AIM 4 (Economics and Policy)

Carbon consequences of changes in wood supply and product demand from pine plantations: preliminary results from market and LCI analyses.

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PINEMAP Second Annual Meeting
University of Georgia Hotel and Conference Center
Athens, Georgia
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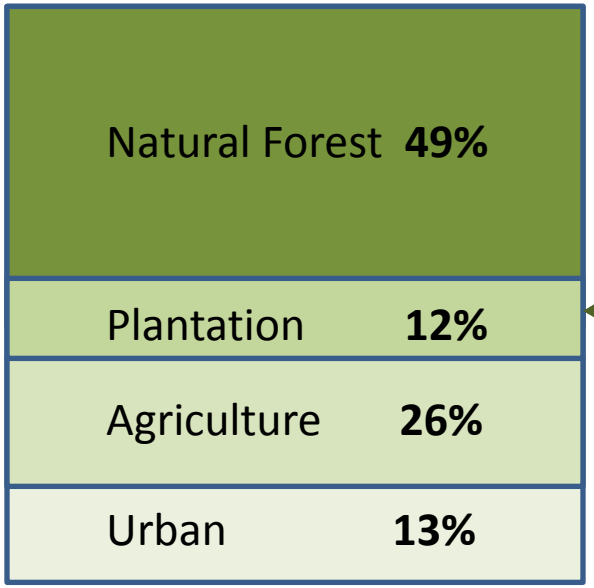
U.S. South Land Proportions



Future of Plantations Depends On Their Ability To Compete in This Space

- Financial returns
- Landowner Objectives
- Policies (ag, carbon)
- Ecosystem Services
- Risks (fire, pests, climate)
- **Markets (land, product)**

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Carbon Impact of Plantations Depends On:

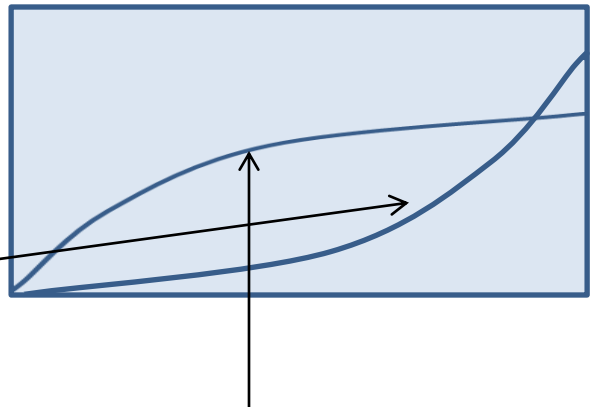
- Area of Plantations (previous slide)
- Landuse Comparative Advantage
  - *e.g. agriculture vs. natural forests*
- **Management/Biology of Plantations**
- Time Scale
- Regional Scale
- Displacement/Leakage
- **Life Cycle Inventory (LCI)**
  - **Cradle to Grave Carbon Accounting**

