Forest and Wood Use Carbon Model

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Institute for the Study of Earth, Oceans, and Space, UNH

New Hampshire Climate Change Policy Task Force
7th Task Force Meeting
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NH Audubon Concord, NH

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Why a revised forest model?

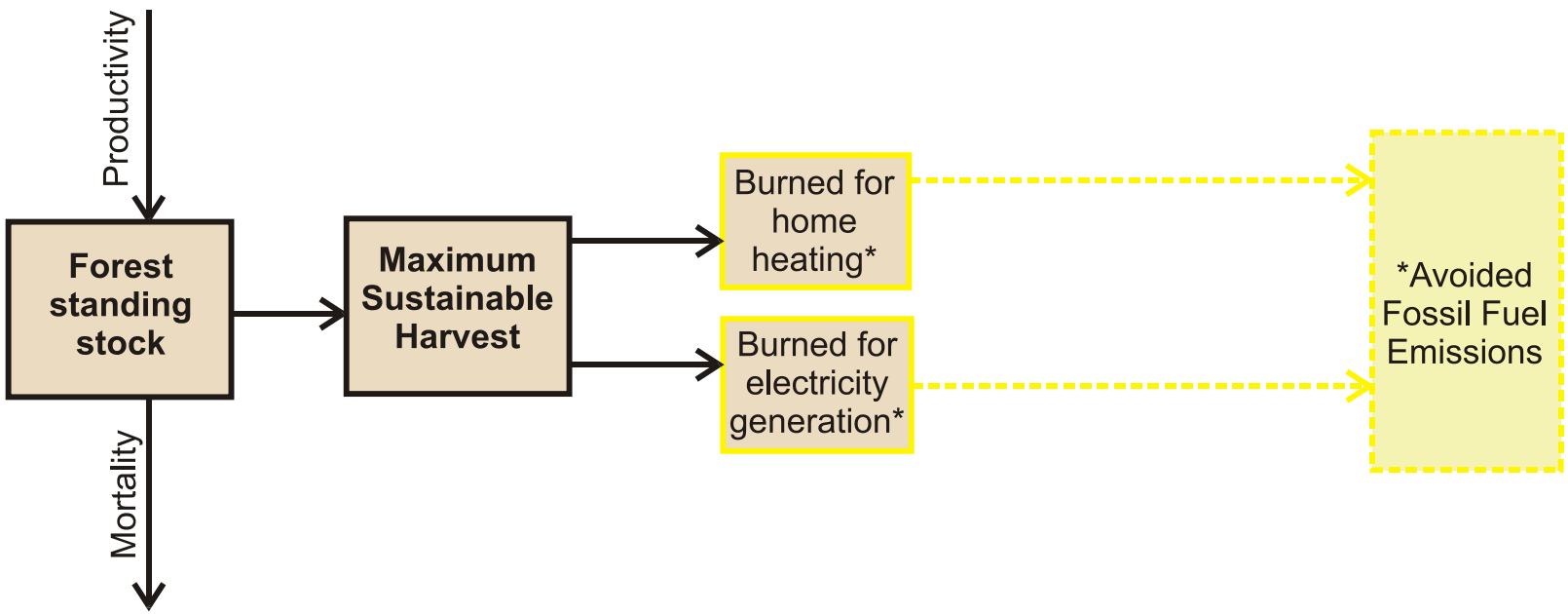
- Interest in the following actions:
    - Reducing forested land conversion rates
    - Wood for energy
        - Home heating
        - Electricity
    - Durable product promotion
    - Changes in harvest amount
    - Maintaining an economically and ecologically sustainable working forest

→ These actions interact!

- What is the estimated net impact of NH forest management on atmospheric greenhouse gas levels?

Why a revised forest model?

