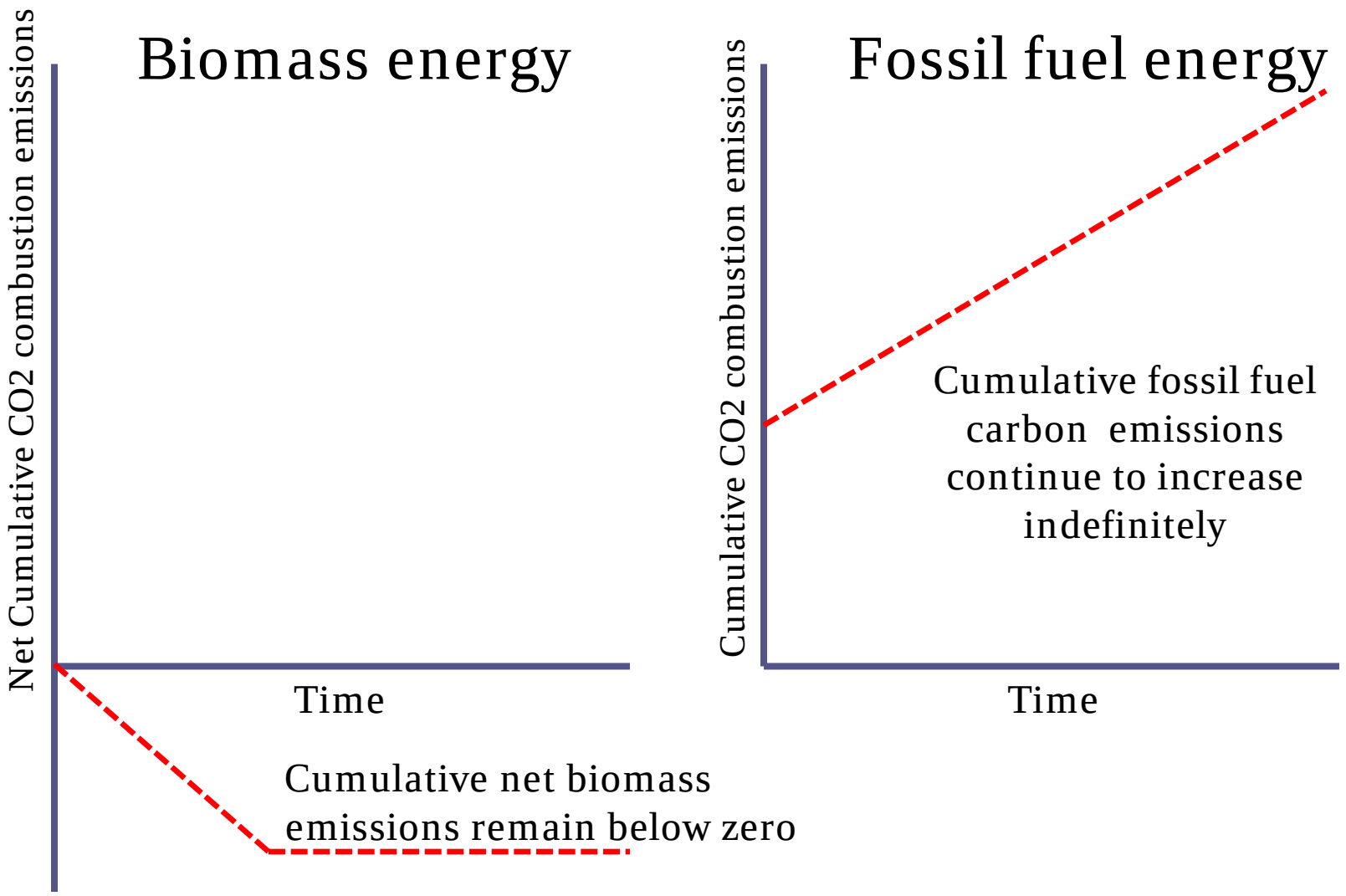
Harvesting biomass from plots that were not previously managed