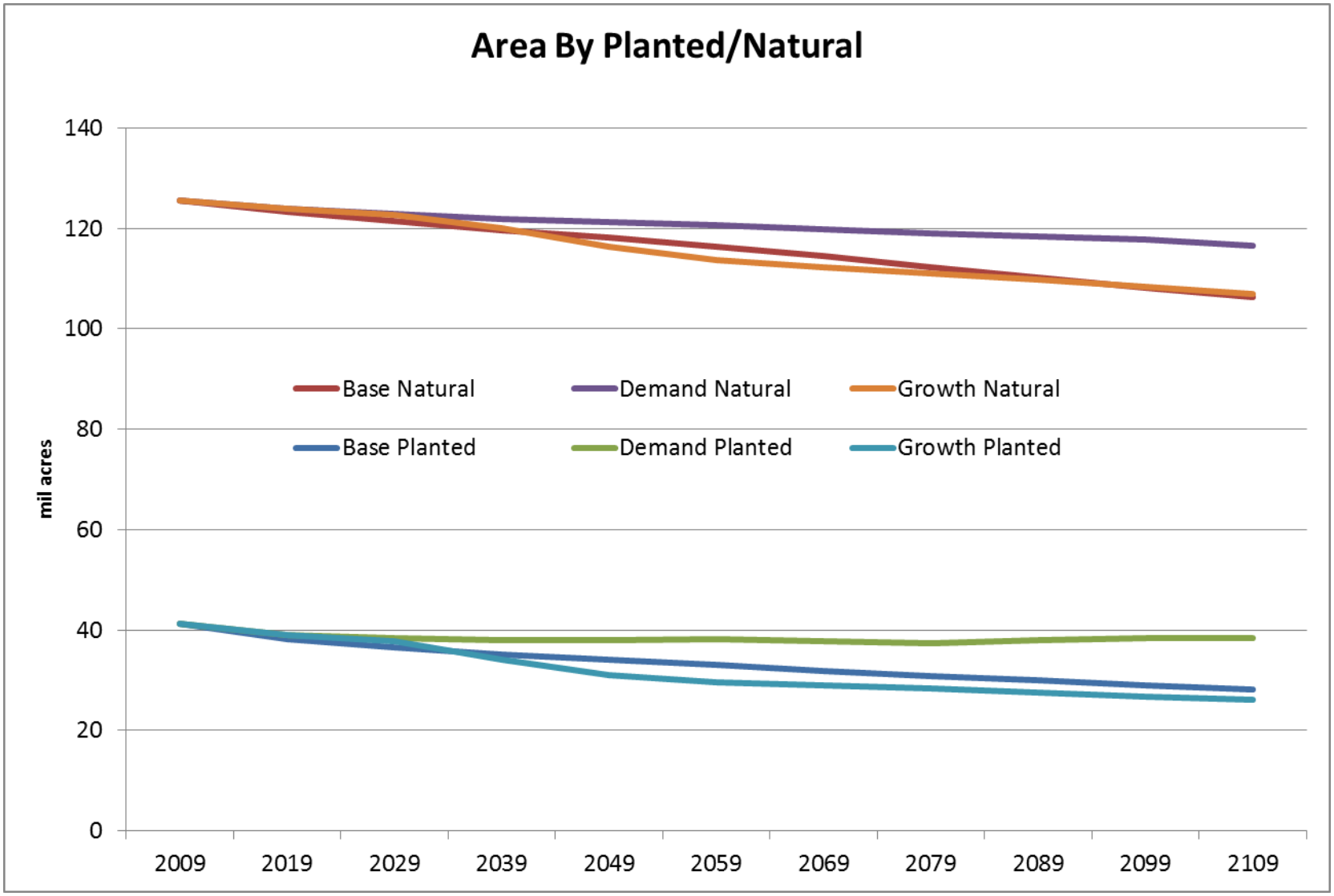
Two Quick Overviews

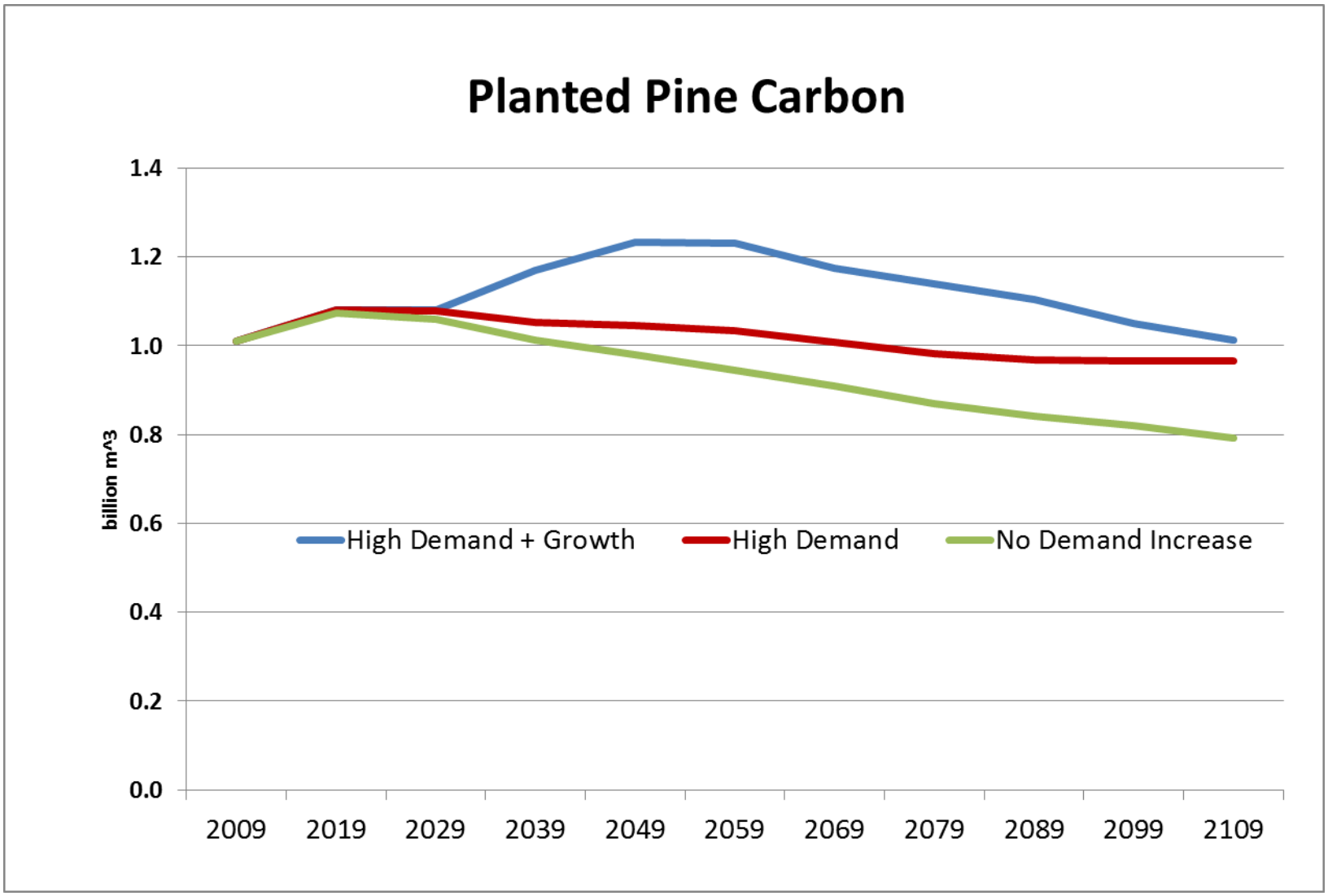
- Forest Carbon and Land-use Change
  - Bob Abt
- LCI of Pulpwood Displacement by Pellets
  - Puneet Dwivedi

