

Quantifying the biophysical climate change mitigation potential of Canada's forest sector

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Outline

Description of Tier 3 GHG accounting system

Description of application for scenario analysis

Analysis of mitigation potential for forest management and wood product strategies

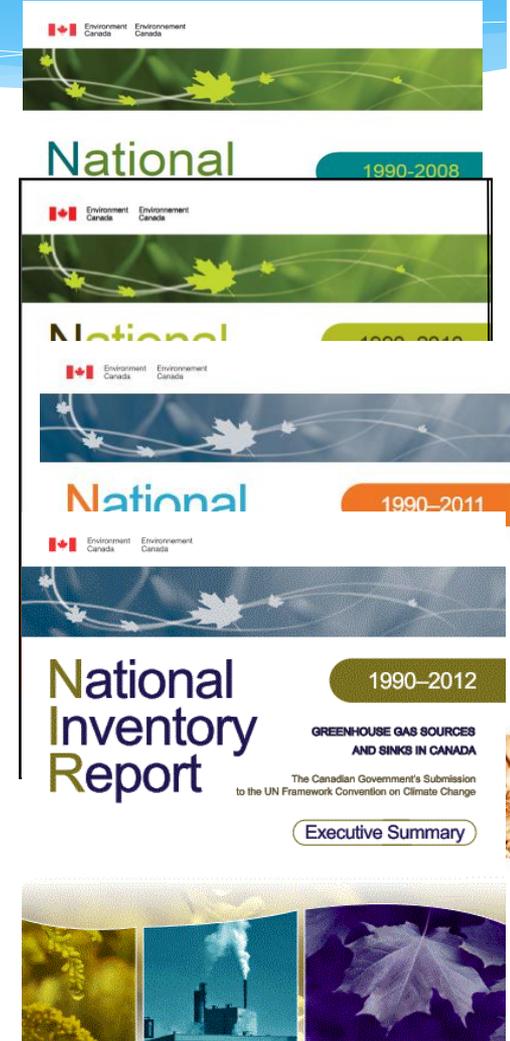
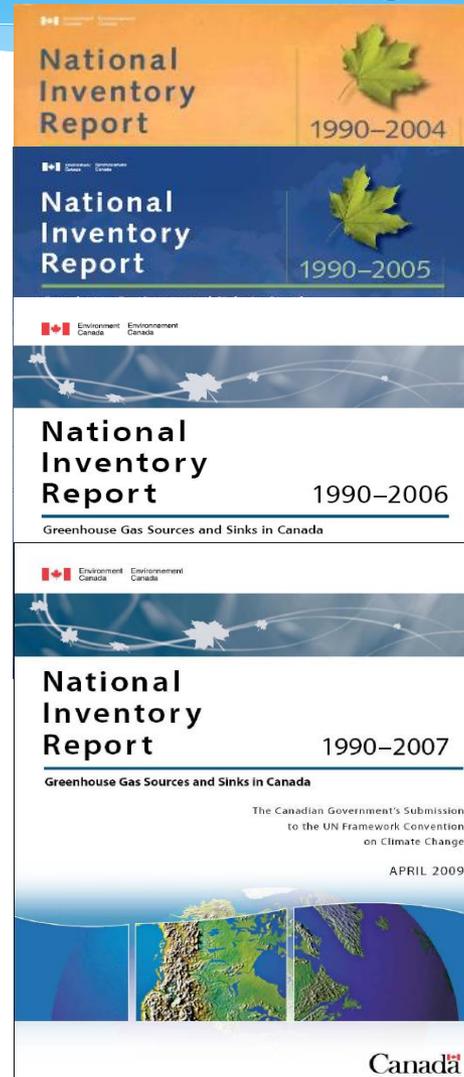
Key messages and lessons learned



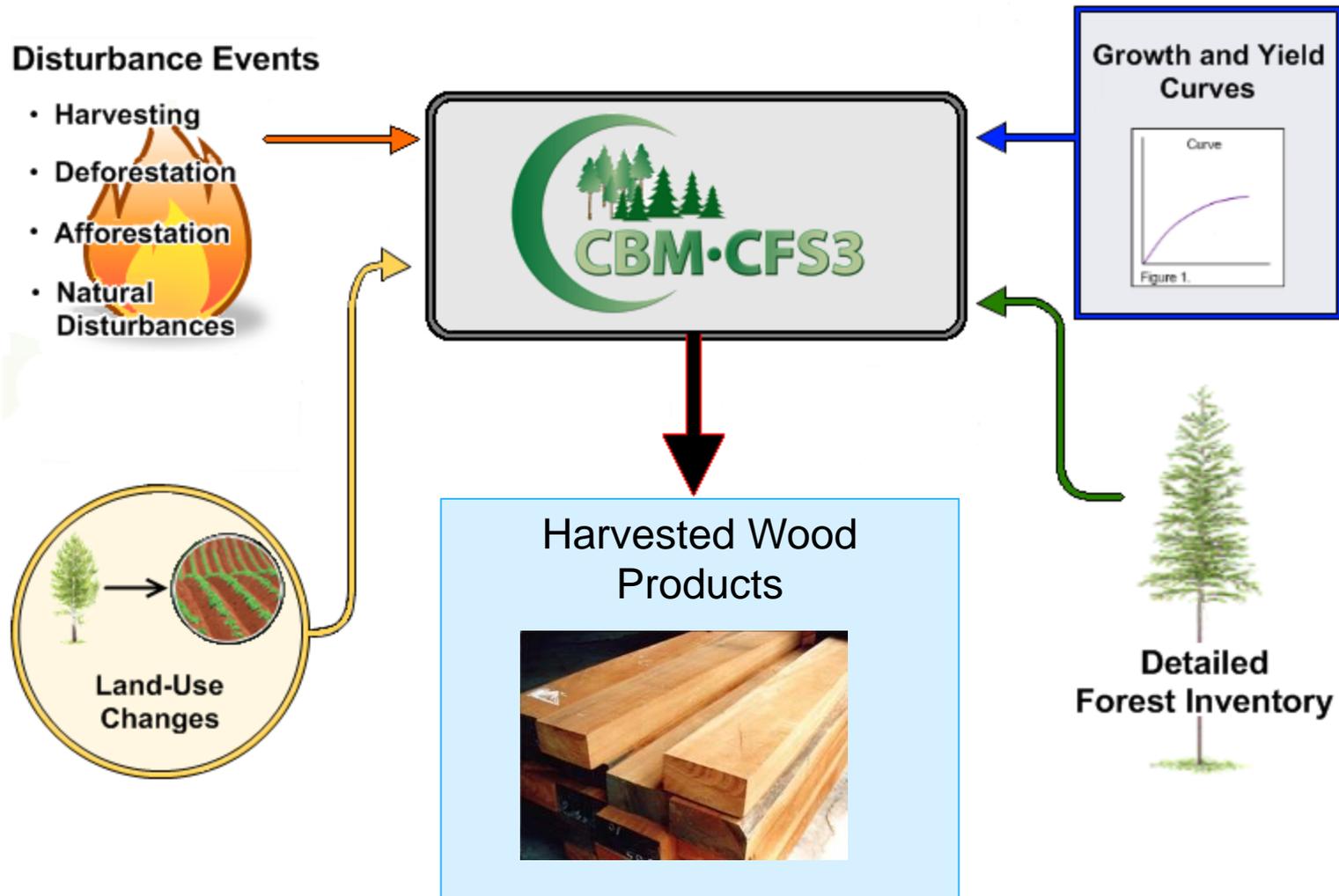
National Forest Carbon Monitoring, Accounting and Reporting System