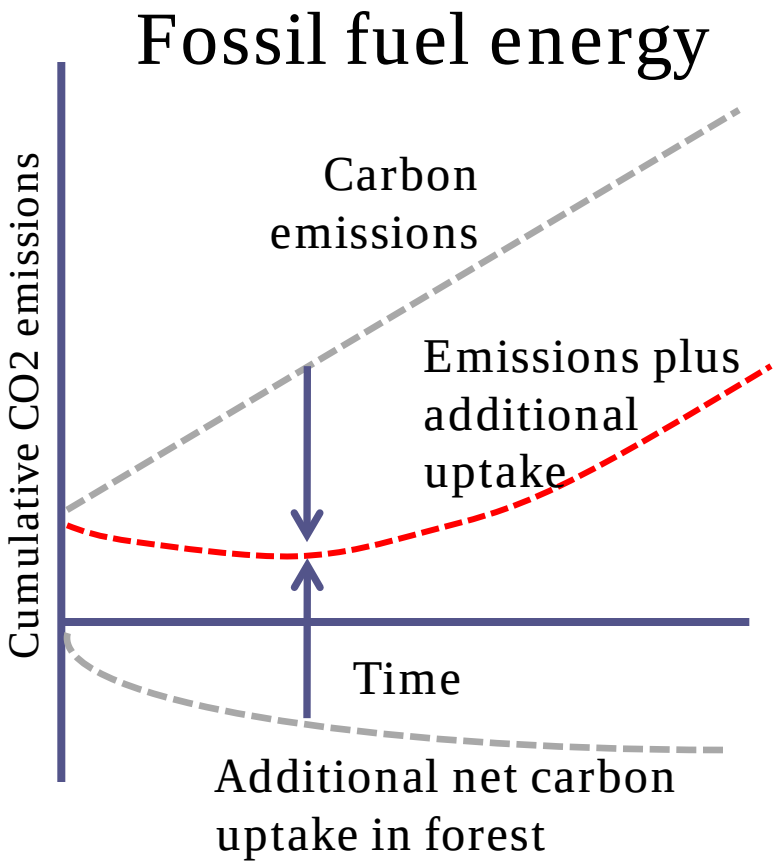



Biomass energy
Net Cumulative CO2 combustion emissions
Time
Fossil fuel energy
Cumulative CO2 combustion emissions
Biomass lower from here forward
Time

Biomass from an afforestation project



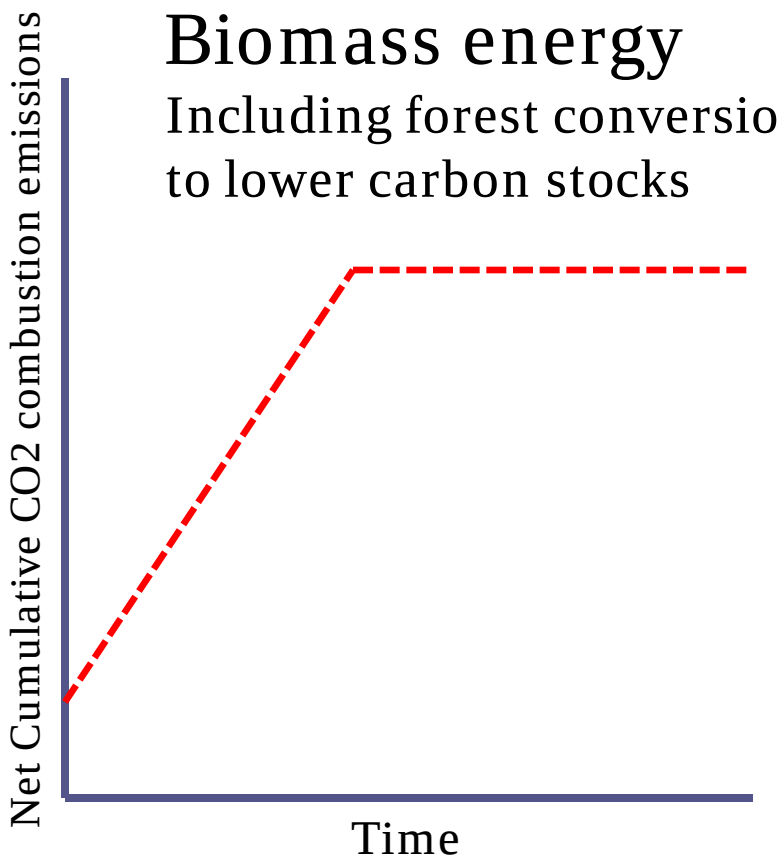
Don’t we get more sequestration by not harvesting?