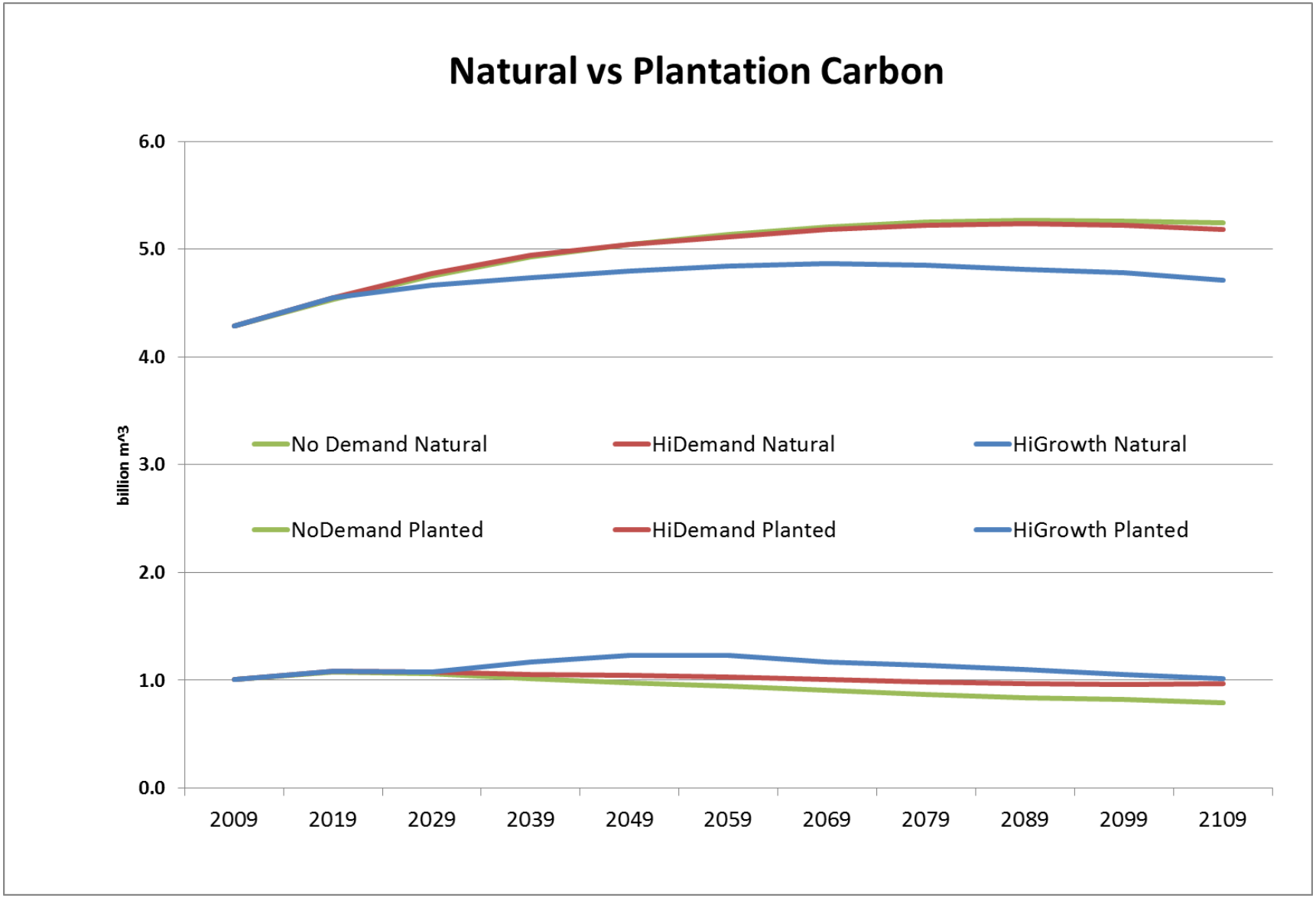
Forest Carbon and Land-use Change

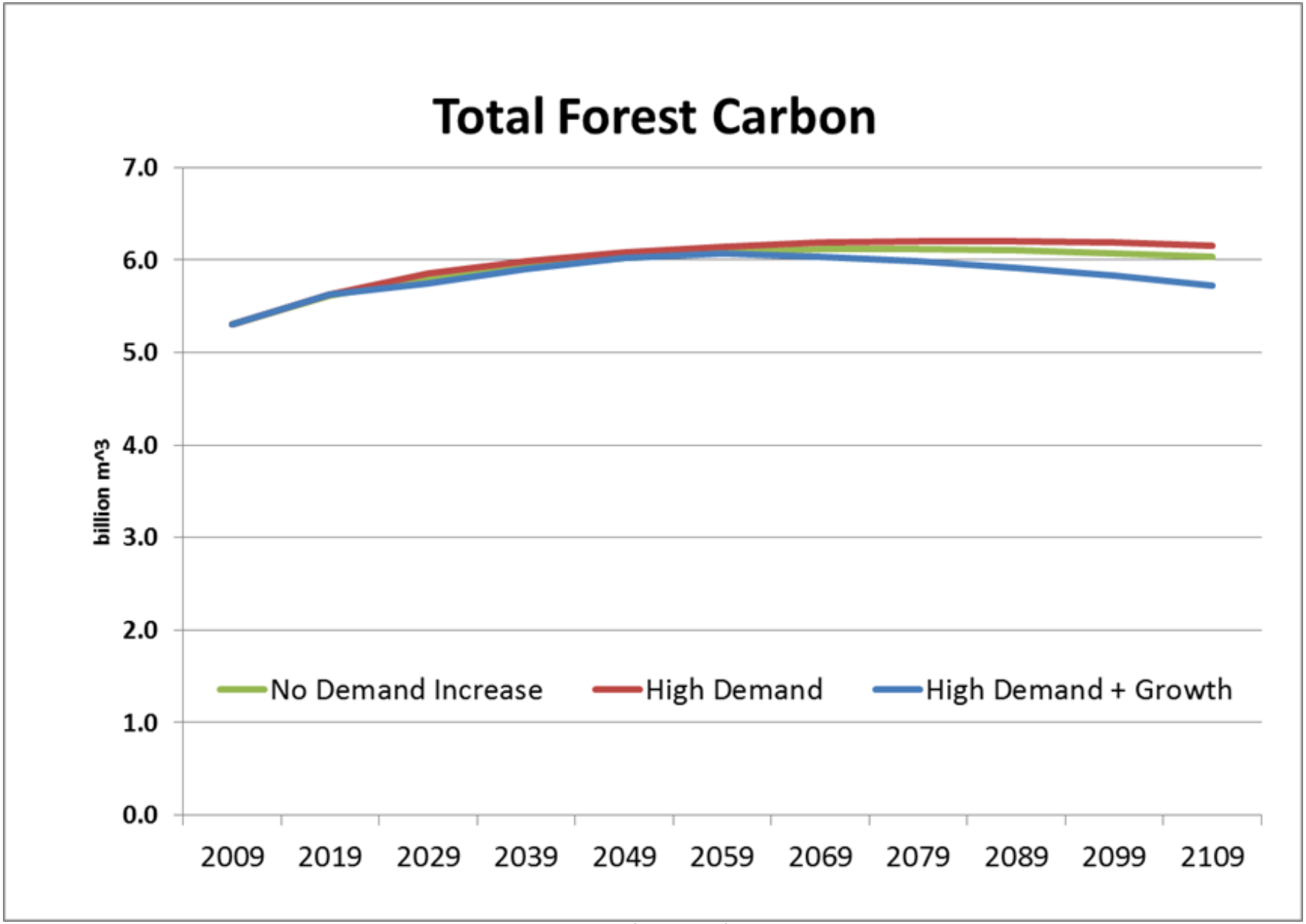
- Supply Push and Demand Pull
  - Landuse between agriculture and forest depends on relative prices
  - Planting is price sensitive
- 100 year projections
  - Base-No demand increase
    - low prices continue
  - .5%/yr demand increase
    - prices recover
  - Demand increase + 100% plantation growth increase
    - Price increases dampened by supply increase




Area By Planted/Natural
140
120
100
80
60
40
20
0
mil acres
Base Natural
Demand Natural
Growth Natural
Base Planted
Demand Planted
Growth Planted
2009
2019
2029
2039
2049
2059
2069
2079
2089
2099
2109


Planted Pine Carbon
billion m^3
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
2009
2019
2029
2039
2049
2059
2069
2079
2089
2099
2109
High Demand + Growth
High Demand
No Demand Increase


Natural vs Plantation Carbon
billion m^3
6.0
5.0
4.0
3.0
2.0
1.0
0.0
No Demand Natural
HiDemand Natural
HiGrowth Natural
NoDemand Planted
HiDemand Planted
HiGrowth Planted
2009
2019
2029
2039
2049
2059
2069
2079
2089
2099
2109


Total Forest Carbon
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
billion m^3
No Demand Increase
High Demand
High Demand + Growth
2009
2019
2029
2039
2049
2059
2069
2079
2089
2099
2109

Forest Carbon and Land-use Change

- Hypothetical Scenarios
- Emphasizes role of:
  - Forest carbon and the extensive margin (landuse)
  - Importance of policy and market context
  - Initial platform for richer study of:
    - Pinemap management scenarios
    - Policy analysis
      - Carbon policy which favors trees
      - Ag policies which favor agriculture

Overall Carbon Savings

- What is the consequence of diverting pulpwood on carbon sequestered in wood products and wood present in landfills?
- How much carbon is displaced when electricity generated from wood pellets substitutes grid electricity?
- What is the overall carbon savings when both forms of carbon (sequestered and displaced) are considered simultaneously?
- What factors affect overall carbon savings?

Overall Carbon Savings

Case Name	sawtimber	chip-n-saw	pulpwood	logging residues
LEFT-LR	Lumber	OSB	Paper	Left on the ground
BURN-LR	Lumber	OSB	Paper	Burn on the ground
ENE-LR	Lumber	OSB	Paper	Electricity generation
ENE-LR&PW	Lumber	OSB	Electricity generation	Electricity generation

