Pacific Institute
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Managing BC's Forest Sector to Mitigate Climate Change: Future Options for Emission Reductions

Thursday May 25th, 2017

SFU Harbour Centre - Room 2270

515 West Hastings St. – Vancouver, BC, V6B 5K3

Webcast: Starts at 8:55am

Webcast questions: email n_calle@sfu.ca

Agenda

8:30 am	Check-in/Coffee
9:00 am	Sybil Seitzinger - *Opening Remarks*
9:05 am	Werner A. Kurz - *The role of forests and forest products in decarbonization*
9:25 am	Carolyn Smyth - *Mitigation options for BC's forest sector:*
	Part 1- Options and their mitigation potential
	Zach Xu – *Mitigation options for BC's forest sector:*
	Part 2 - Costs and socio-economic impacts of implementing options
9:55 am	Q&A discussion and feedback
10:15 am	Coffee Break & Infographics
10:30 am	Robbie Hember - *Environmental Impacts on Forest Productivity in BC*
10:45 am	George Hoberg - *Forest Carbon Mitigation Policy: A Policy Gap Analysis for BC*
11:00 am	Guillaume Peterson St-Laurent - *Deliberating Climate Change Mitigation*
	Options and Policies in British Columbia's forests
11:15 am	Werner A. Kurz – *Outlook for the next phase of the project*
11:30 am	Q&A discussion and feedback
12:00	Meeting ends

The role of forests and forest products in decarbonization

Werner A. Kurz

Natural Resources Canada
Canadian Forest Service

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May 25th, 2017 SFU Harbour Centre Vancouver, BC

Natural Resources Canada | Ressources naturelles Canada

Canada

2016 hottest year on record … again

EcoWatch®

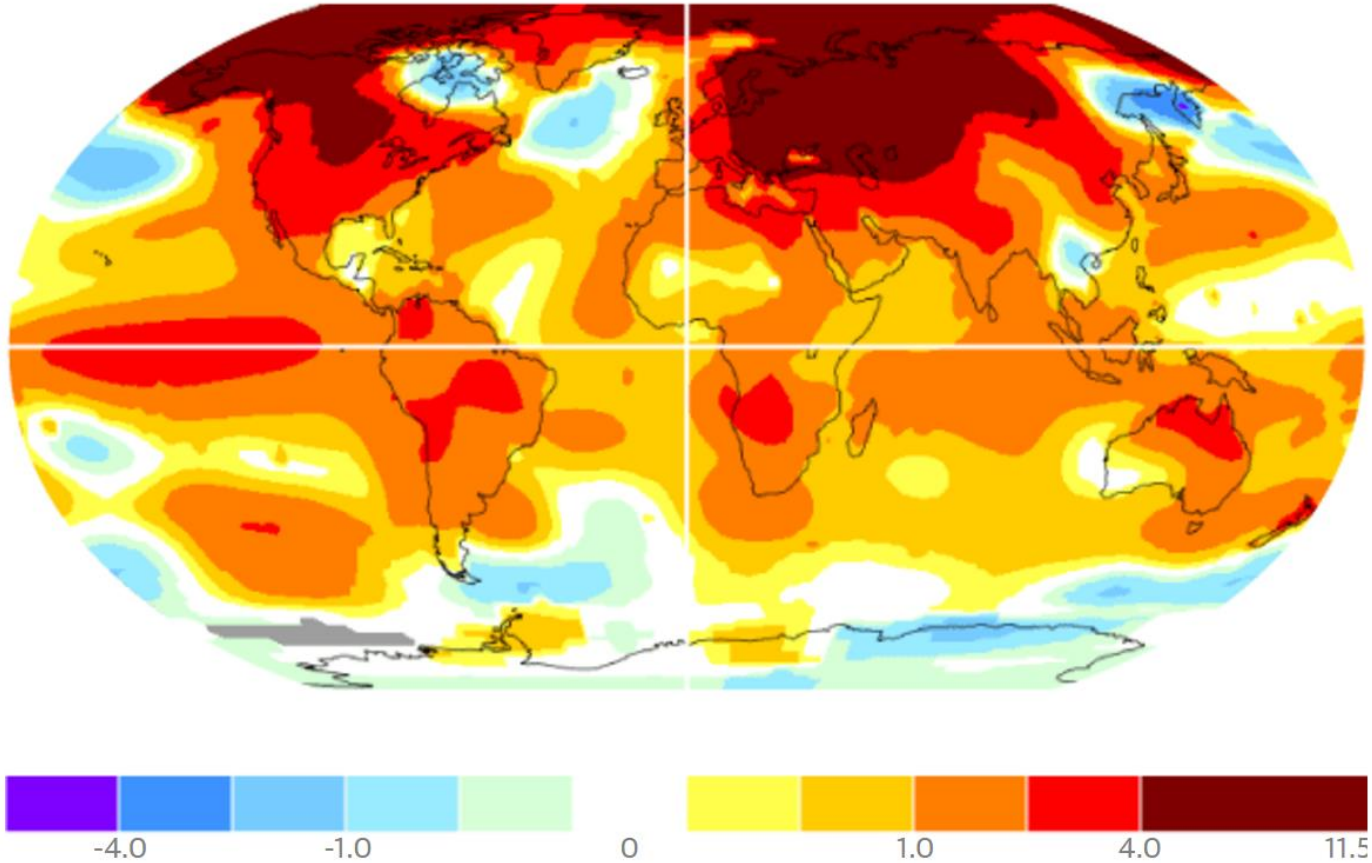
Record-warm months dominated in 2016, including: January, February, March, April, May, June, July and August, according to the National Oceanic and Atmospheric Administration. Photo credit: *NOAA*