Wood for energy model



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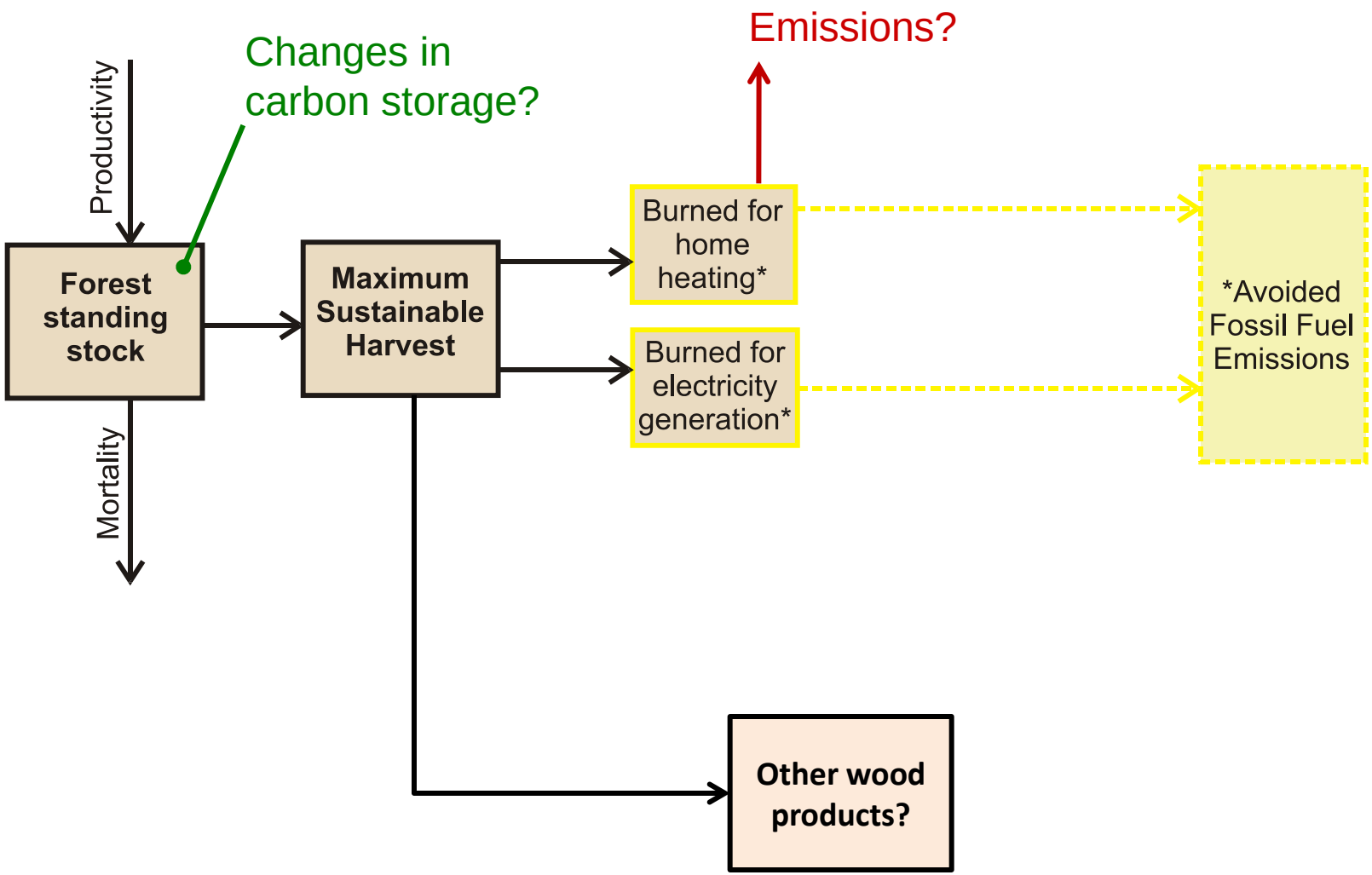
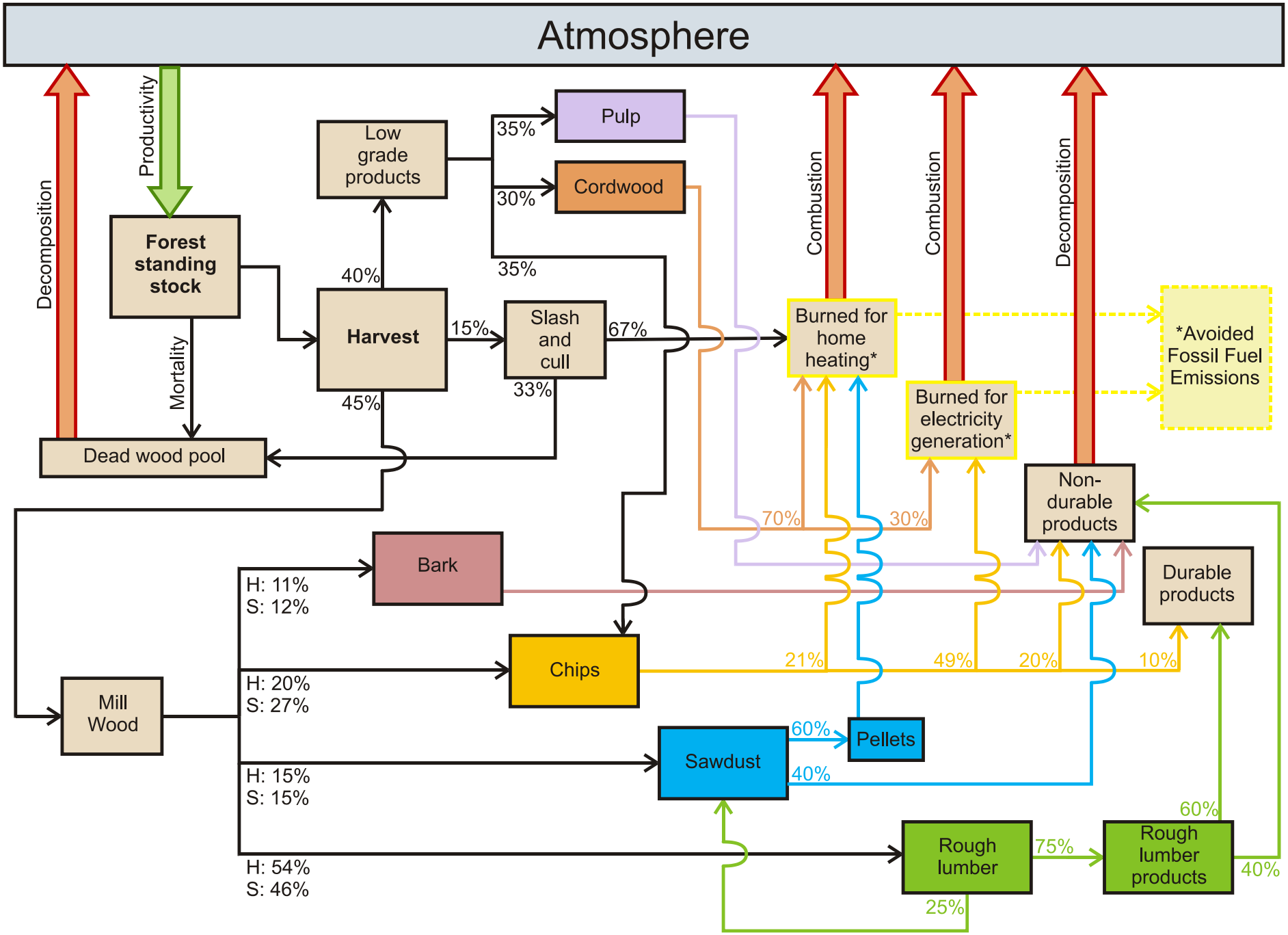
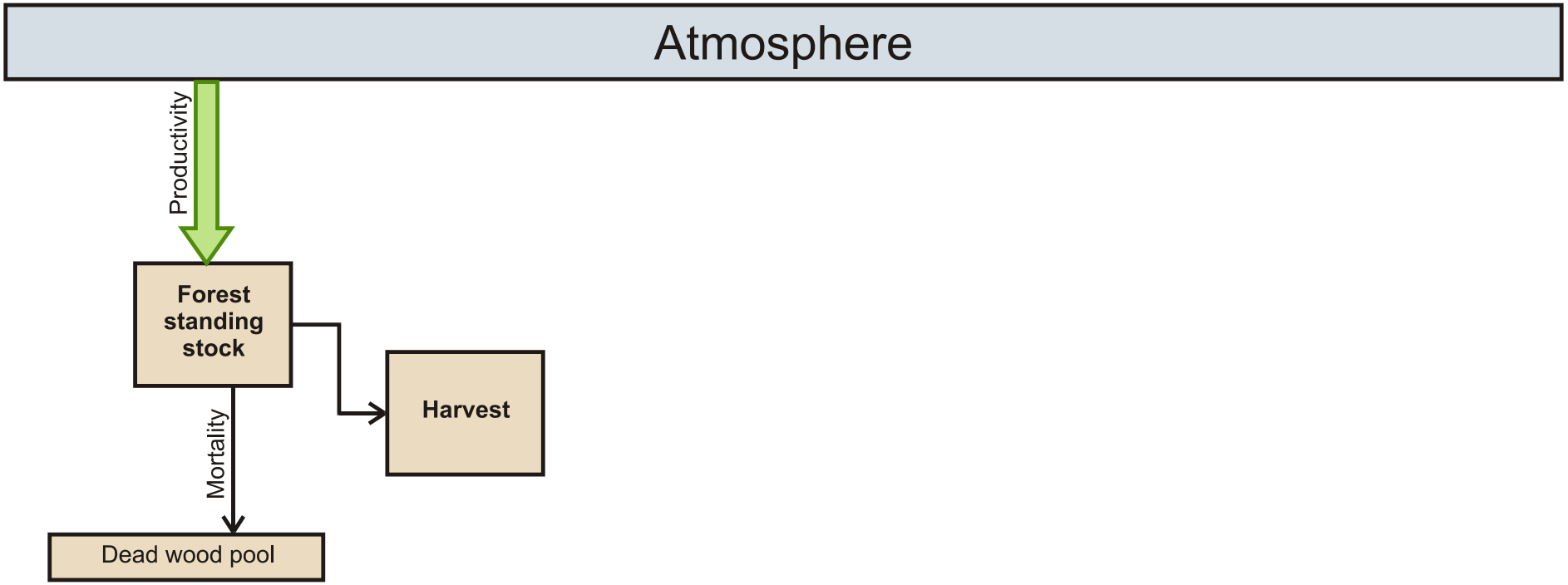
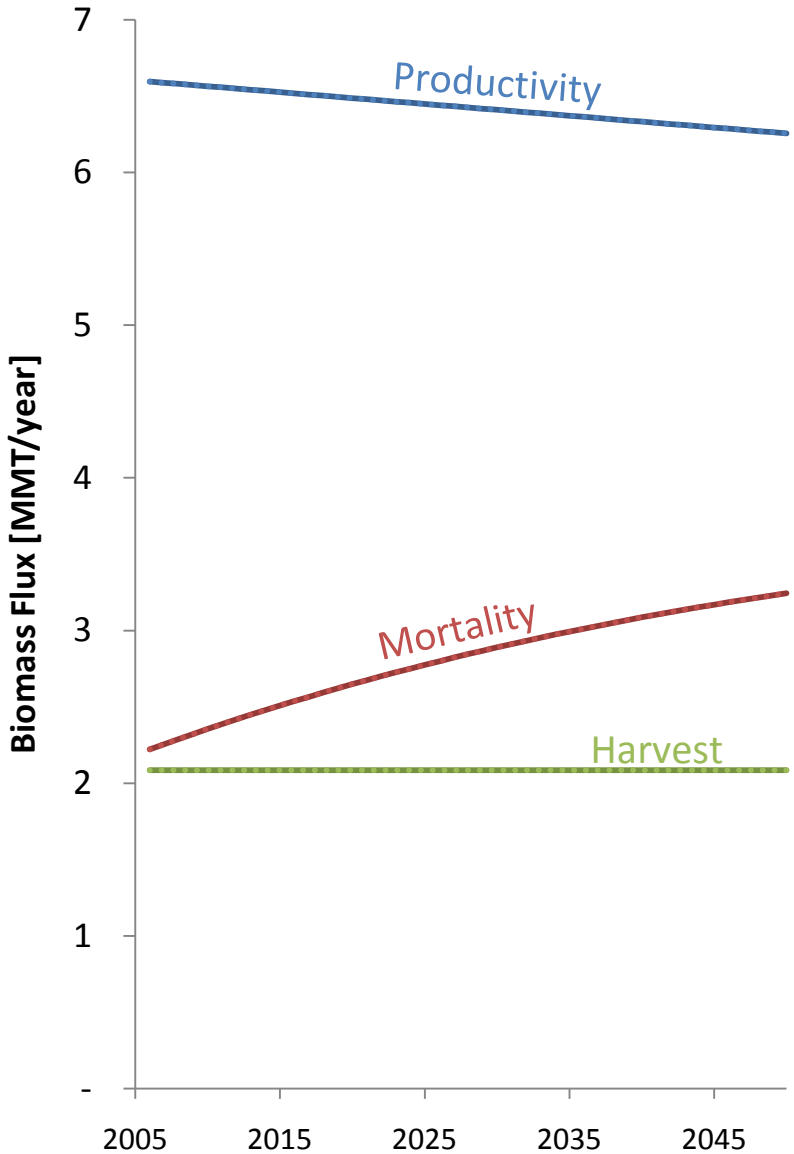
Wood for energy model

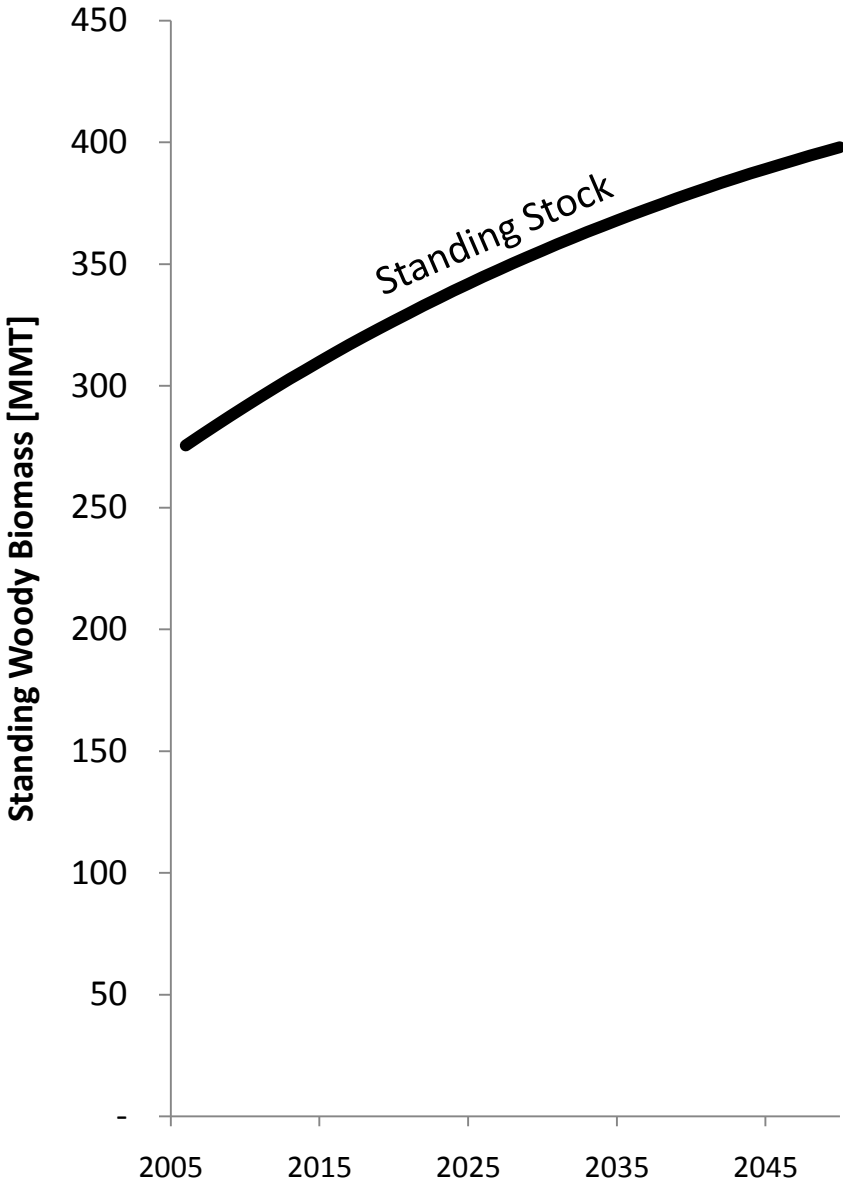



Atmosphere
Decomposition
Productivity
Forest standing stock
Mortality
Dead wood pool
Low grade products
40%
Harvest
45%
15%
Slash and cull
33%
67%
35%
Pulp
30%
Cordwood
35%
Combustion
Combustion
Decomposition
Burned for home heating*
Burned for electricity generation*
*Avoided Fossil Fuel Emissions
70%
30%
Non-durable products
Durable products
Bark
H: 11%
S: 12%
Chips
21%
49%
20%
10%
Mill Wood
H: 20%
S: 27%
Sawdust
60%
Pellets
40%
H: 15%
S: 15%
60%
Rough lumber
75%
Rough lumber products
40%
25%
H: 54%
S: 46%