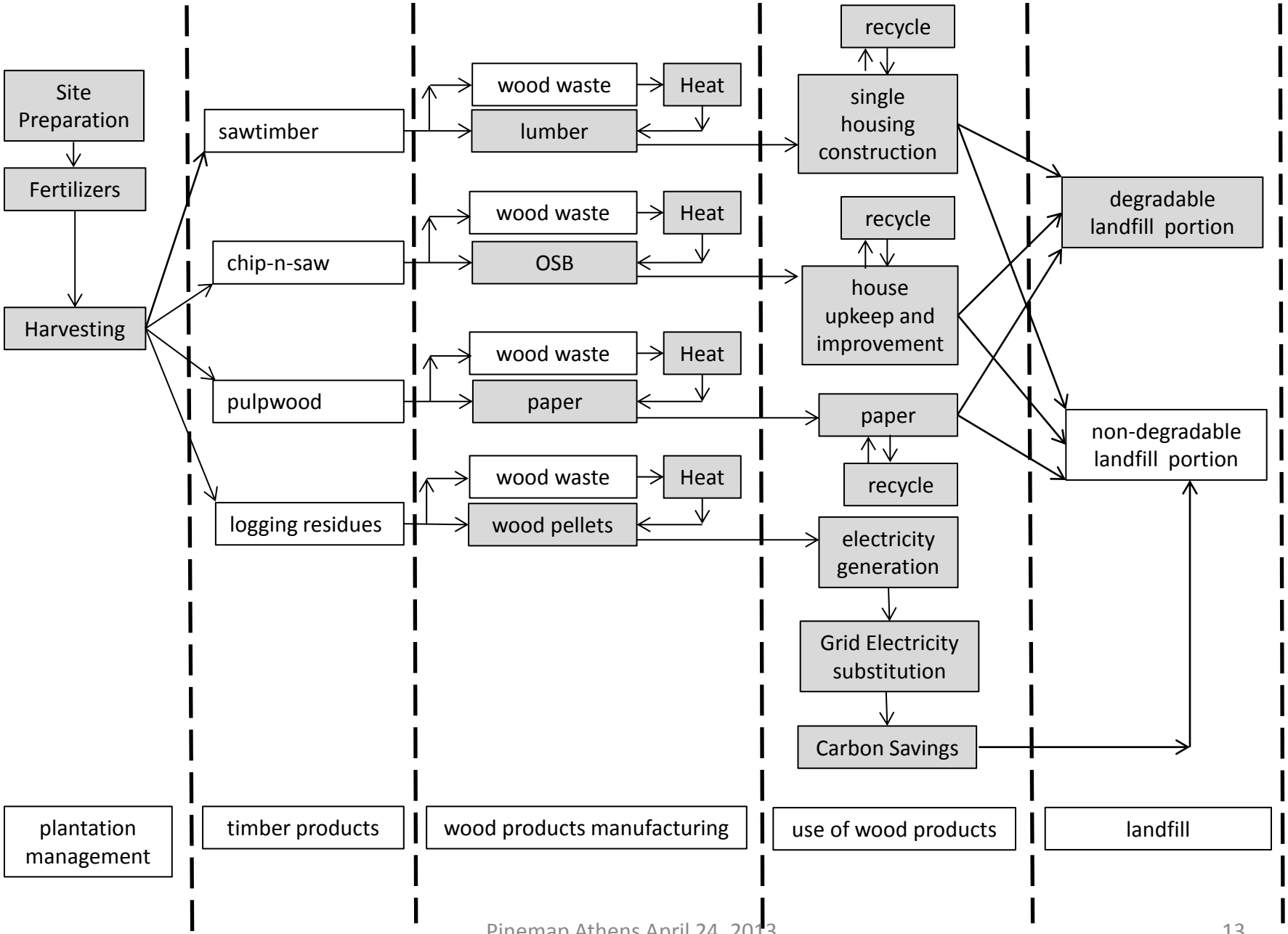
Selected Species: Slash pine

Two scenarios of forest management: Intensive and Non-intensive

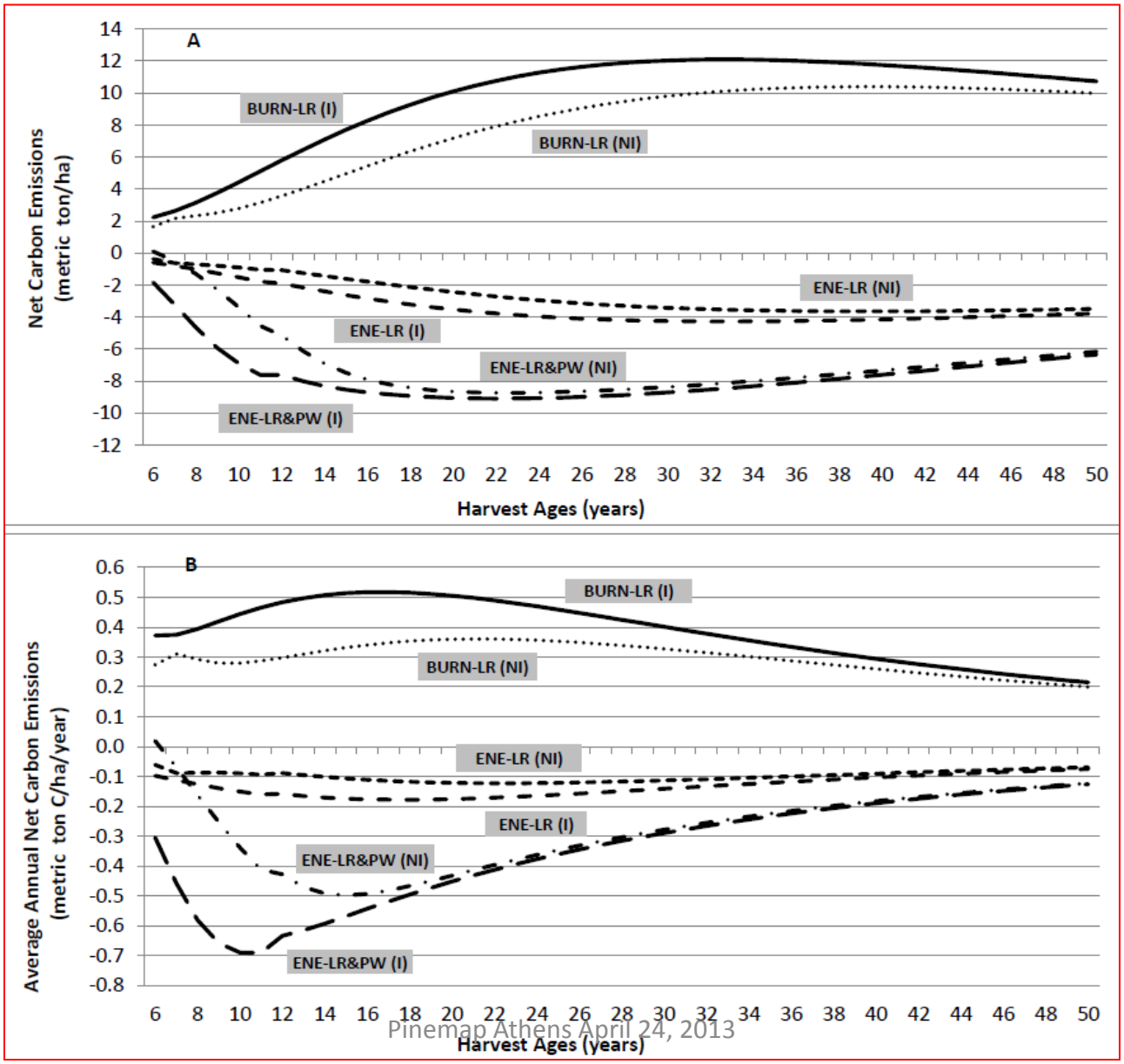
Harvest Age: Year 6 to Year 50

Simulation Period: 1000 years

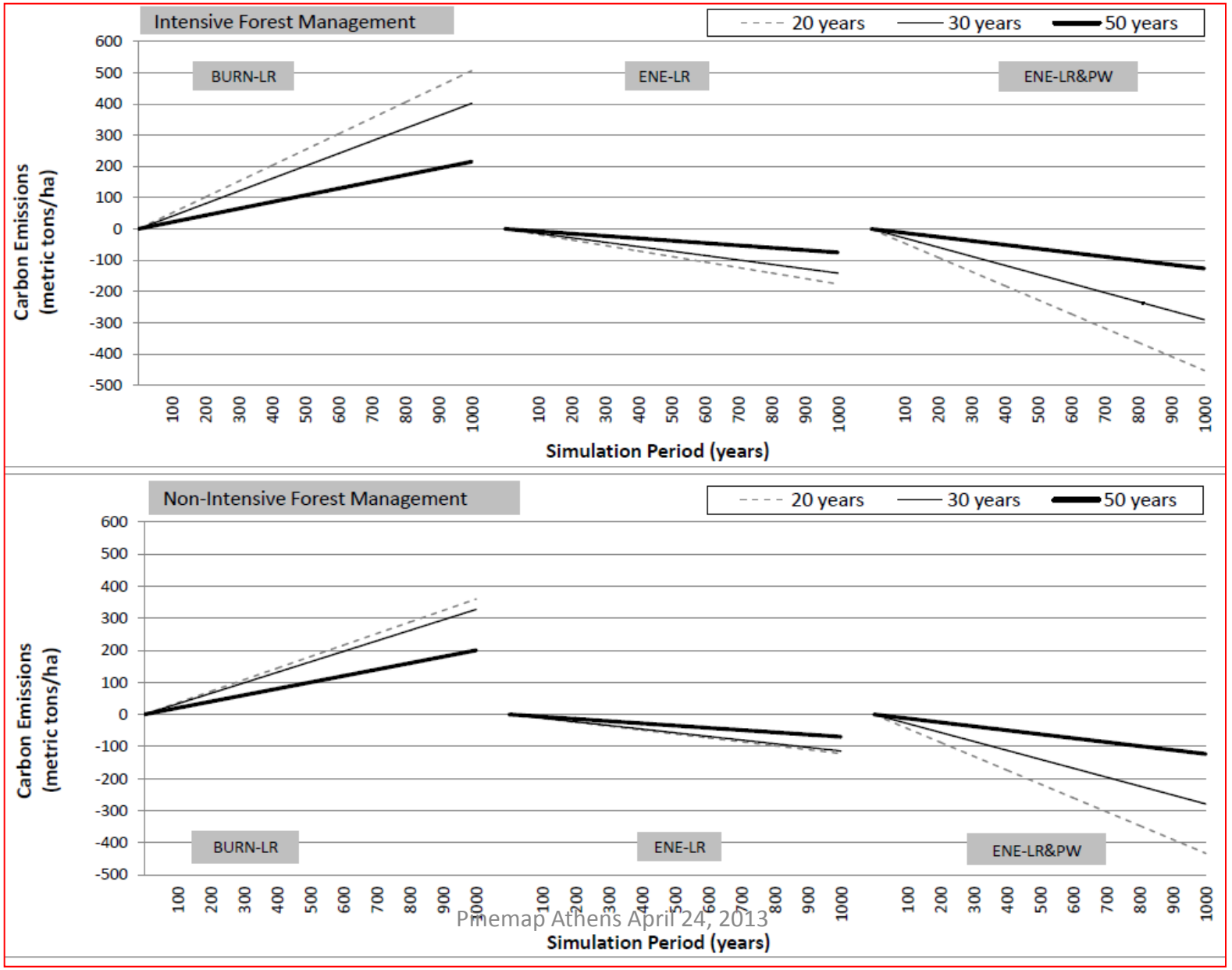
Multiple harvest cycles


Site Preparation
Fertilizers
Harvesting
sawtimber
chip-n-saw
pulpwood
logging residues
wood waste
Heat
lumber
wood waste
Heat
OSB
wood waste
Heat
paper
wood waste
Heat
wood pellets
recycle
single housing construction
recycle
house upkeep and improvement
paper
recycle
electricity generation
Grid Electricity substitution
Carbon Savings
degradable landfill portion
non-degradable landfill portion
plantation management
timber products
wood products manufacturing
use of wood products
landfill