Scientists Say 2016 Is Hottest Year Ever Recorded

Source: http://www.ecowatch.com/2016-hottest-year-on-record-2176895643.html

Observed temperature

Temperature anomaly for February 2016 compared to 1951-1980 average (degrees C)

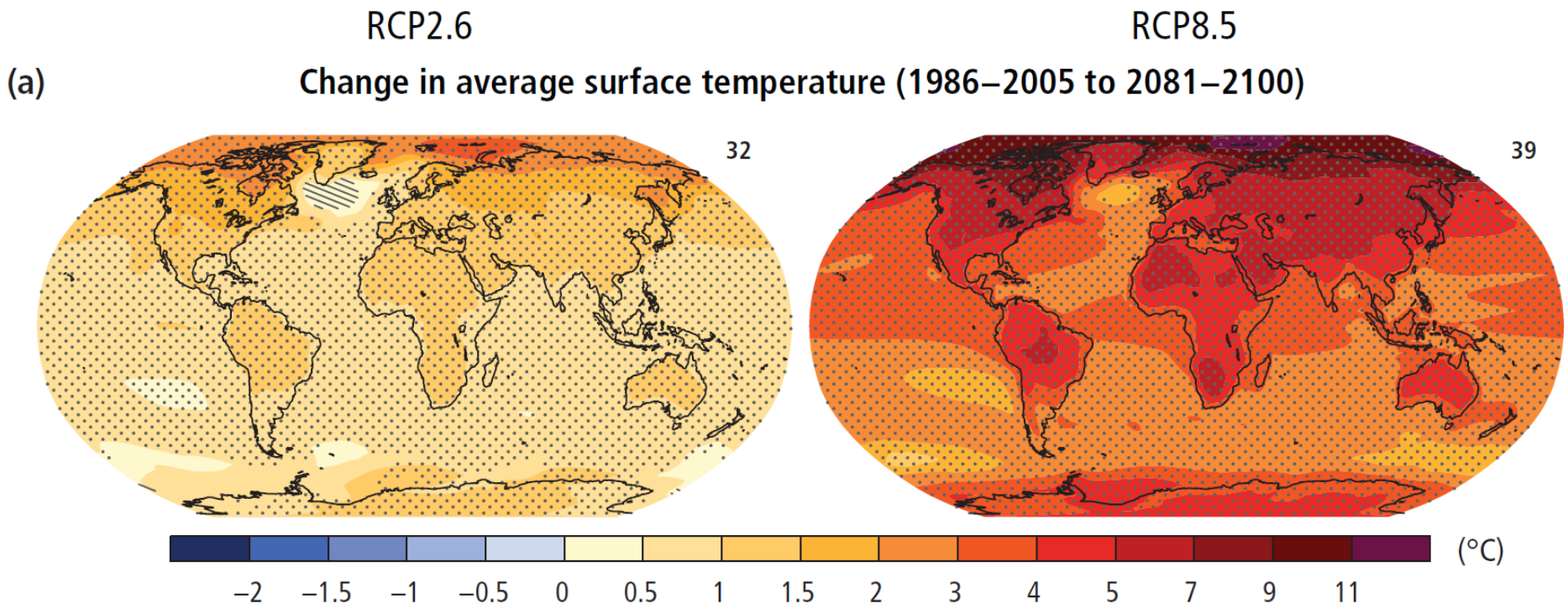


Guardian graphic

Source: Nasa

Predicted change in temperature

Low (RCP2.6) and high (RCP8.5) scenarios

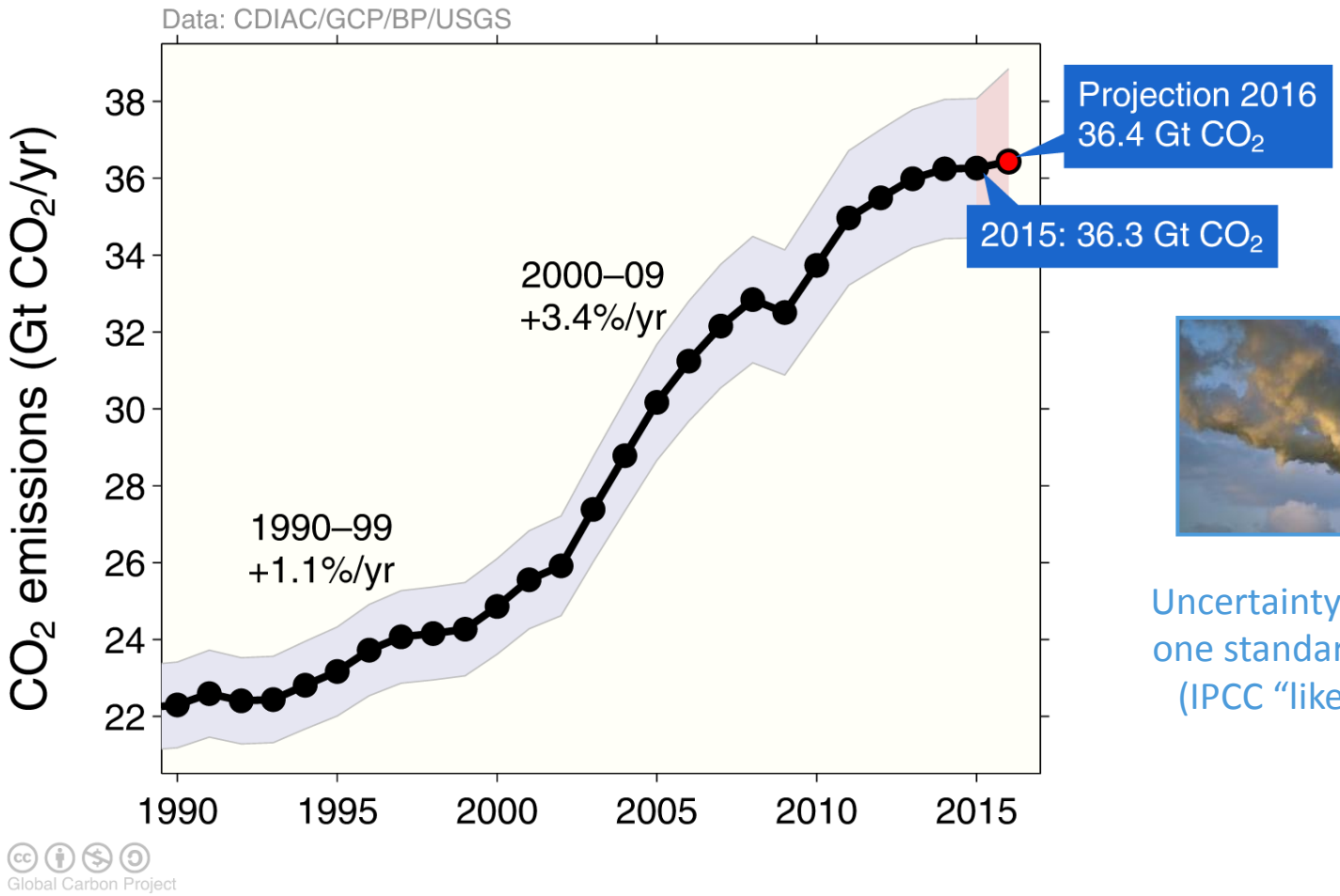


Source: IPCC AR5 Summary for Policy Makers, Figure SPM7

Emissions from fossil fuel use and industry

Global emissions from fossil fuel and industry: 36.3 ± 1.8 $GtCO_2$ in 2015, 63% over 1990

- Projection for 2016: 36.4 ± 2.3 $GtCO_2$, 0.2% higher than 2015



Uncertainty is ±5% for one standard deviation (IPCC "likely" range)

Estimates for 2014 and 2015 are preliminary. Growth rate is adjusted for the leap year in 2016.