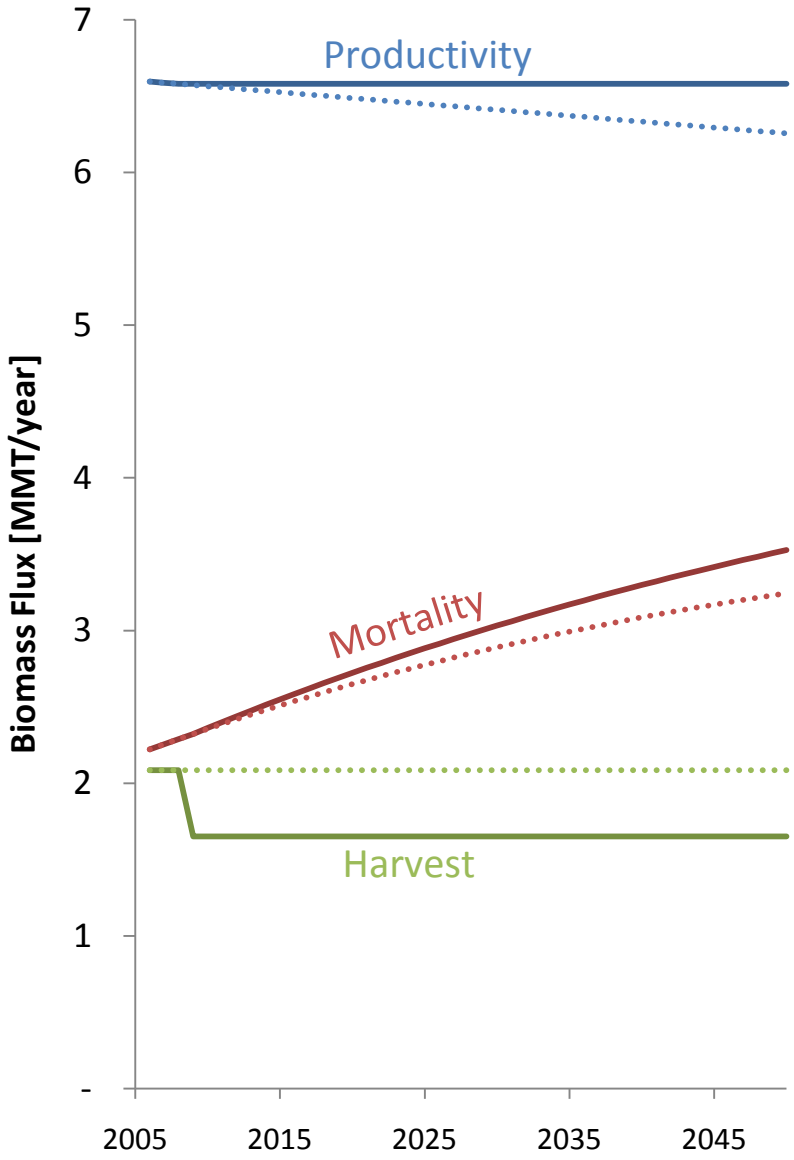

Atmosphere
Productivity
Forest standing stock
Harvest
Mortality
Dead wood pool

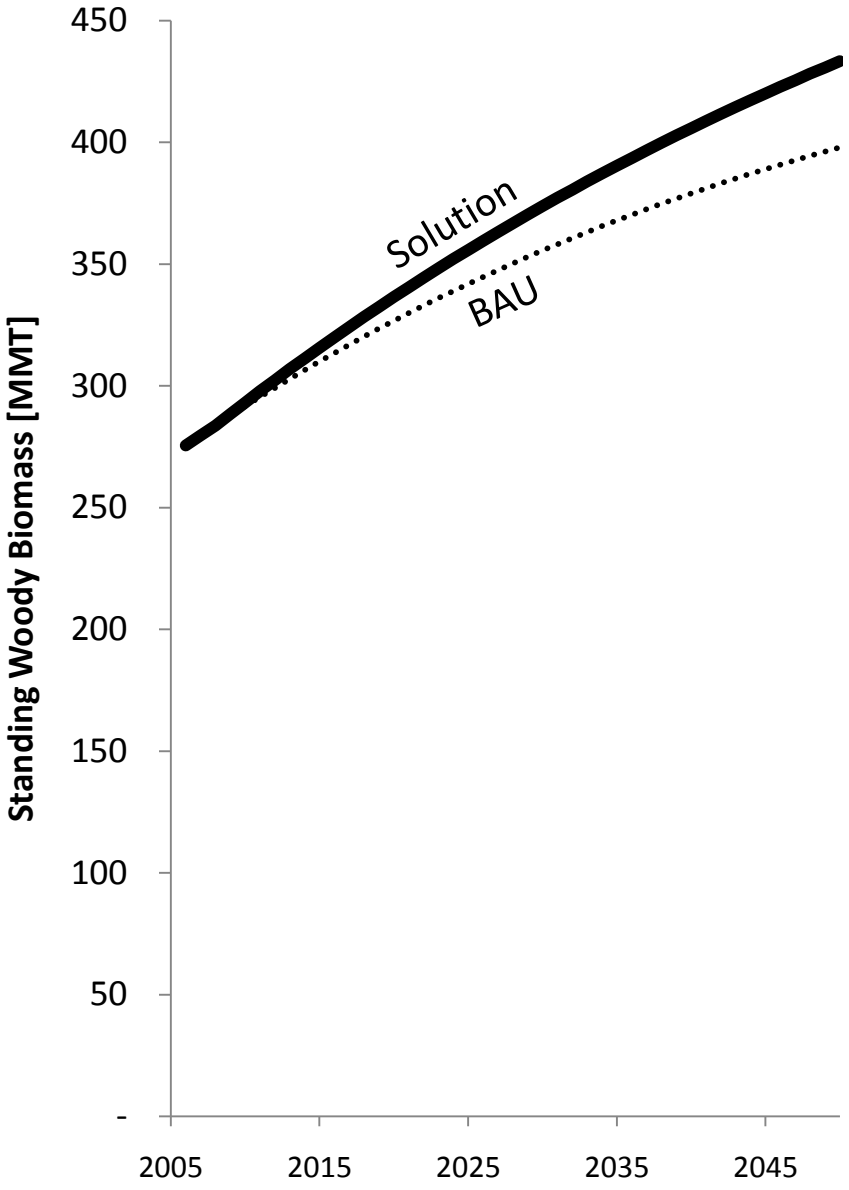
BAU


Biomass Flux [MMT/year]
7
6
5
4
3
2
1
-
2005
2015
2025
2035
2045
Productivity
Mortality
Harvest

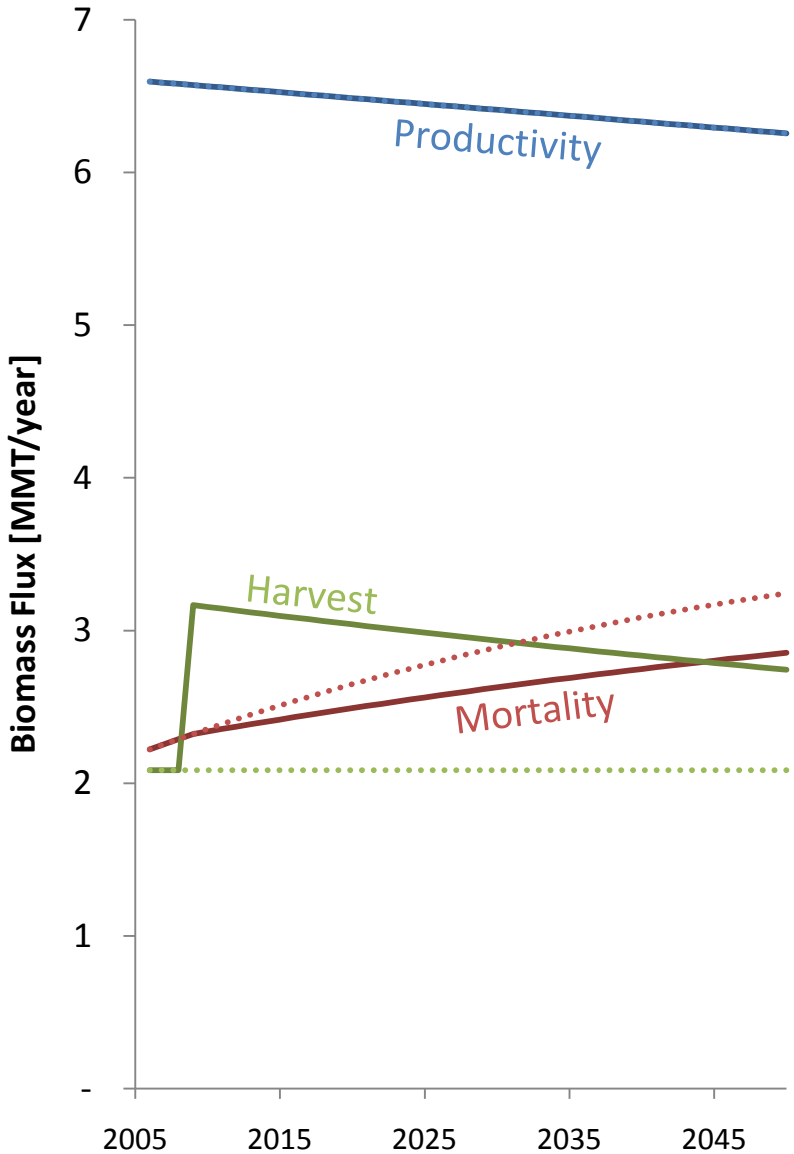

Standing Woody Biomass [MMT]
450
400
350
300
250
200
150
100
50
-
2005
2015
2025
2035
2045
Standing Stock