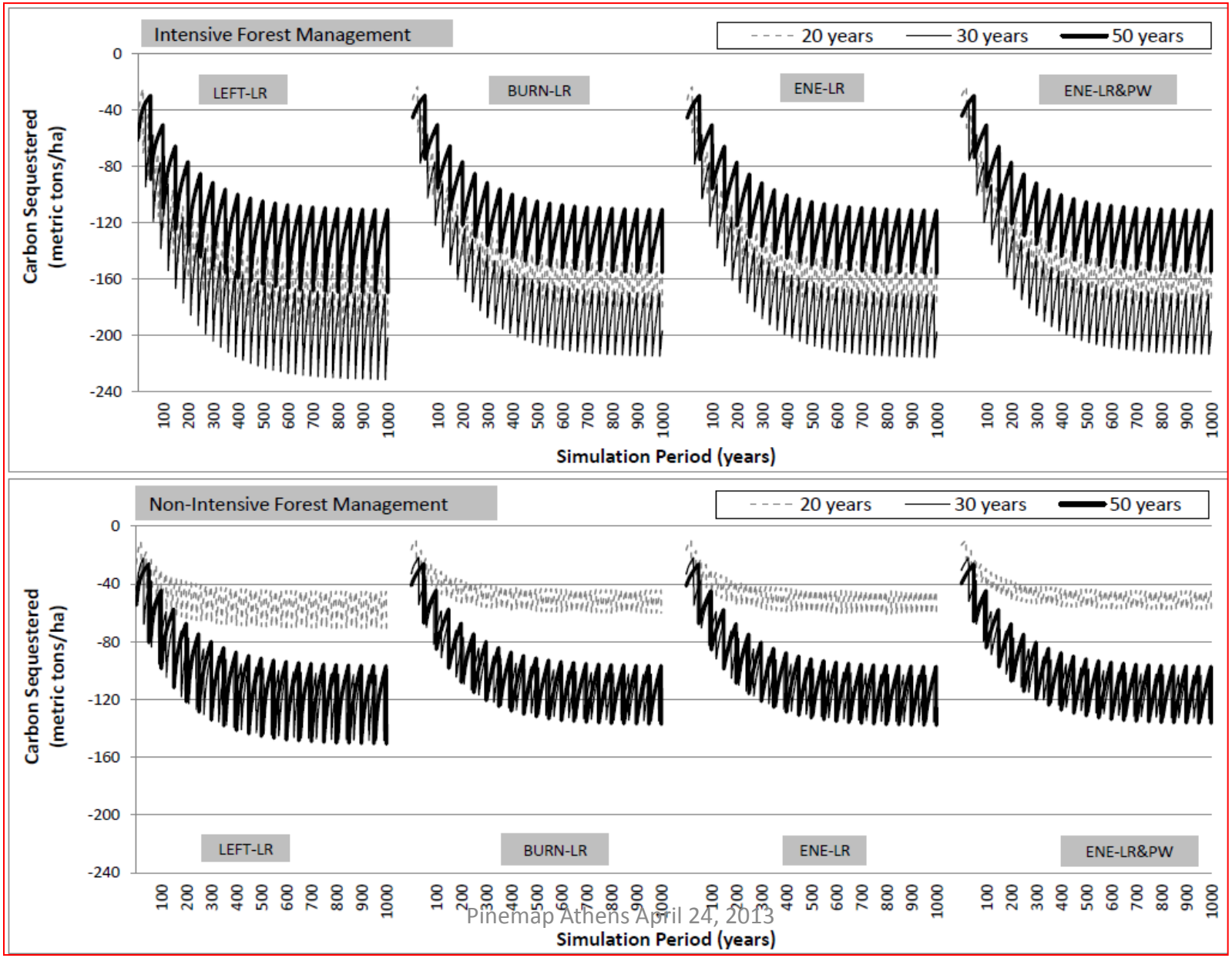
Carbon Displaced



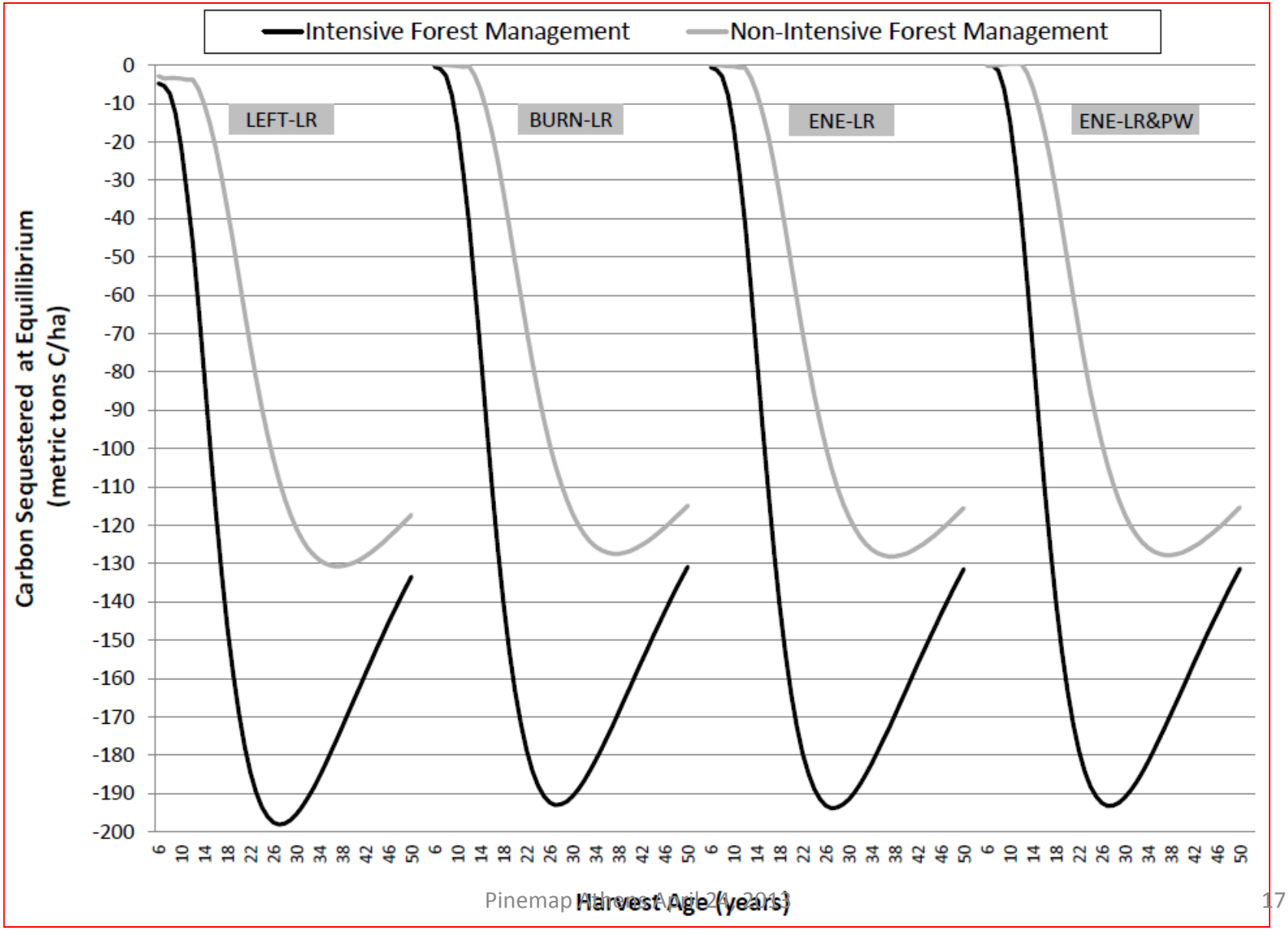
Carbon Displaced



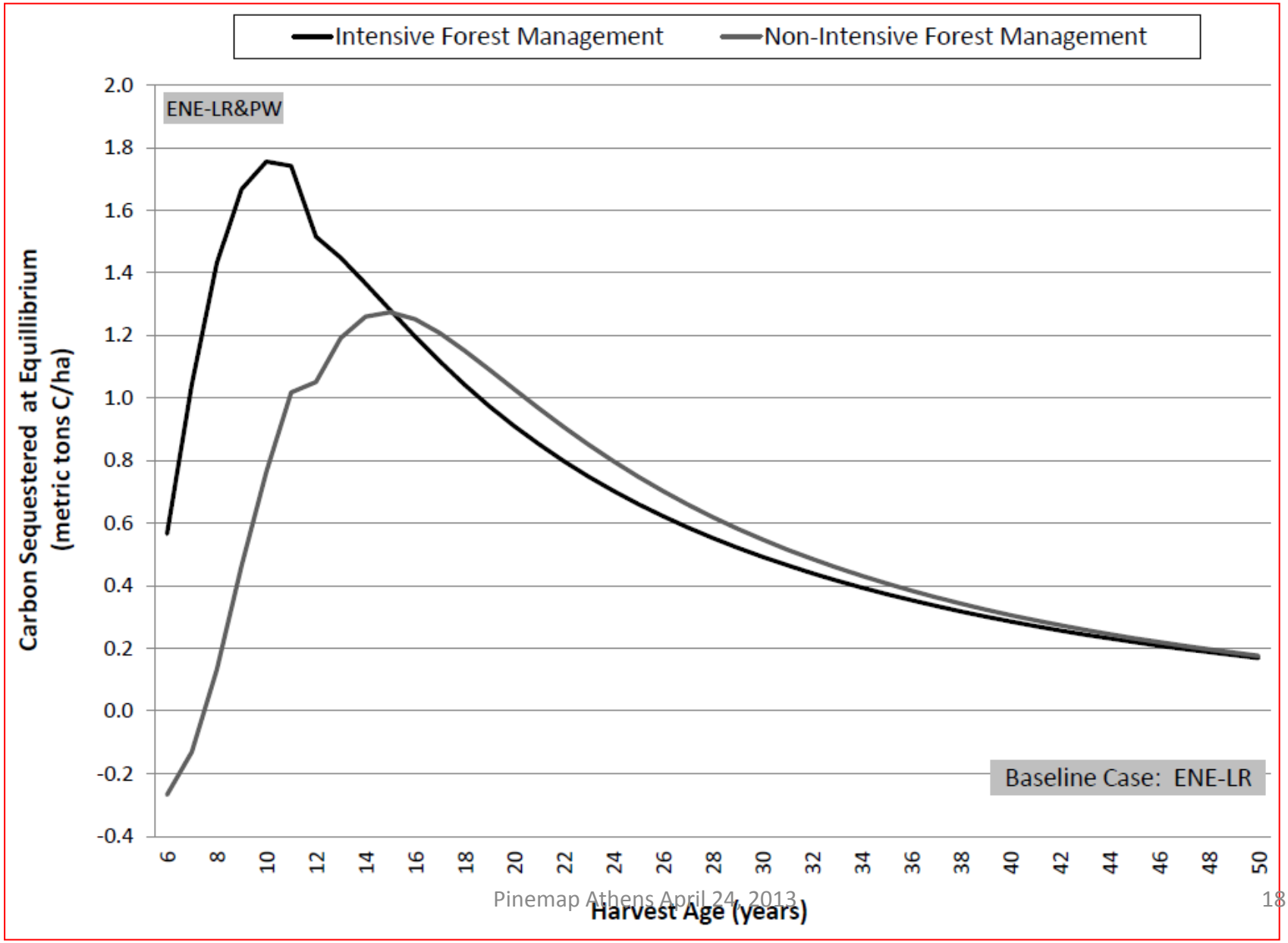
Carbon in Wood Products



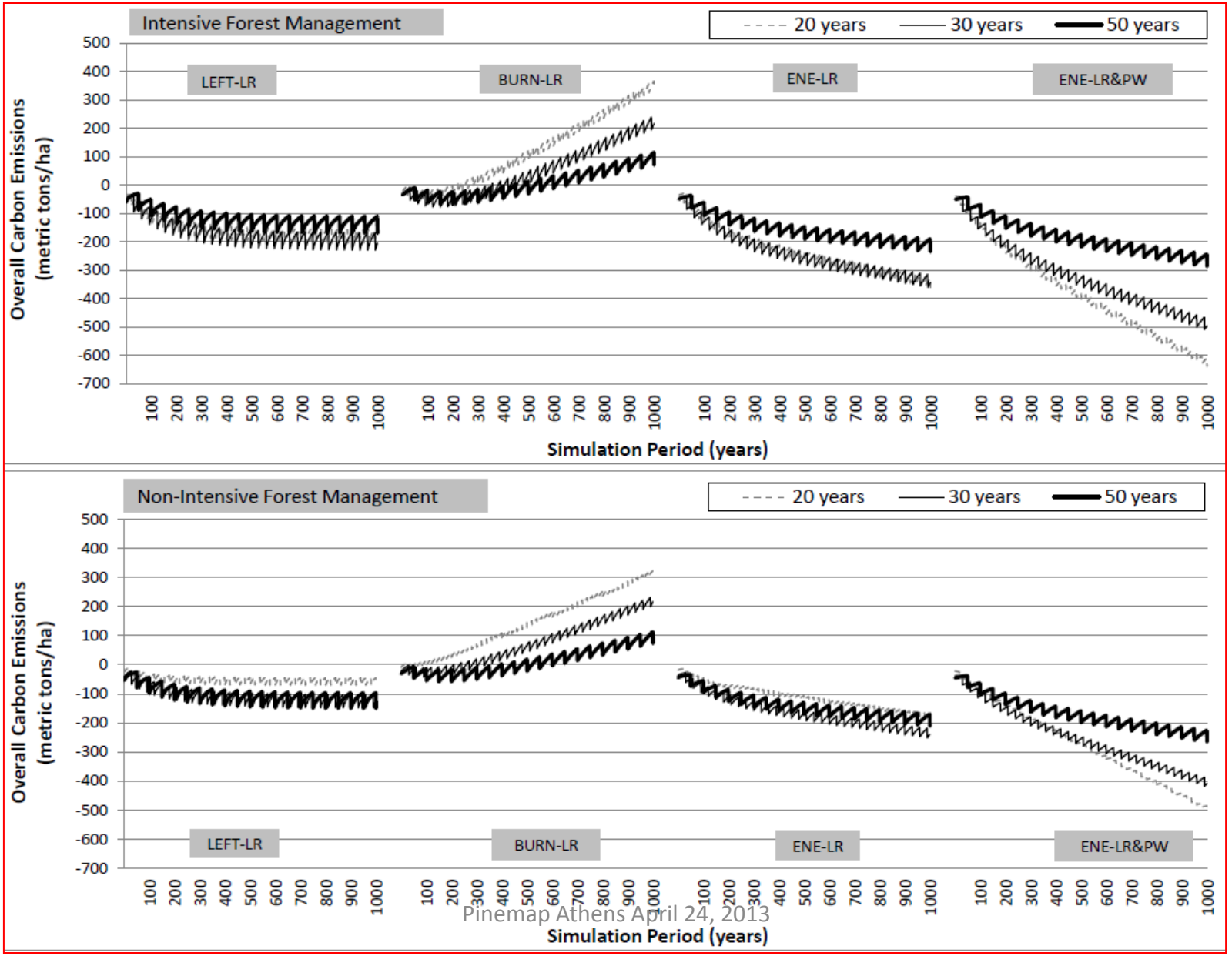