Source: CDIAC; Le Quéré et al 2016; Global Carbon Budget 2016

Fate of anthropogenic CO_2 emissions (2006-2015)

34.1 $GtCO_2$/yr

91%

Fossil Fuel burning

9%

3.5 $GtCO_2$/yr

Deforestation, land-use change

Sources = Sinks

16.4 $GtCO_2$/yr

44%

31%

11.6 $GtCO_2$/yr

26%

9.7 $GtCO_2$/yr

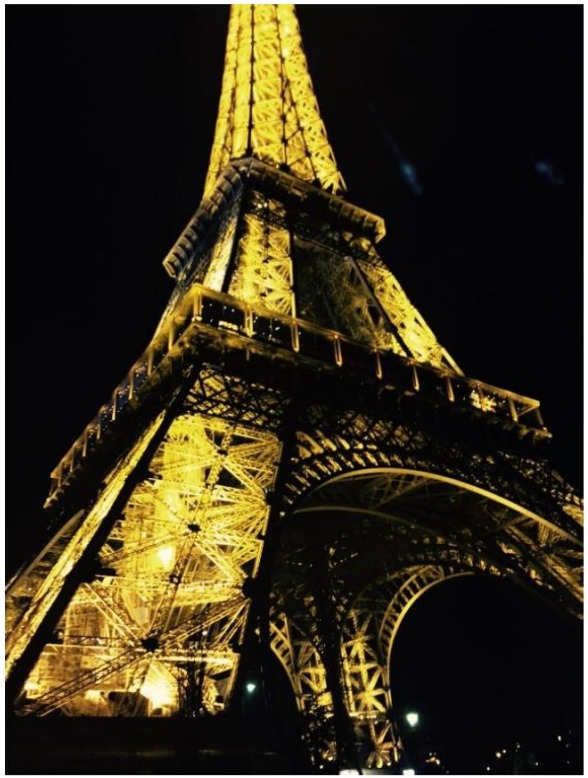
Source: CDIAC; NOAA-ESRL; Houghton et al 2012; Giglio et al 2013; Le Quéré et al 2016; Global Carbon Budget 2016

United Nations

Framework Convention on Climate Change

Paris Agreement

- **Ambitious temperature target well below 2º C.**
- The submissions on intended Nationally-Determined Contributions (NDCs) from over 140 countries recognise the importance of the land sector in achieving GHG emission reduction targets.