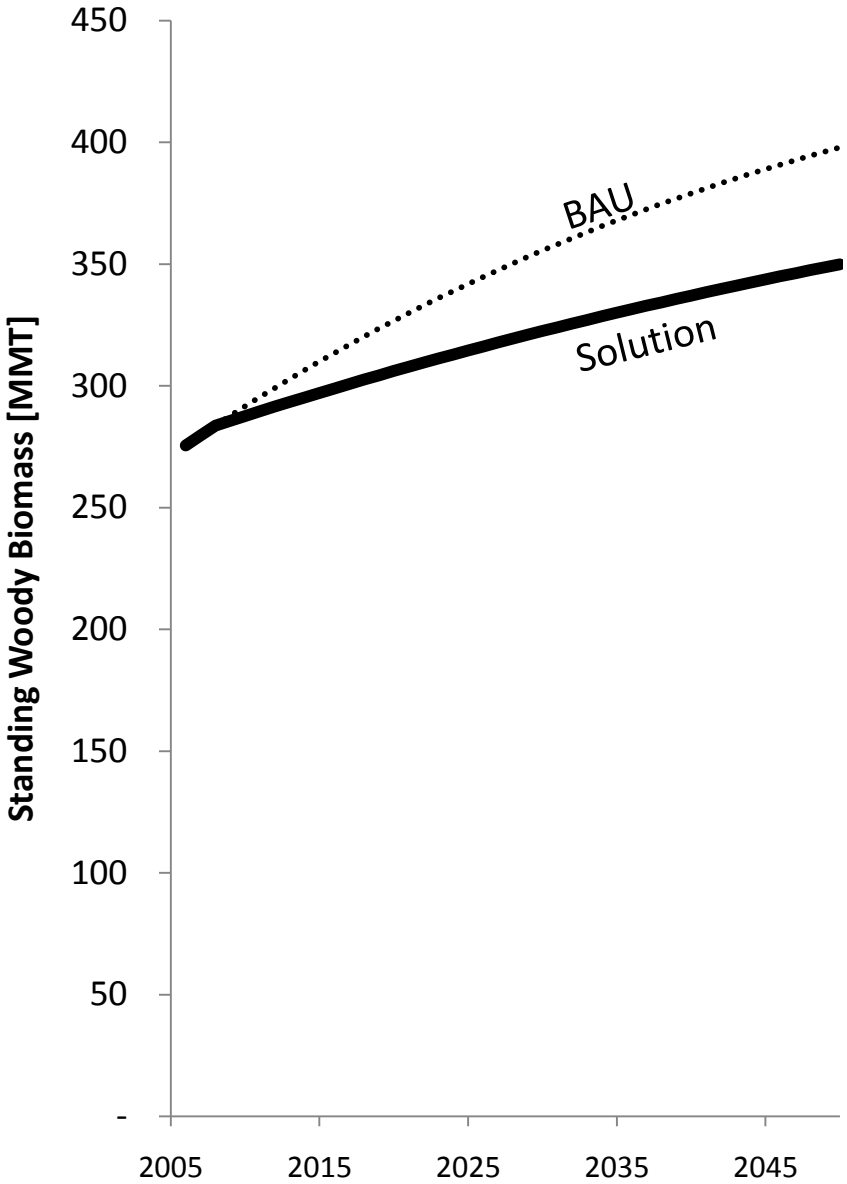
Avoid all forested land conversion



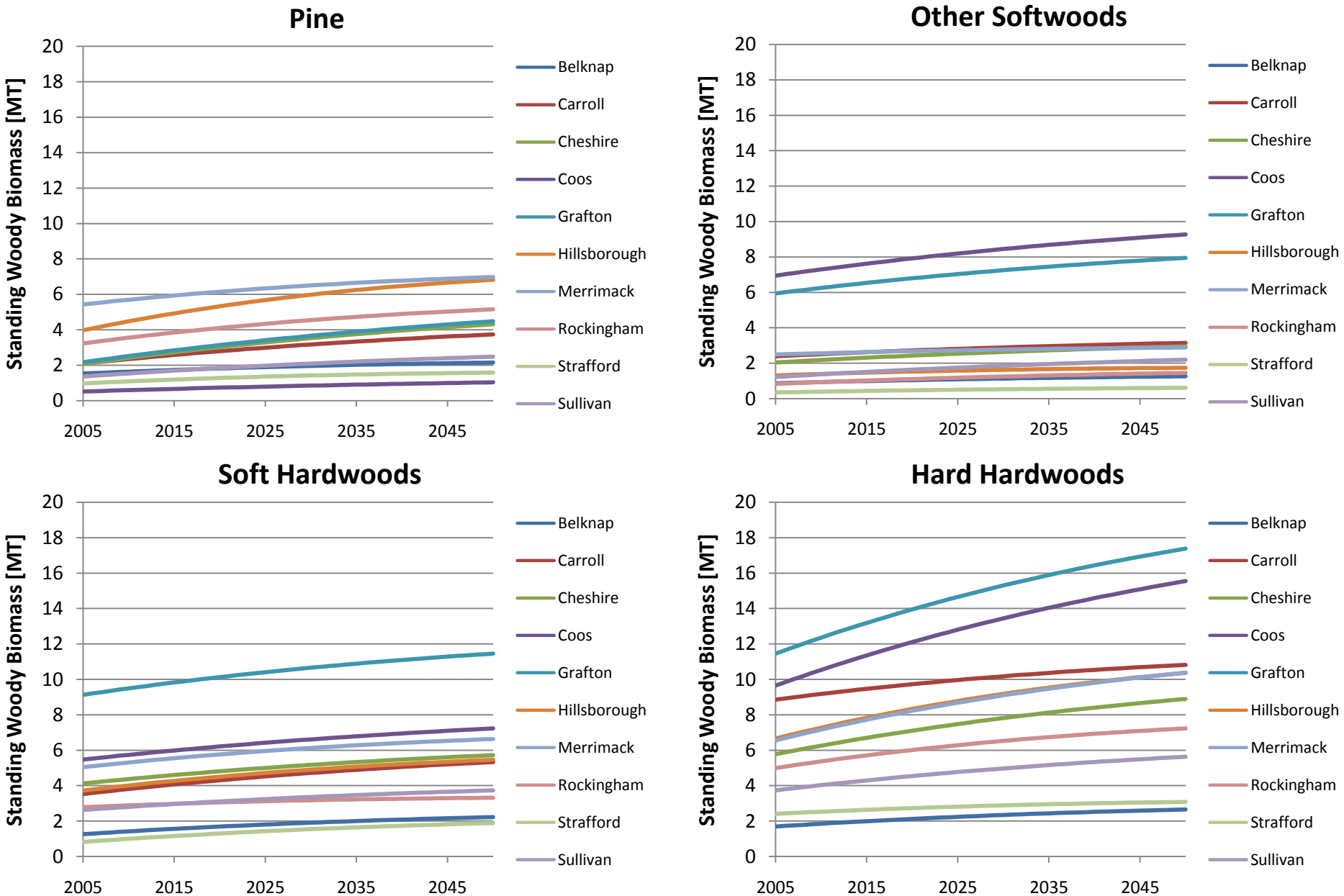


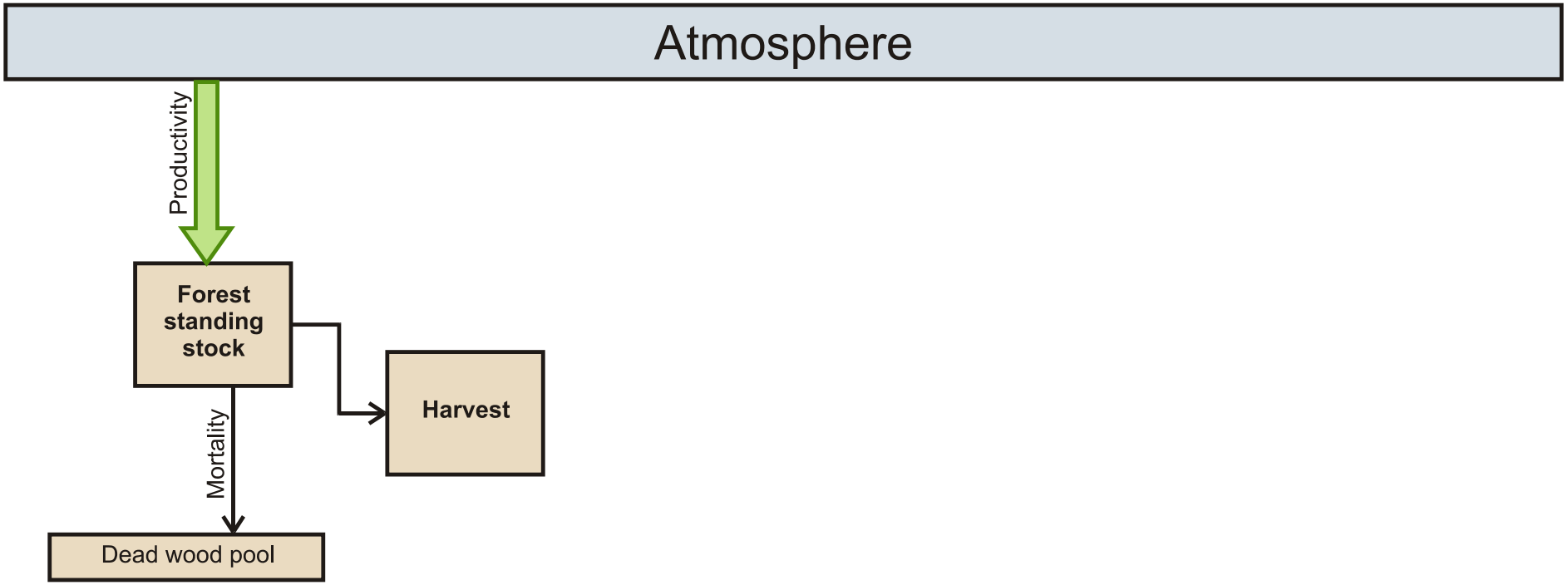
Additional annual harvest: 50% of increment





Model Output (BAU): Standing Woody Biomass
(10 counties, 4 Forest Classes)