One national system, many uses:

- * Reporting past C dynamics
 - * National GHG Inventory
 - * State of Canada's Forests
- * Projecting future C dynamics
 - * Scientific research
 - * Policy development
 - * International negotiation
- * Develop climate mitigation and adaptation strategies
- * Assess C implications of forest management options



Tier 3 system – one inventory plus change

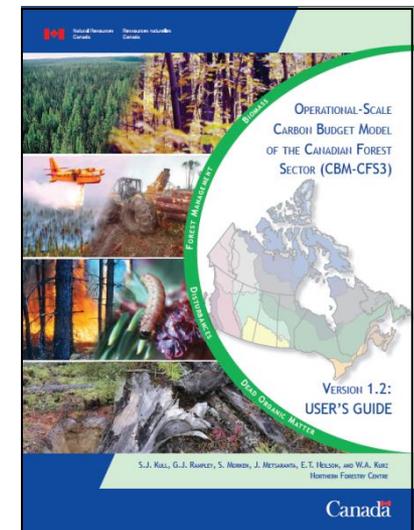


Carbon Budget Model of the Canadian Forest Sector (CBM-CFS3)

Carbon Budget Model

- * An empirical model of forest C dynamics.
- * Allows forest managers to assess carbon implications of forest management (increase sinks and reduce sources)
- * Builds on >25 years of CFS Science
- * Downloaded by 1000+ people in 54 countries (carbon.cfs.nrcan.gc.ca)
- * Trained 500+ people

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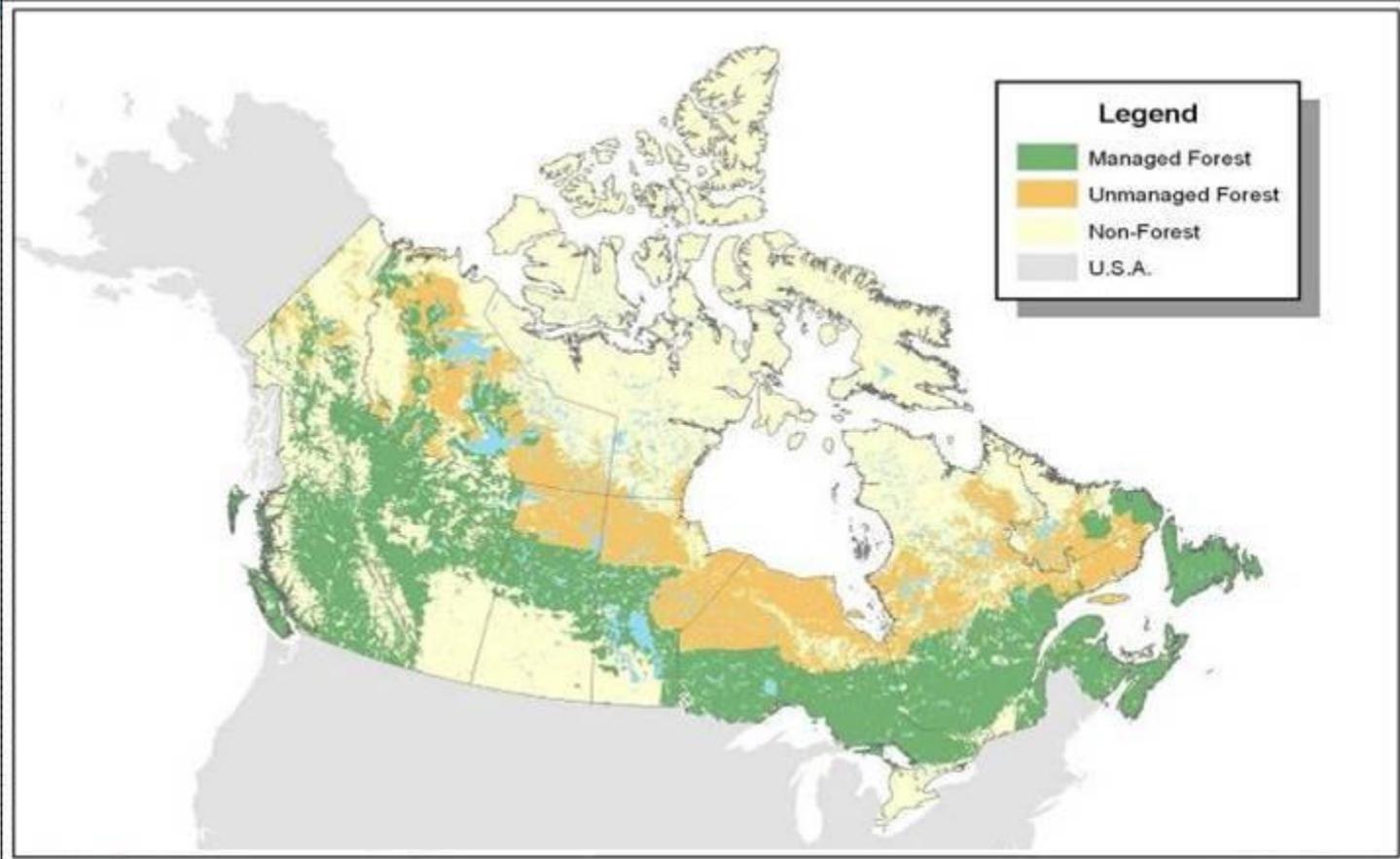
Carbon Budget Modelling Framework for Harvested Wood Products