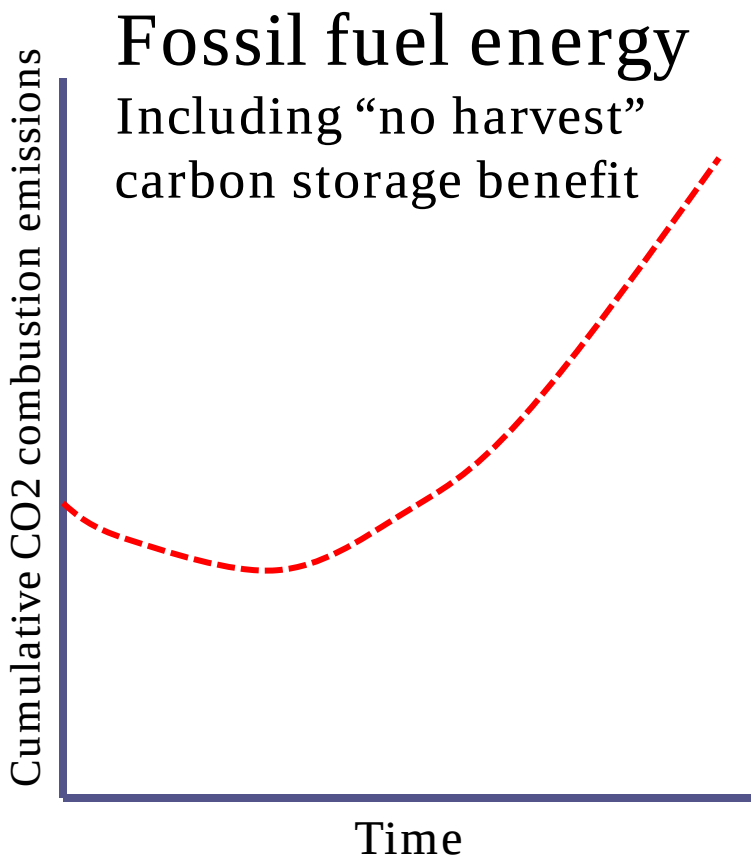


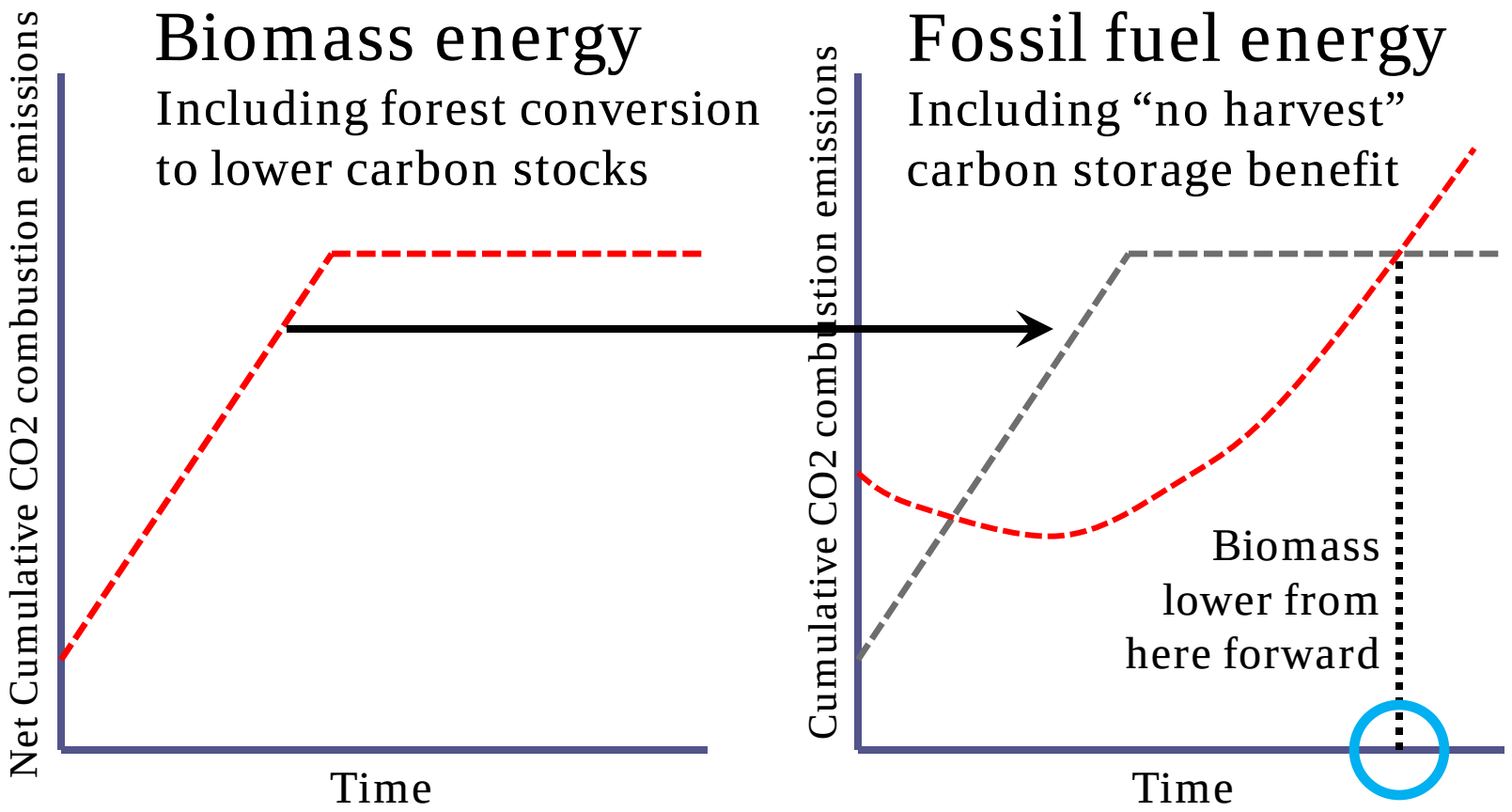
When forest carbon benefits saturate (i.e. the trees stop growing), the benefits of “no harvest” stop.

The time to saturation and carbon uptake curves are very site specific.

Biomass from previously unmanaged forests; fossil fuel credited with sequestration.






Biomass energy
Including forest conversion
to lower carbon stocks
Net Cumulative CO2 combustion emissions
Time
Fossil fuel energy
Including "no harvest"
carbon storage benefit
Cumulative CO2 combustion emissions
Biomass
lower from
here forward
Time

Key information that is needed and not currently available

- Emissions from use of bioenergy (gross and net)
  - By fuel type
  - By region
  - By sector
- Categorization of biomass feedstocks used
  - Conditions under which it was grown
  - Type of material (e.g. waste vs. product)

Without bioenergy emissions and feedstock information

- Net ghg emissions will be underestimated by a significant amount over the next several decades
- No basis for comparing the relative merits of bioenergy versus fossil fuel
- Standing stock of forest biomass will be undervalued and could be significantly reduced
  - Creating potential shortages of other products derived from biomass e.g. paper, timber – leading to leakage