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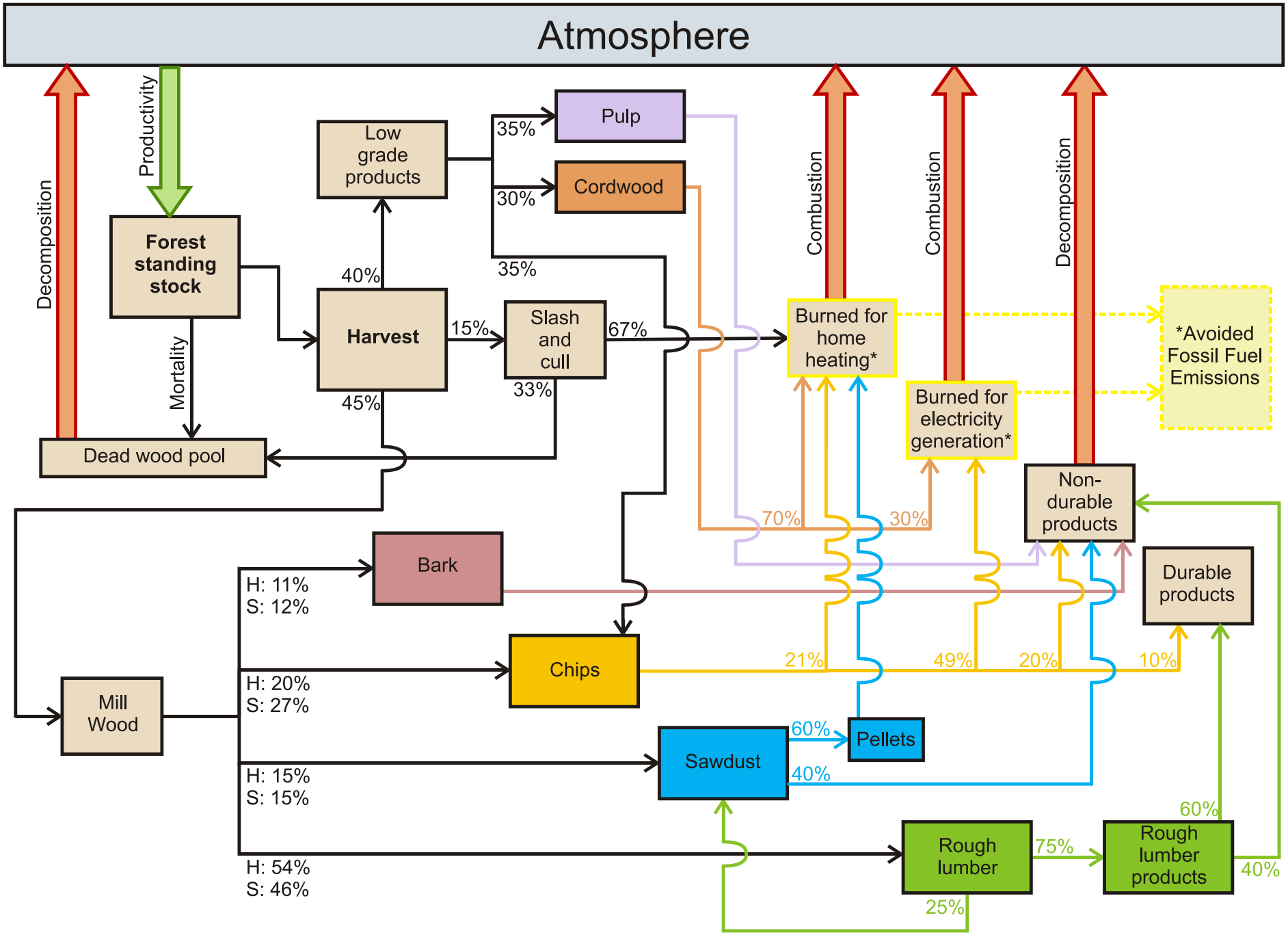
Forest standing stock
Harvest
Mortality
Dead wood pool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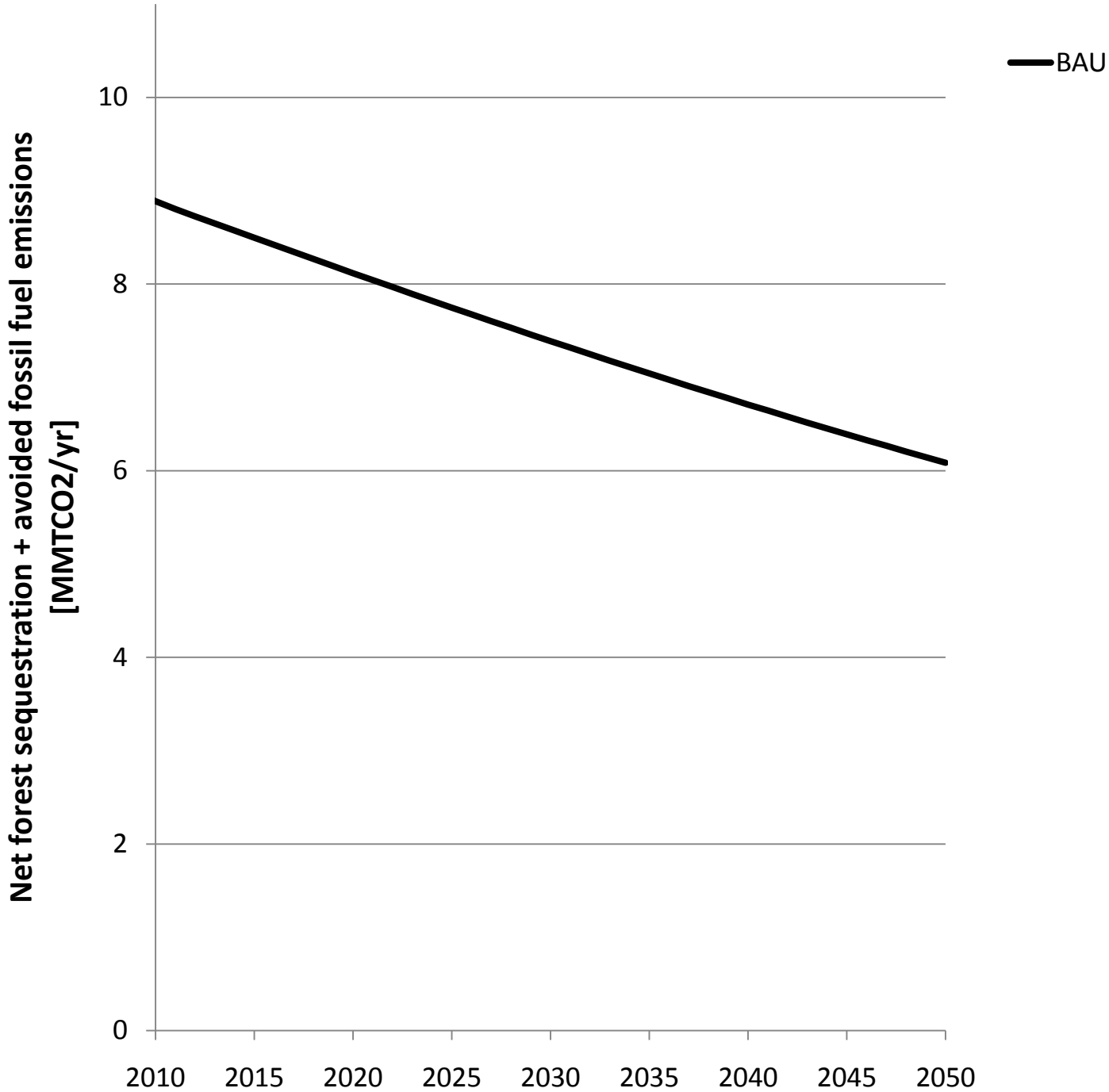
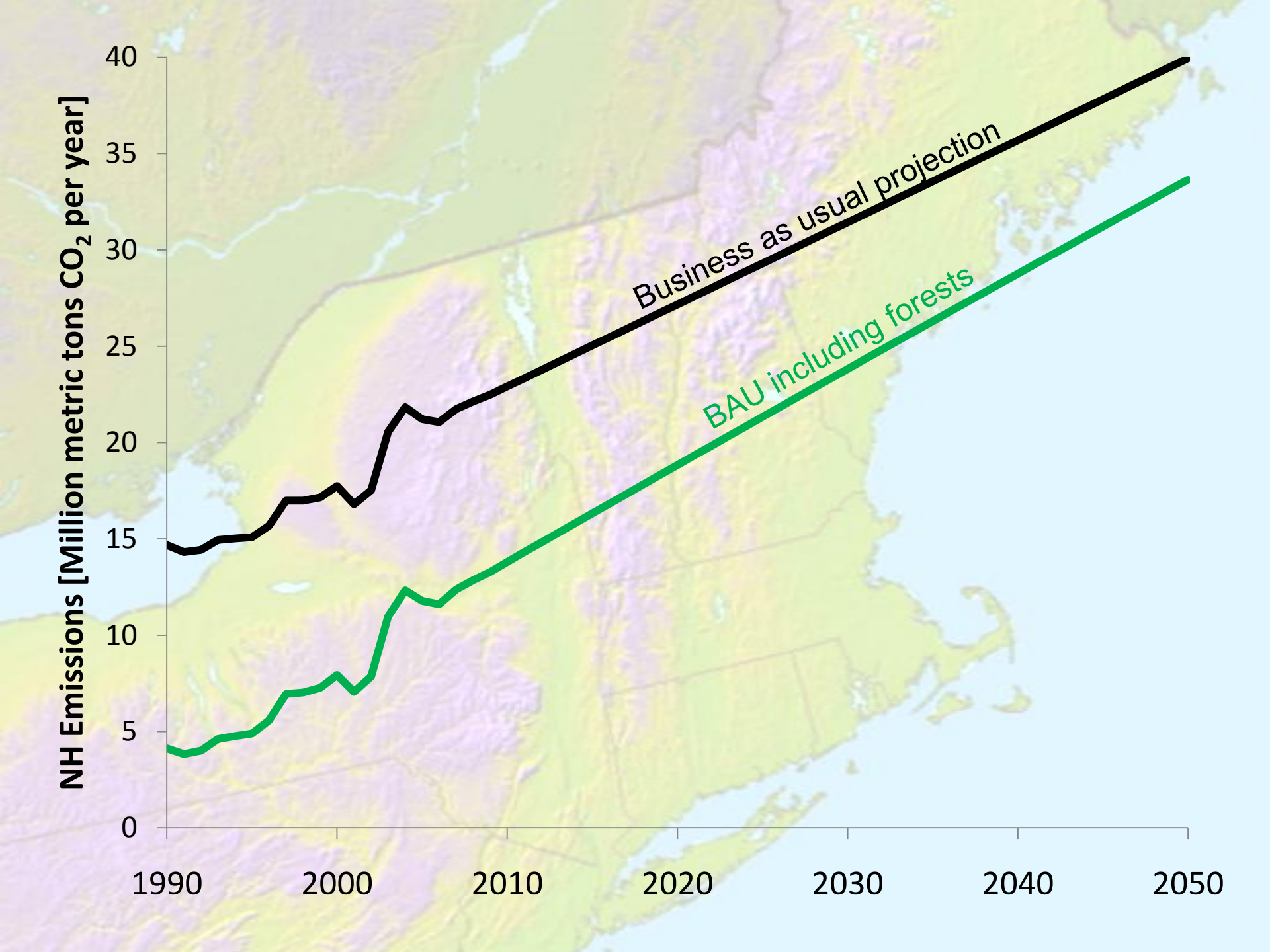
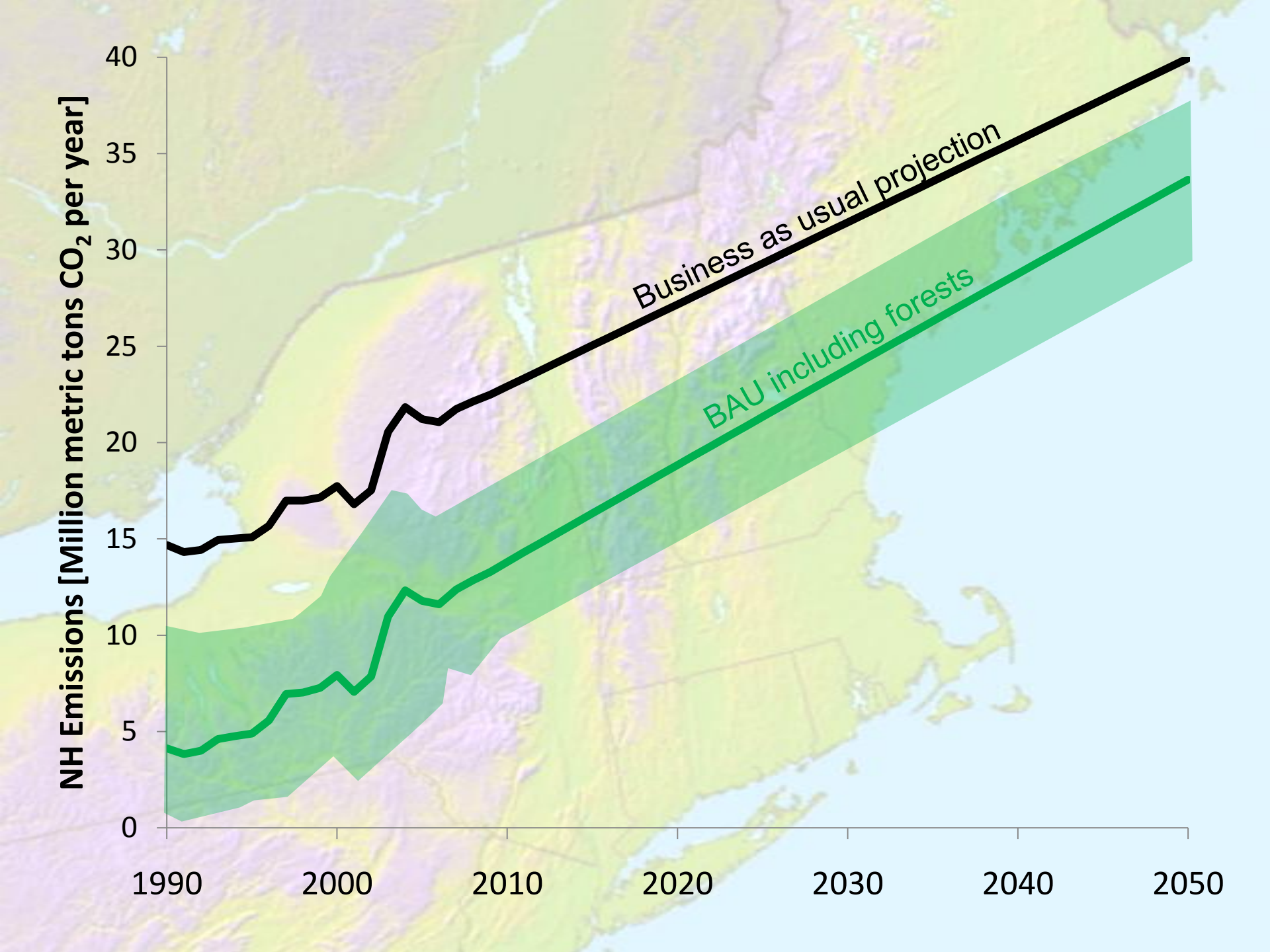