Production approach

- * Uses harvest from Carbon Budget model
- * Tracks harvested C through manufacturing, use, and end-of-life use
- * Commodities: sawnwood, panels, other solid wood, and pulp & paper based on national statistics reported in FAO
- * Includes product half-lives, end-of-life treatment and landfill emissions



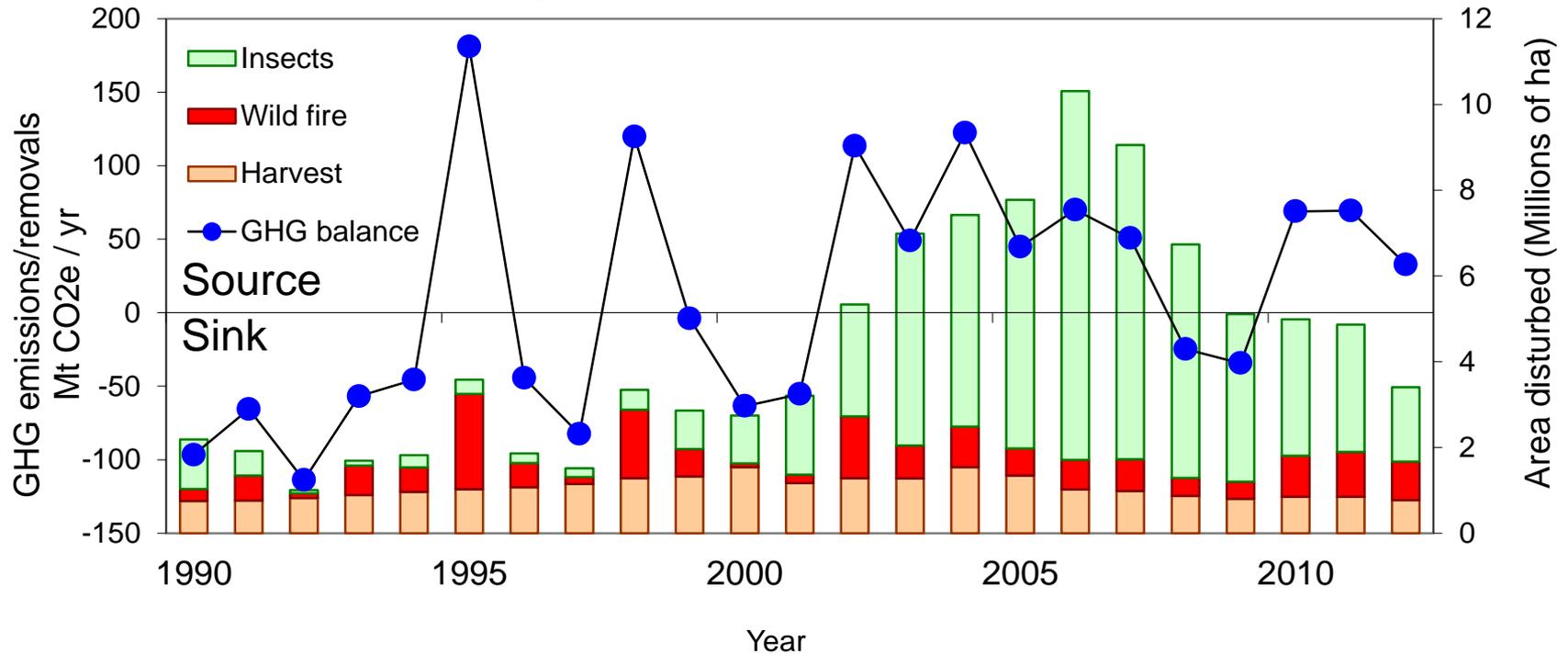
Canada's Managed Forest 230 Mha



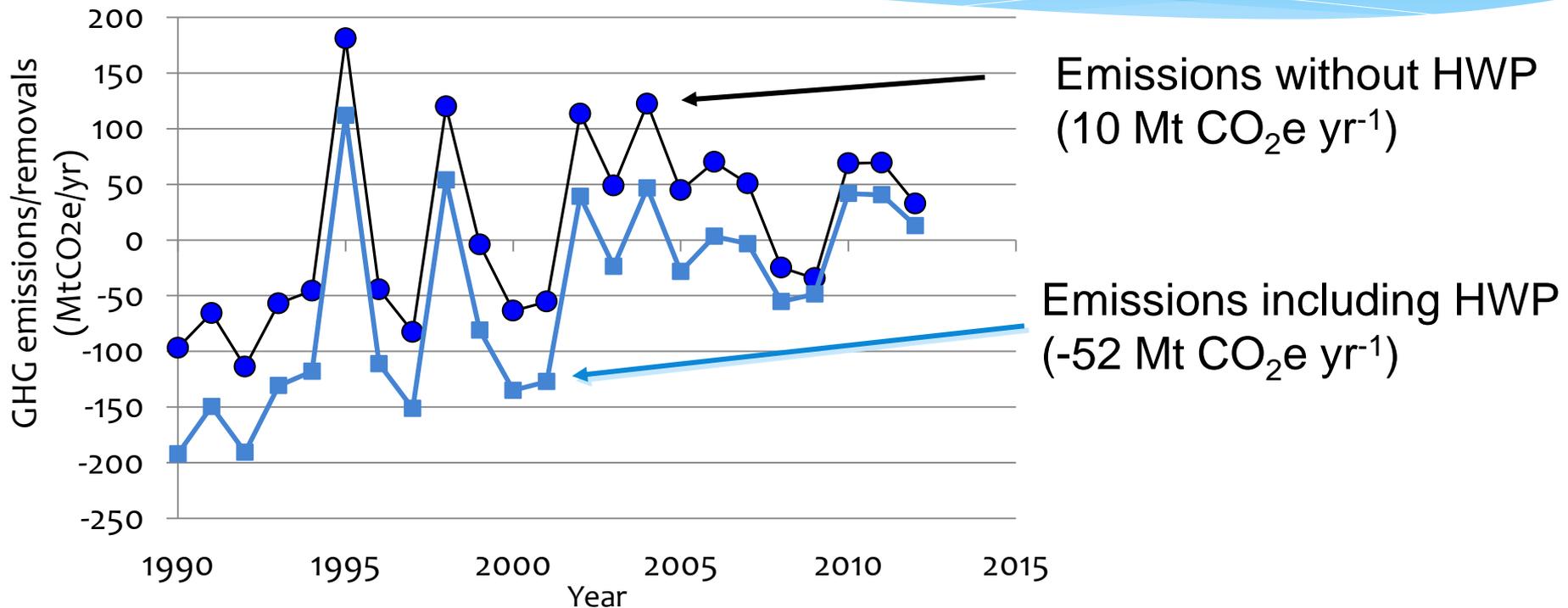
Managed forests are those managed for timber and non-timber resources (including parks) or subject to fire protection.

Managed forest GHG balance

Carbon Emissions and Area disturbed, FLFL
(Assuming instantaneous emission of harvested C)



Harvested Wood Product Lifetimes IPCC 2006 Guidelines