Carbon in Wood Products



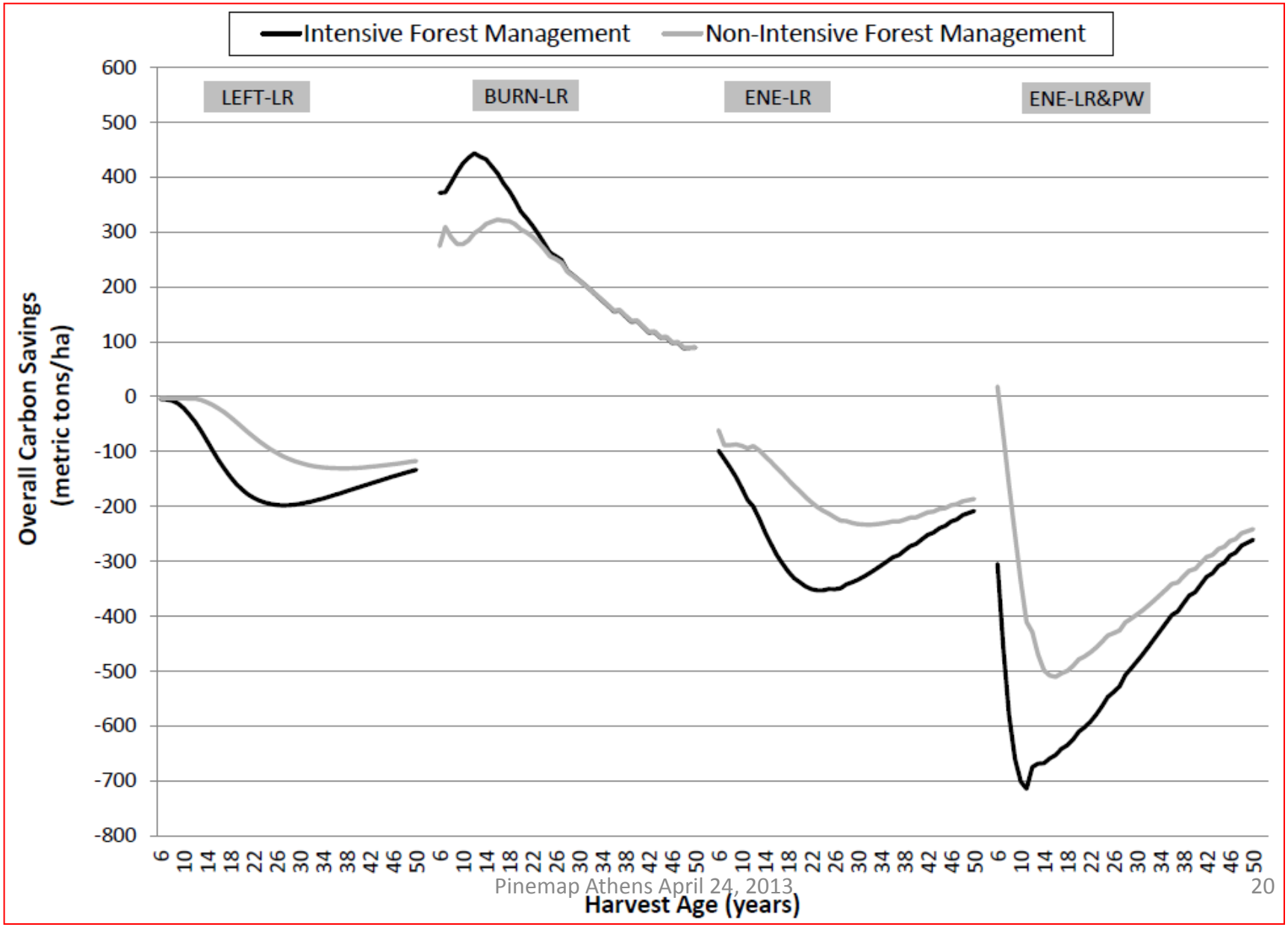
Carbon in Wood Products



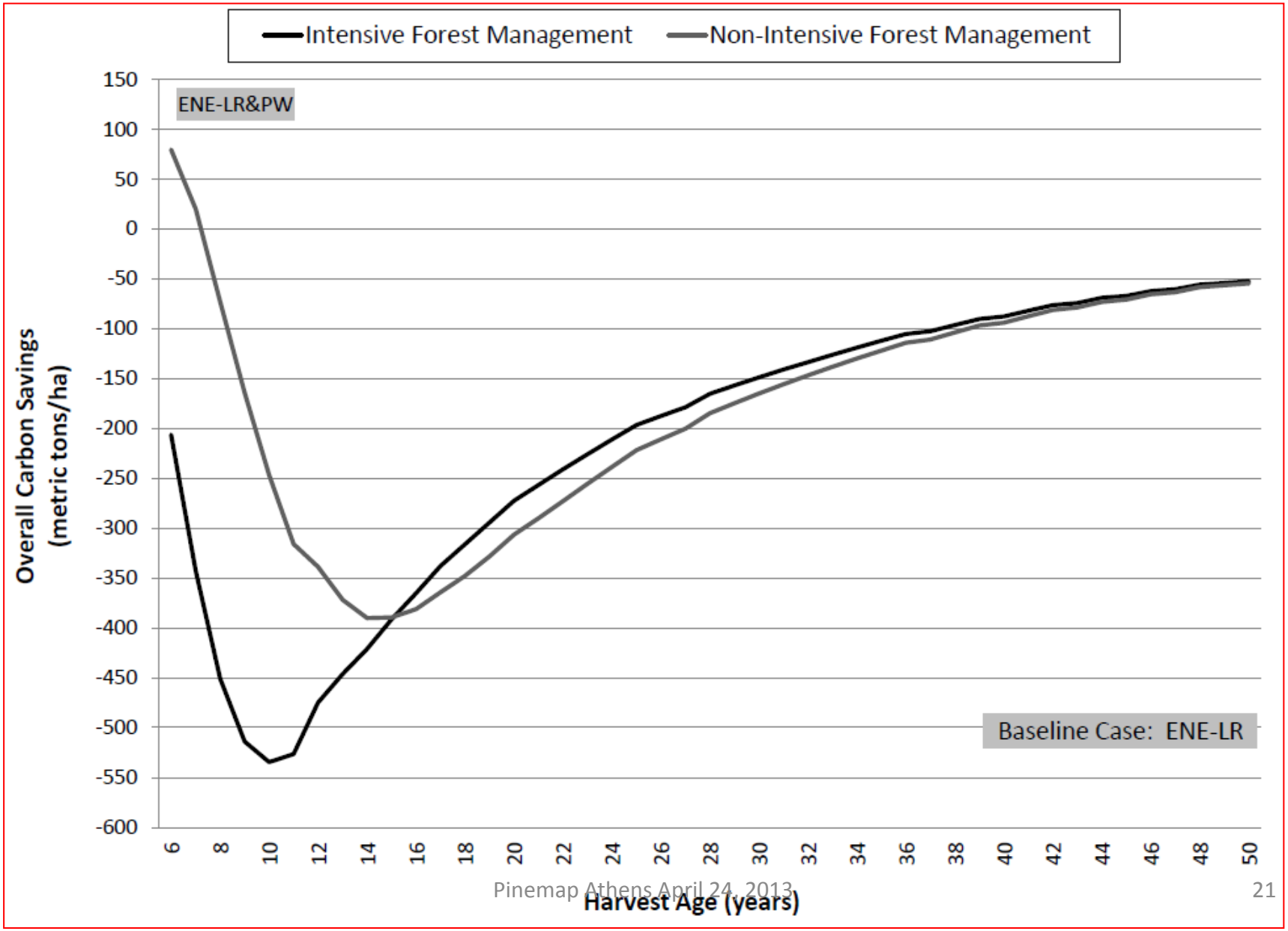
Overall Carbon Savings



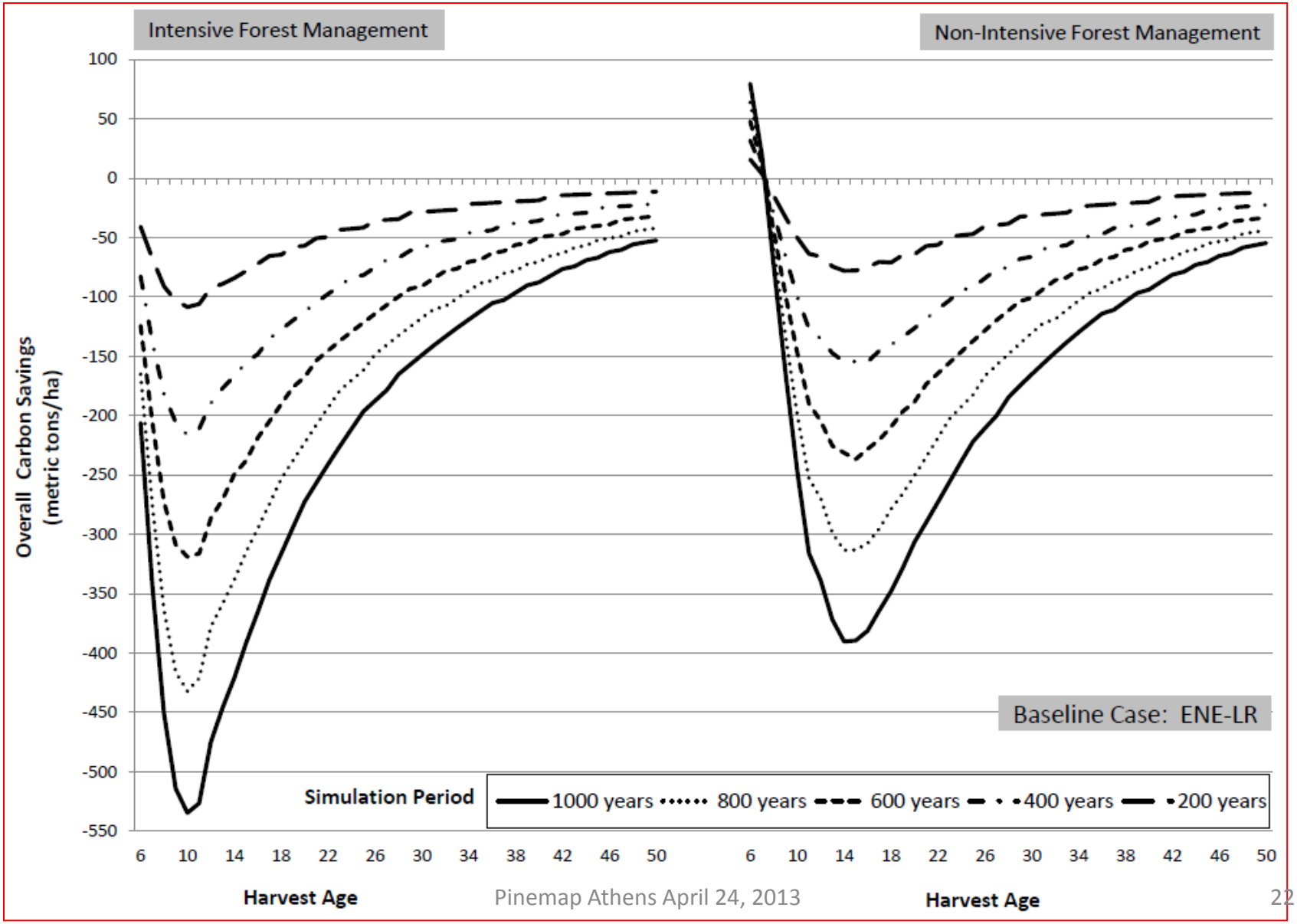
Overall Carbon Savings



Overall Carbon Savings



Overall Carbon Savings



Summary

- Increase in harvest age will not always lead to more carbon sequestration in wood products and wood present in landfills
- Diversion of pulpwood for bioenergy decreases carbon sequestered in wood products and wood present in landfills
- Displaced carbon fully compensates the loss of carbon sequestered in wood products and wood present in landfills
- Harvest age and selected simulation period are key determinants of overall carbon savings.