BAU
Net forest sequestration + avoided fossil fuel emissions [MMTCO2/yr]
10
8
6
4
2
0
2010
2015
2020
2025
2030
2035
2040
2045
2050


NH Emissions [Million metric tons CO_2 per year]
40
35
30
25
20
15
10
5
0
1990
2000
2010
2020
2030
2040
2050
Business as usual projection
BAU including forests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35
30
25
20
15
10
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2030
2040
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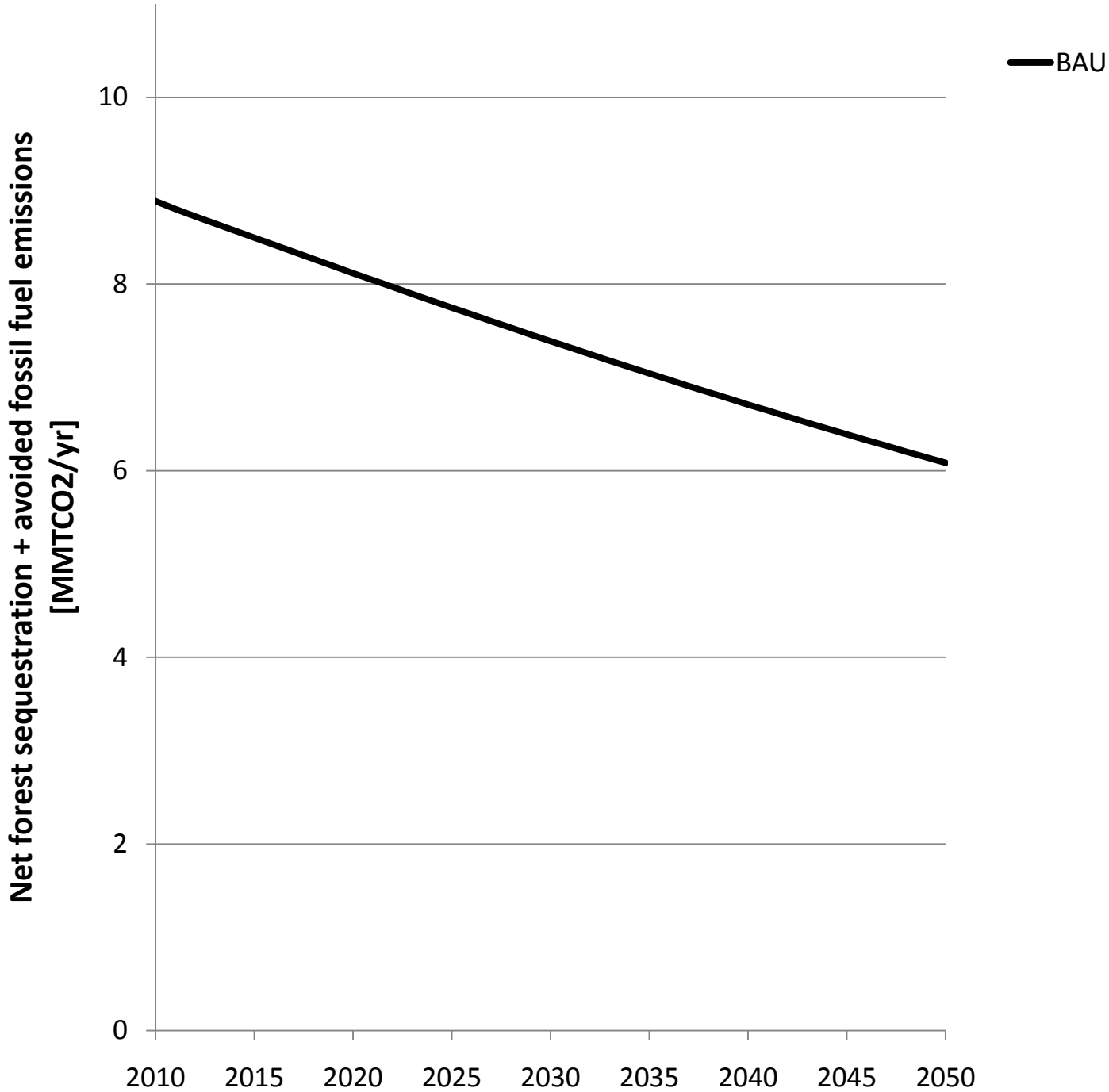
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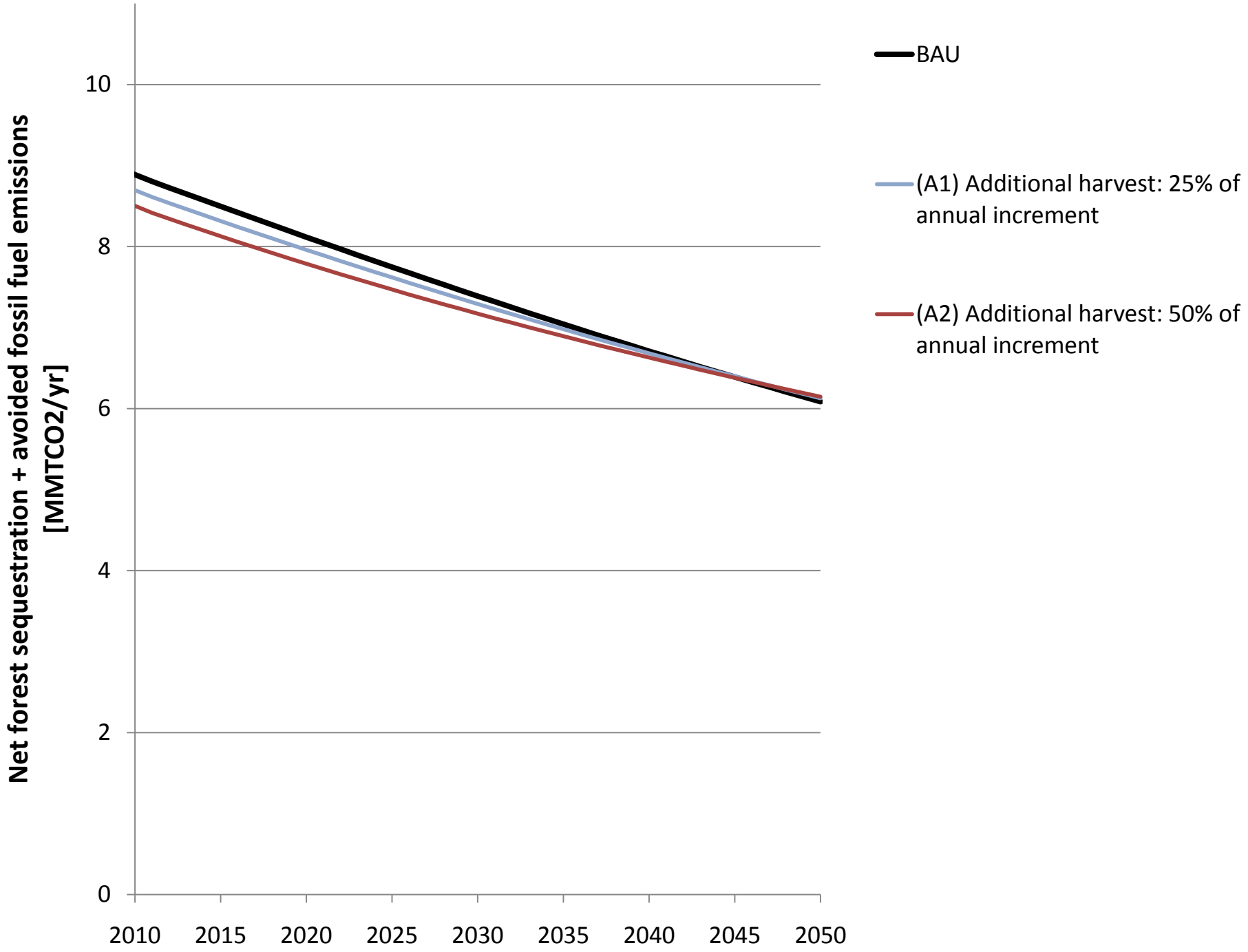
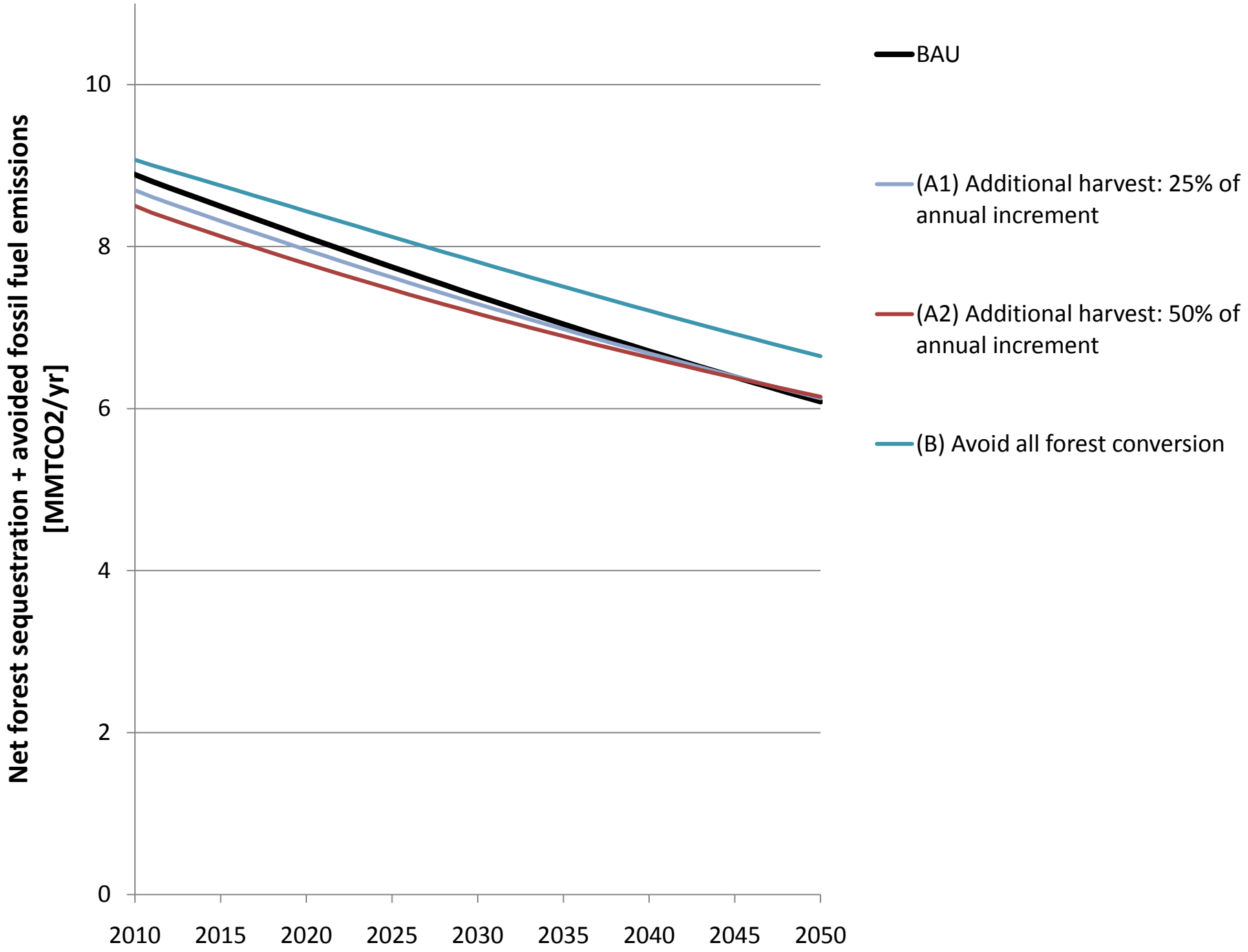
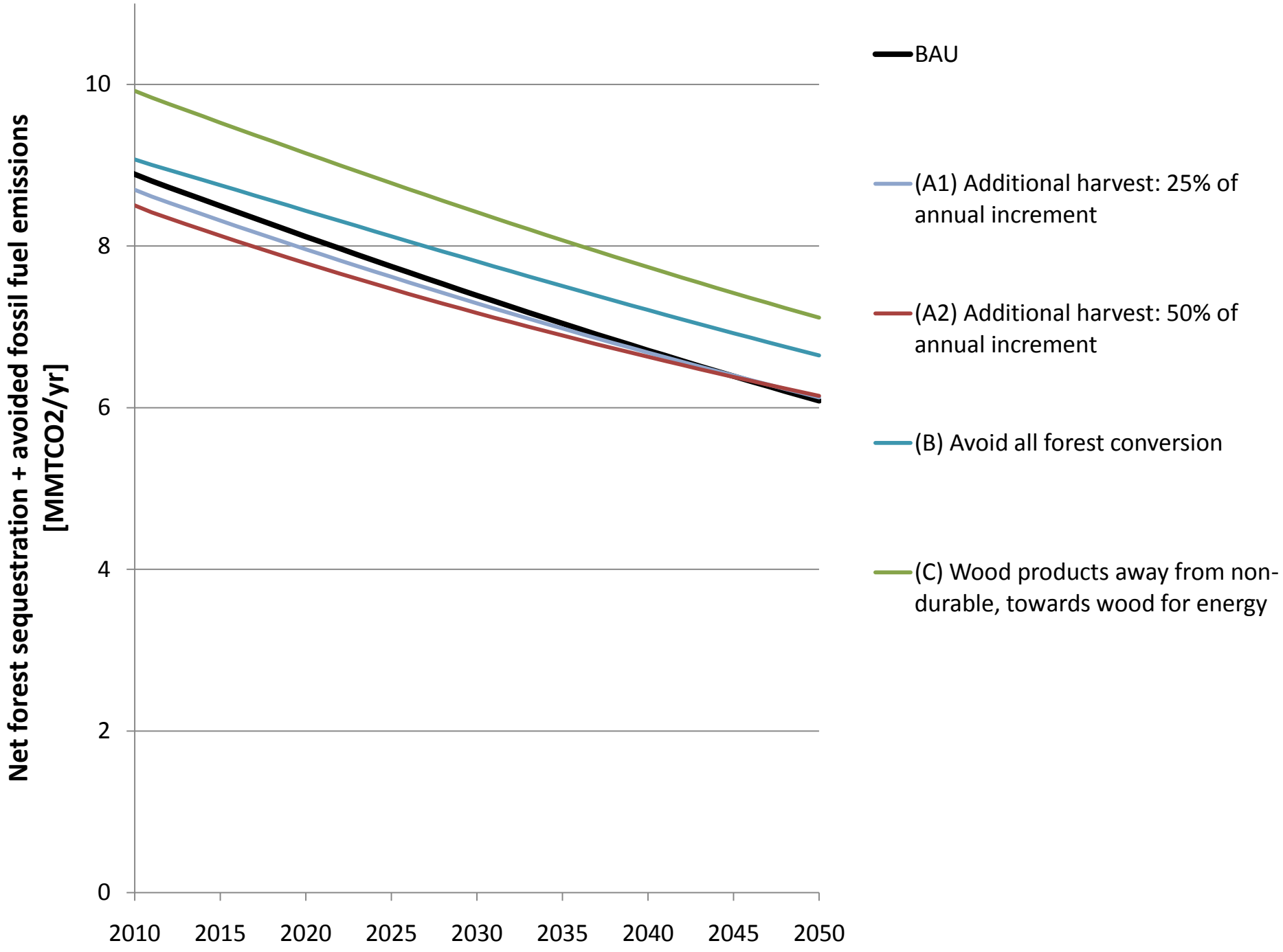
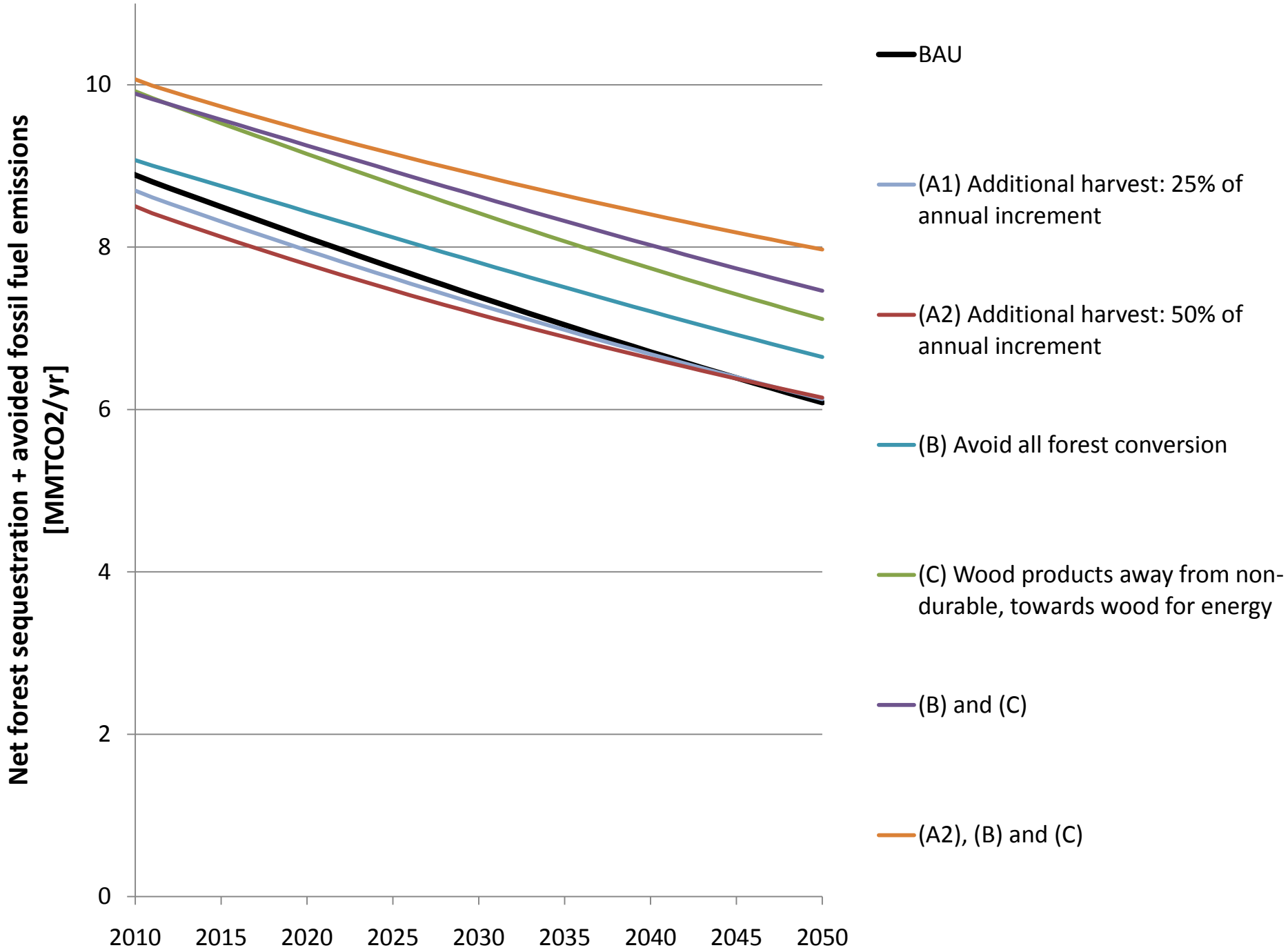
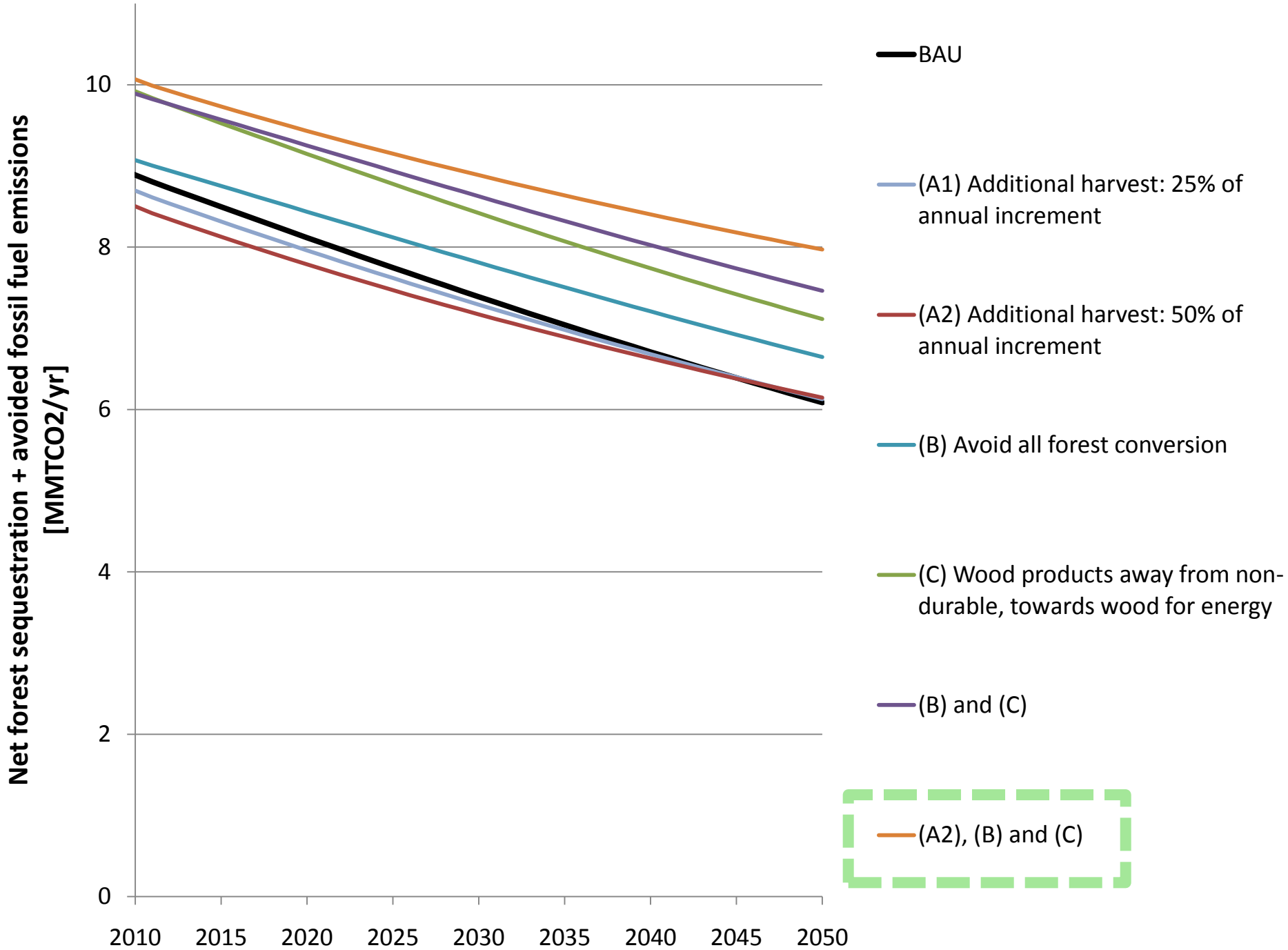
8
6
4
2
0
2010
2015
2020
2025
2030
2035
2040
2045
2050