Commodity pools start in 1990.

First order decay functions (35 years for sawnwood, 25 years for panels, 2 years for pulp and paper).

Retired products and mill residues instantly oxidized.

National-scale example application of using inventory for mitigation analyses

Objective is to determine the mitigation potential of forest carbon management for Canada's managed forest

Time-series from GHG reporting (1990 – 2011) extended by projecting activity data (harvest, fires, planting, etc.) to 2050

Coarse spatial scale (39 spatial units representing 230 Mha).

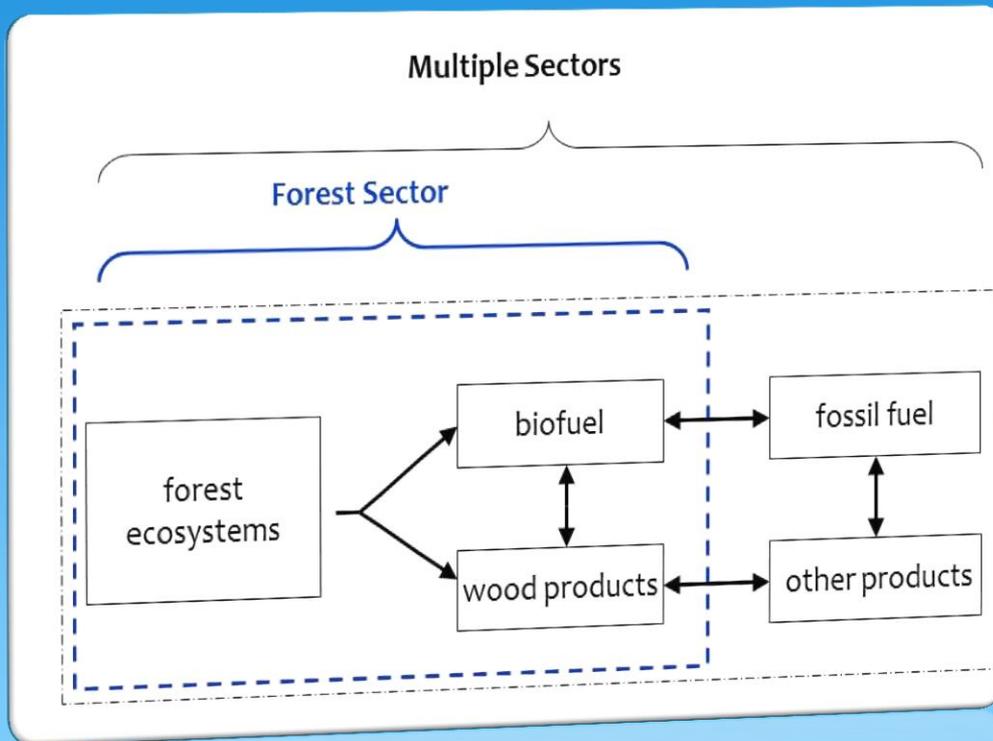
Mitigation is defined as the reduced emissions from incremental activities relative to a Base Case

Results published in Biogeosciences (In Press)

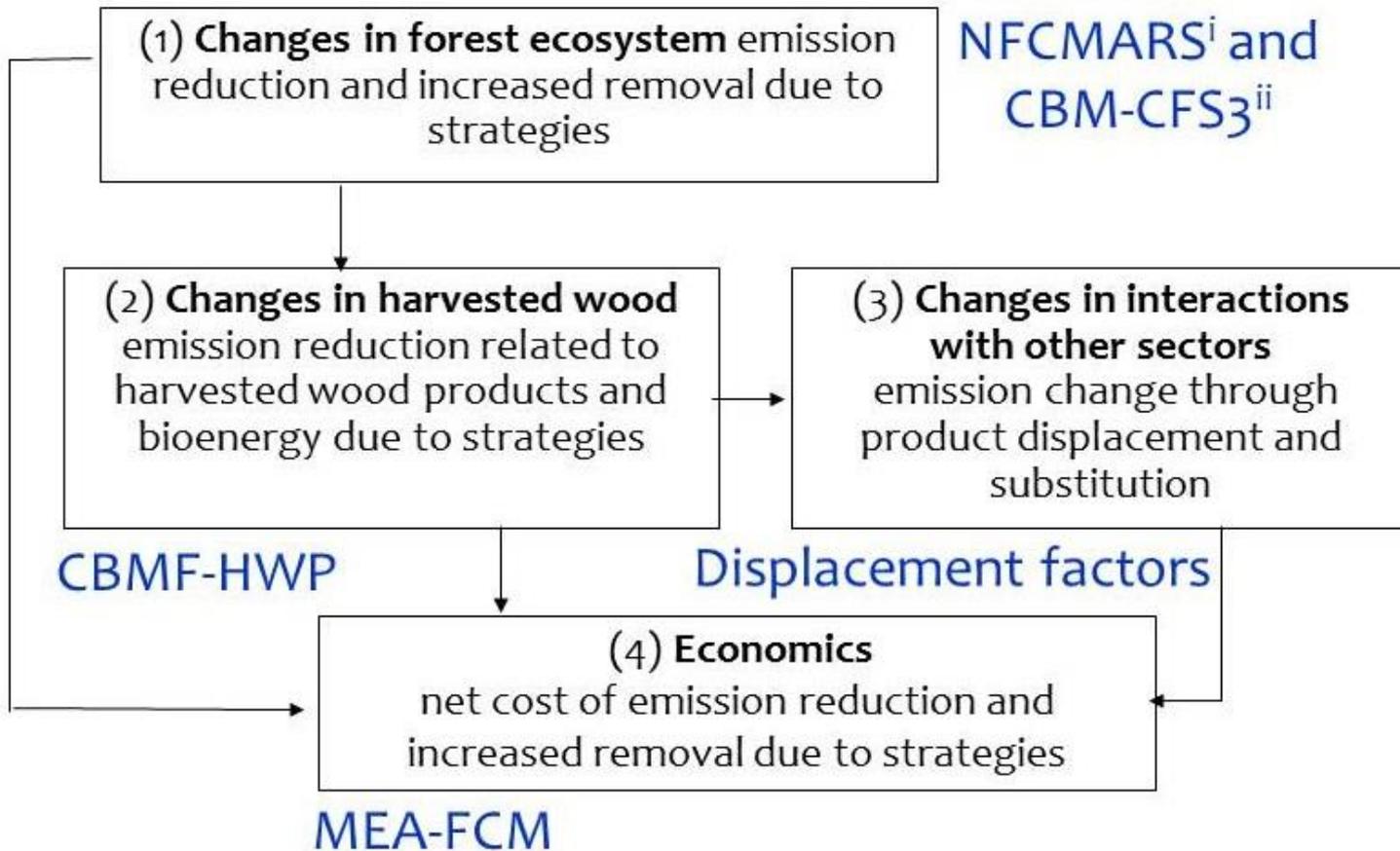


Systems' approach to emission reductions

Broaden the scope to include emissions avoided when using biomass in place of other energy sources or products.