Net forest sequestration + avoided fossil fuel emissions [MMTCO2/yr]
10
8
6
4
2
0
2010
2015
2020
2025
2030
2035
2040
2045
2050
BAU
(A1) Additional harvest: 25% of annual increment
(A2) Additional harvest: 50% of annual increment


Net forest sequestration + avoided fossil fuel emissions [MMTCO2/yr]
10
8
6
4
2
0
2010
2015
2020
2025
2030
2035
2040
2045
2050
BAU
(A1) Additional harvest: 25% of annual increment
(A2) Additional harvest: 50% of annual increment
(B) Avoid all forest conversion


Net forest sequestration + avoided fossil fuel emissions [MMTCO2/yr]
10
8
6
4
2
0
2010
2015
2020
2025
2030
2035
2040
2045
2050
BAU
(A1) Additional harvest: 25% of annual increment
(A2) Additional harvest: 50% of annual increment
(B) Avoid all forest conversion
(C) Wood products away from non-durable, towards wood for energy


Net forest sequestration + avoided fossil fuel emissions [MMTCO2/yr]
10
8
6
4
2
0
2010
2015
2020
2025
2030
2035
2040
2045
2050
BAU
(A1) Additional harvest: 25% of annual increment
(A2) Additional harvest: 50% of annual increment
(B) Avoid all forest conversion
(C) Wood products away from non-durable, towards wood for energy
(B) and (C)
(A2), (B) and (C)


Net forest sequestration + avoided fossil fuel emissions [MMTCO2/yr]
10
8
6
4
2
0
2010
2015
2020
2025
2030
2035
2040
2045
2050
BAU
(A1) Additional harvest: 25% of annual increment
(A2) Additional harvest: 50% of annual increment
(B) Avoid all forest conversion
(C) Wood products away from non-durable, towards wood for energy
(B) and (C)
(A2), (B) and (C)

Combination Scenario

Wood for electricity scenario

Wood electricity generation (MW capacity, wood/total)	**2002**	**2009**
Current	**89** / 1821	
Scenario estimate		**179** / 2733

Wood home heating (trillion BTU, wood/total)	**2005**	**2009**
Current	**2.7** / 54	
Scenario estimate		**9.8** / 54

Carbon savings [MMTCO2e]		
2012	**2025**	**2050**
1.25	1.45	1.91

Combination Scenario

Wood for home heating scenario

Wood electricity generation (MW capacity, wood/total)	**2002**	**2009**
Current	**89** / 1821	
Scenario estimate		**0** / 2733

Wood home heating (trillion BTU, wood/total)	**2005**	**2009**
Current	**2.7** / 54	
Scenario estimate		**29.2** / 54

Carbon savings [MMTCO2e]		
2012	**2025**	**2050**
2.01	2.18	2.59

Combination Scenario

50/50 scenario

Wood electricity generation (MW capacity, wood/total)	**2002**	**2009**
Current	**89** / 1821	
Scenario estimate		**87** / 2733

Wood home heating (trillion BTU, wood/total)	**2005**	**2009**
Current	**2.7** / 54	
Scenario estimate		**19.5** / 54

Carbon savings [MMTCO2e]		
2012	**2025**	**2050**
1.63	1.81	2.25

Forestry Model Discussion and Forestry Recommendations

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