Analytical framework

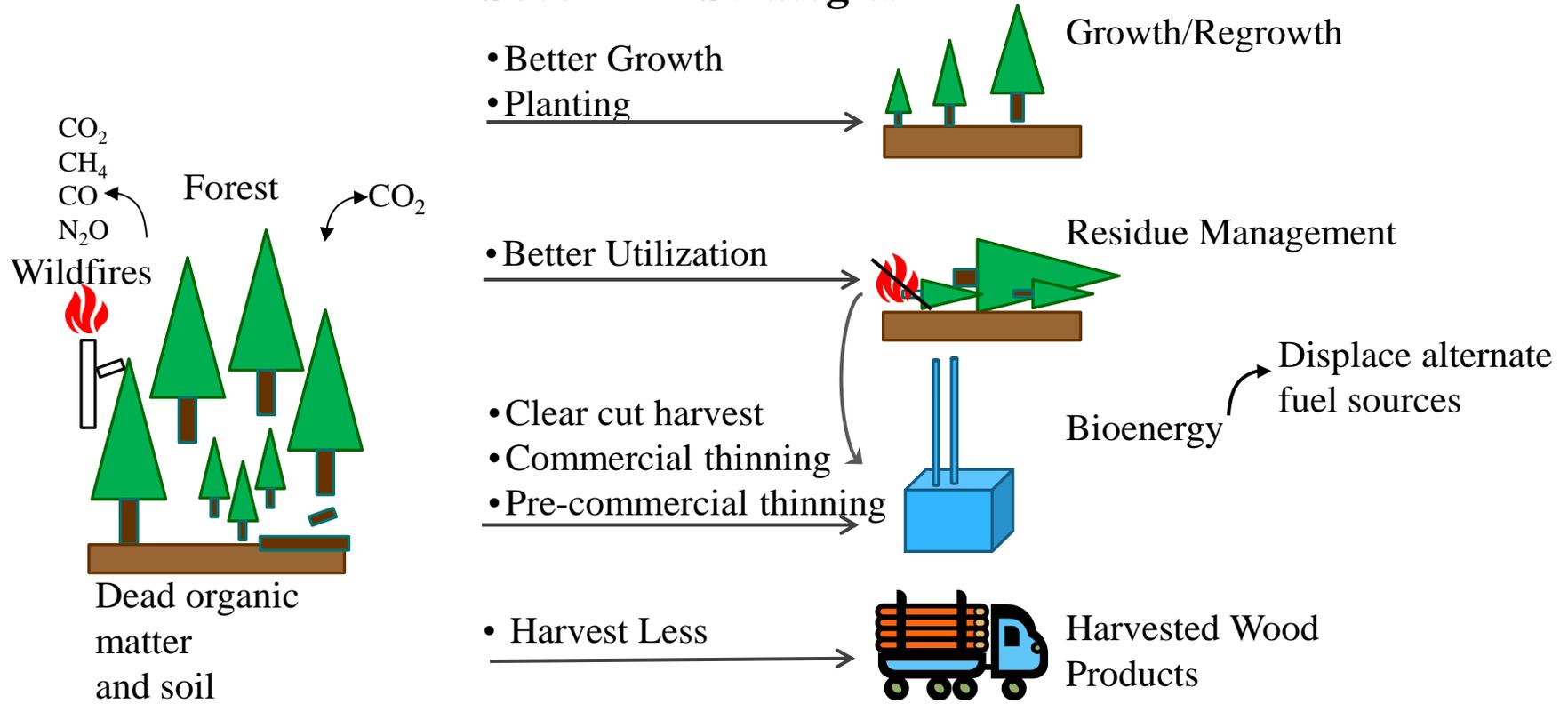


ⁱ Stinson et al. (2011) *Global Change Biology* 17, 2227-2244

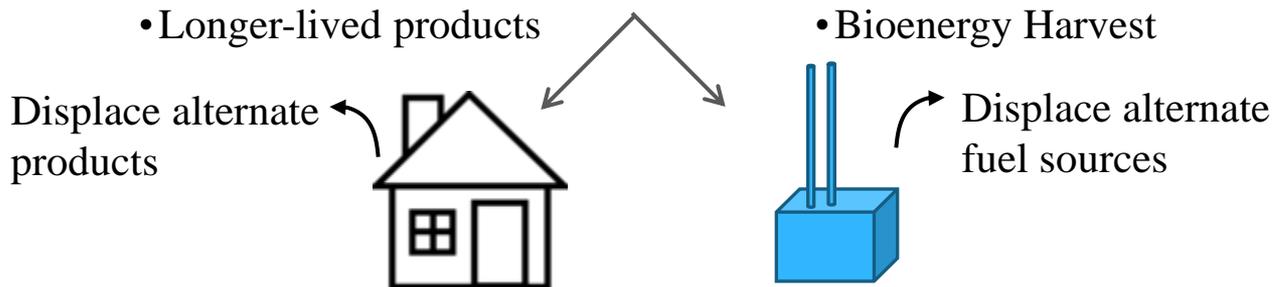
ⁱⁱ Kurz et al. (2009) *Ecological Modelling* 220, 480-504

Mitigation Analysis

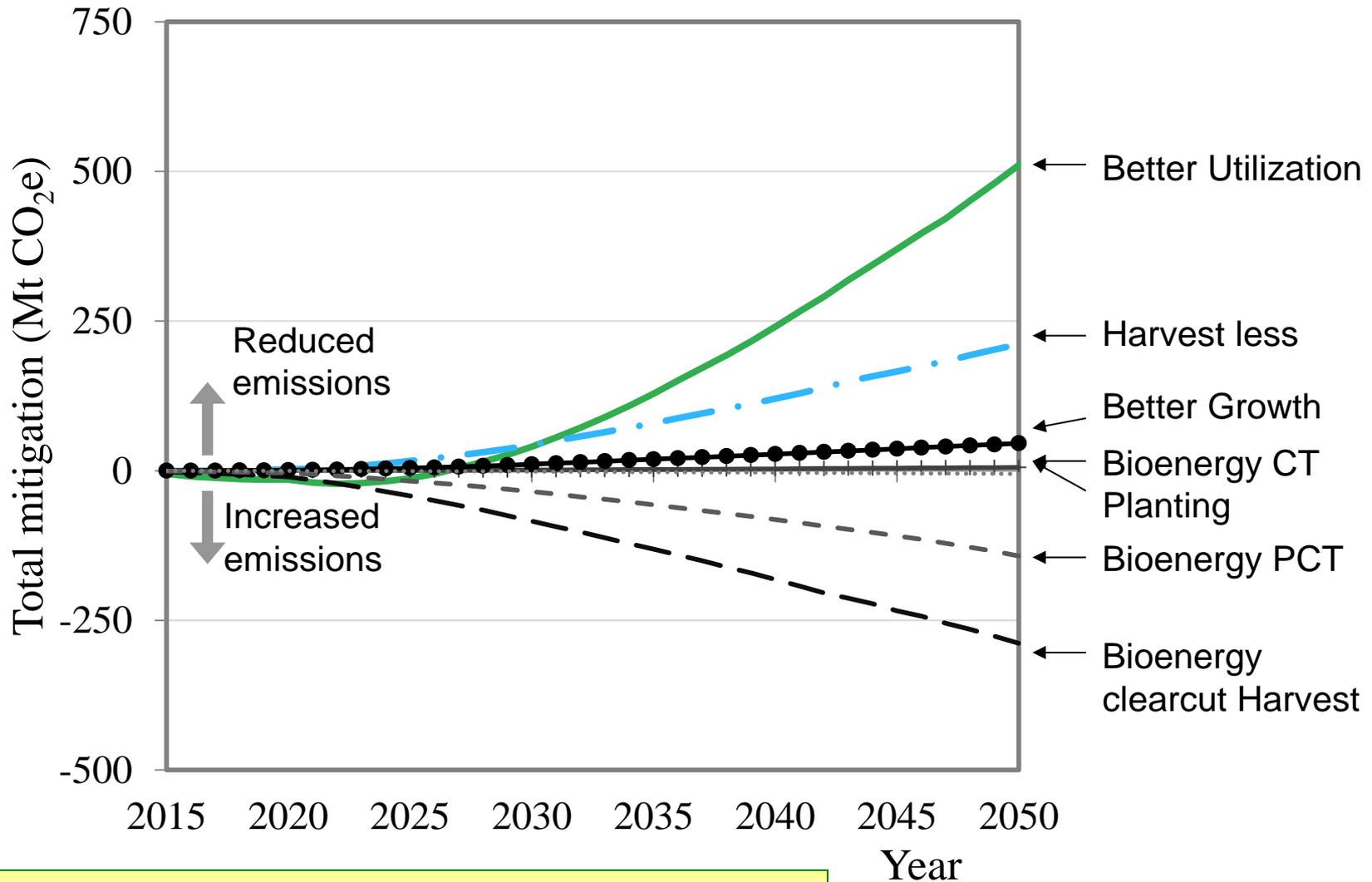
Seven FM Strategies



Two HWP Strategies



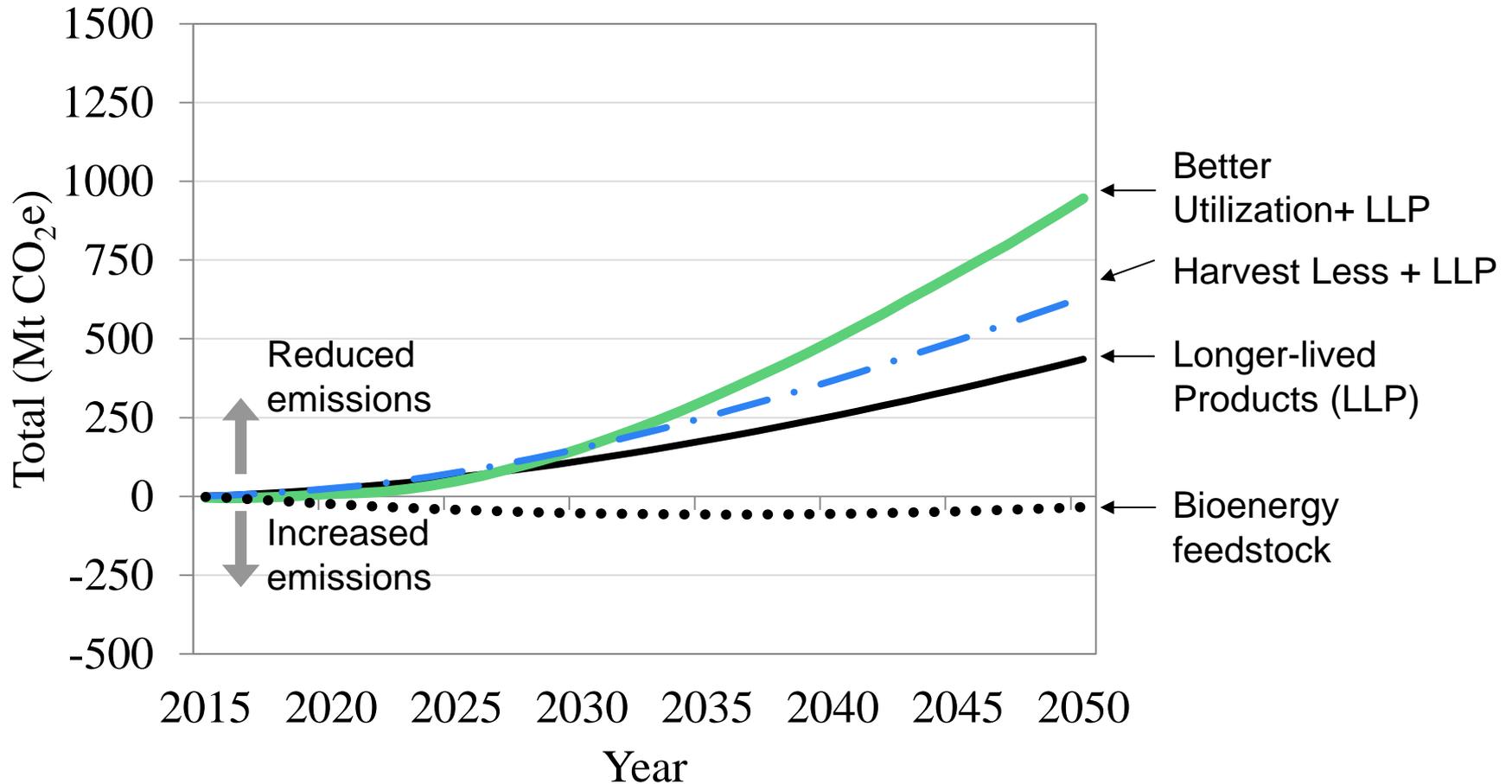
Forest Management cumulative mitigation



Key findings:

Some strategies result in more positive mitigation (or lessen the negative mitigation) when displacement is included

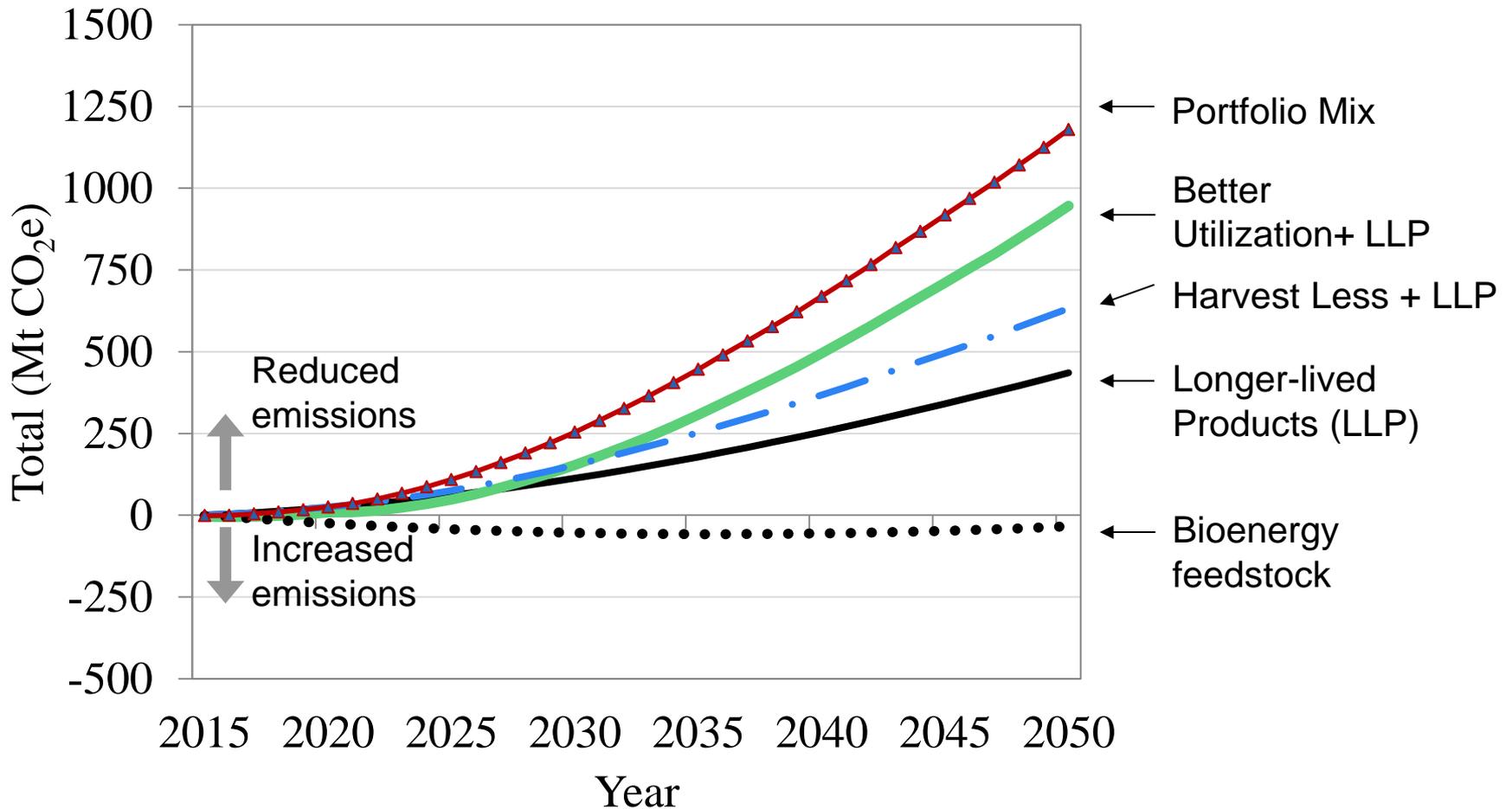
FM and HWP mitigation



Key findings:

Combining FM strategies and HWP strategies can result in higher mitigation potential.

Maximize FM and HWP mitigation



Key findings:

Portfolio mix: derived by choosing the strategy in each region that maximizes mitigation – the strategies vary across the regions

Key messages

- * Design of climate change mitigation portfolios in the forest sector should be based on systems approach that accounts for C in forest ecosystems, C in HWP, and substitution benefits, relative to a baseline.
- * Results clearly demonstrate some proposed mitigation activities are more beneficial than others.
- * Forest managers do not control use of wood – effective mitigation portfolios need to integrate forest management with wood use strategies.
- * Results support conclusion of IPCC AR4 WG III

“[i]n the long term, sustainable forest management strategy aimed at maintaining or increasing forest C stocks, while producing an annual yield of timber, fibre, or energy from the forest, will generate the largest sustained mitigation benefit.” (Nabuurs et al. 2007)

Lessons learned from national-scale application of inventory to mitigation analyses

- * Application of Tier 3 GHG accounting system that follows 2006 IPCC Guidelines and uses the same methods as the National Inventory Report
- * The system was designed, from the outset, to conduct scenario analyses and handle multi-scale uses from project-level assessments to sub-national and national scale applications
- * Defined mitigation as a comparison between two simulations – one “Business as usual” assumption (inventory projection) and a mitigation scenario. Treatment mostly, but not fully, removes influences of natural disturbances, legacy impacts, impacts of climate change and other global drivers.

Thank-you!

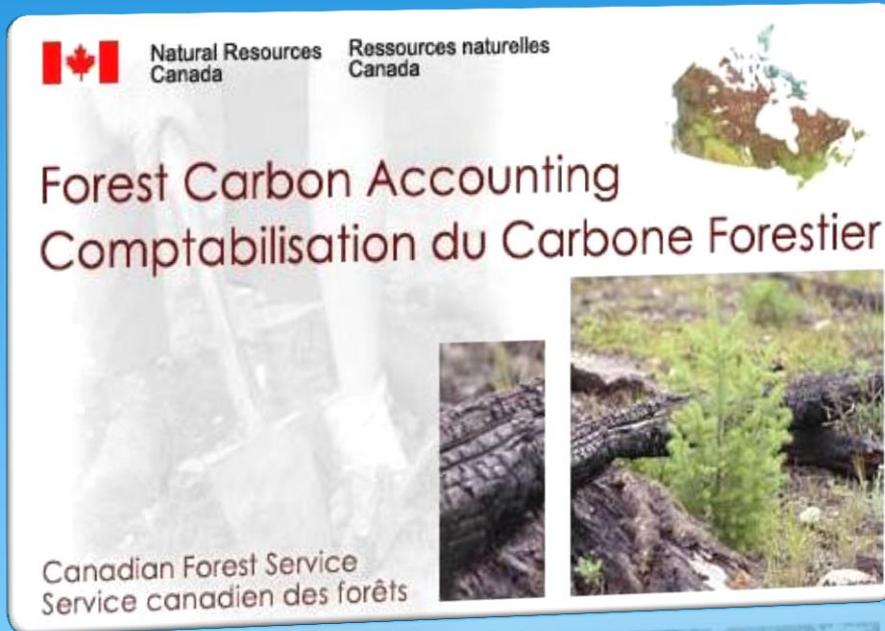
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Global Change Biology

Global Change Biology (2011), doi: 10.1111/j.1365-2486.2010.02369.x

An inventory-based analysis of Canada's managed forest carbon dynamics, 1990 to 2008

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ECOLOGICAL MODELLING 220 (2009) 480–504

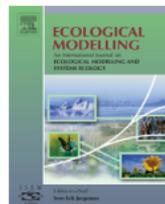


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CBM-CFS3: A model of carbon-dynamics in forestry and land-use change implementing IPCC standards

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