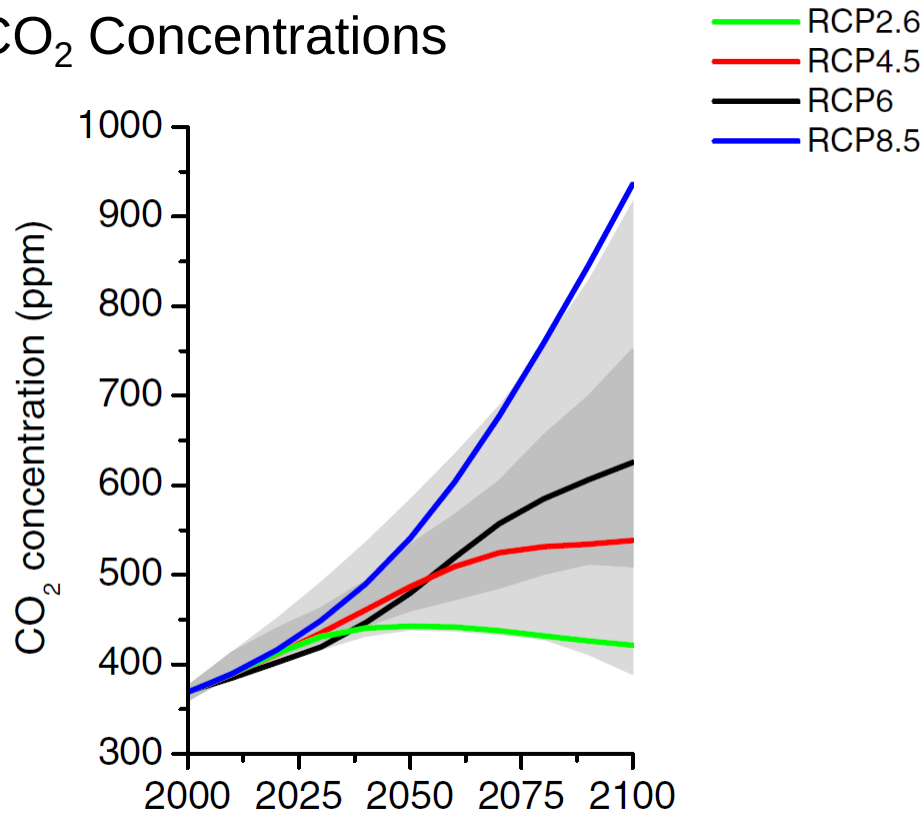
Source: K Simonson

IPCC emissions scenarios

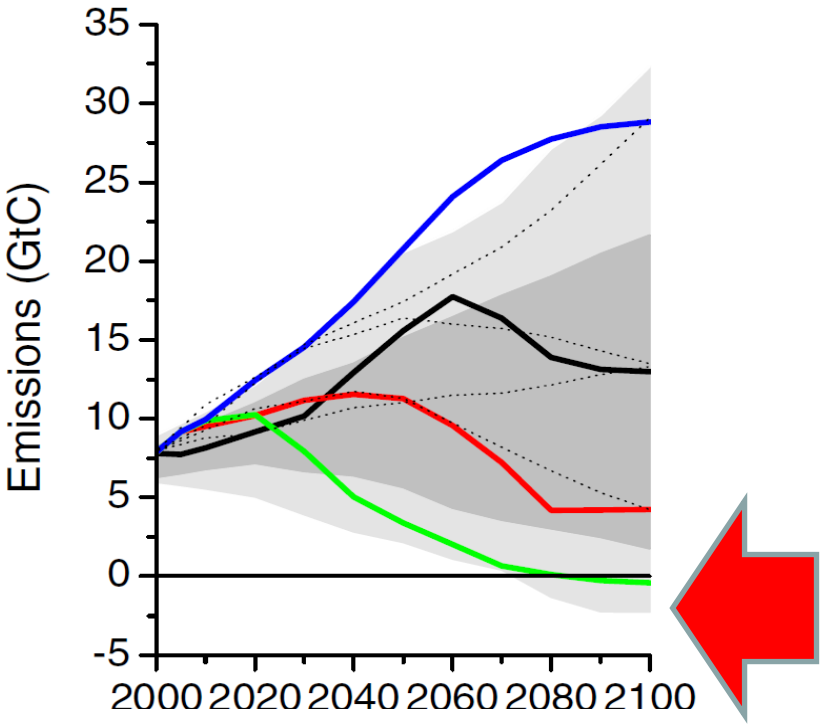
Representative Concentration Pathways

To stay below the 2º C climate threshold net **NEGATIVE** emissions are required by mid century.

CO_2 Concentrations



CO_2 Emissions



Source: Zwiers, Van Vuuren et al. 2011, Climatic Change

nrg | cosia CARBON XPRIZE

ABOUT

We're looking for new, ground-breaking, transformational approaches to converting CO_2 emissions into valuable products.

INTRODUCING THE $20M NRG COSIA CARBON XPRIZE

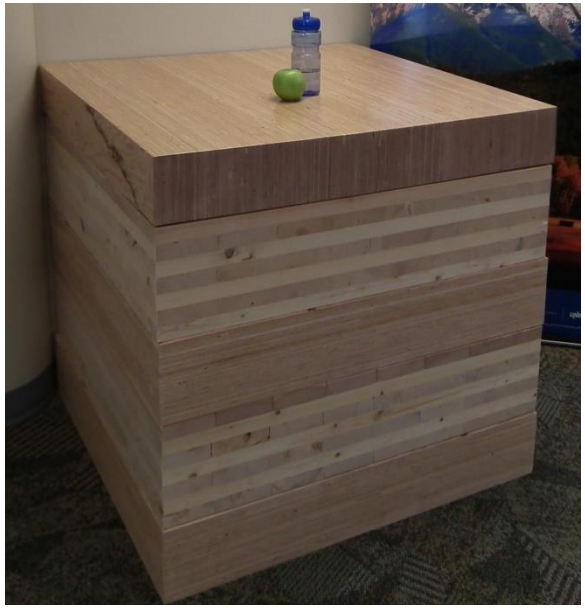
Source: http://carbon.xprize.org/news/introducing-20m-nrg-cosia-carbon-xprize

Tuesday Sept 29, 2015

We're looking for … approaches to converting CO_2 emissions into valuable products.

Forest Carbon

- 50% of the dry weight of wood is carbon.
- 1 m^3 of wood contains ~ 0.25 tons of carbon or ~1 ton of CO_2
- ~ 350 litres of gasoline



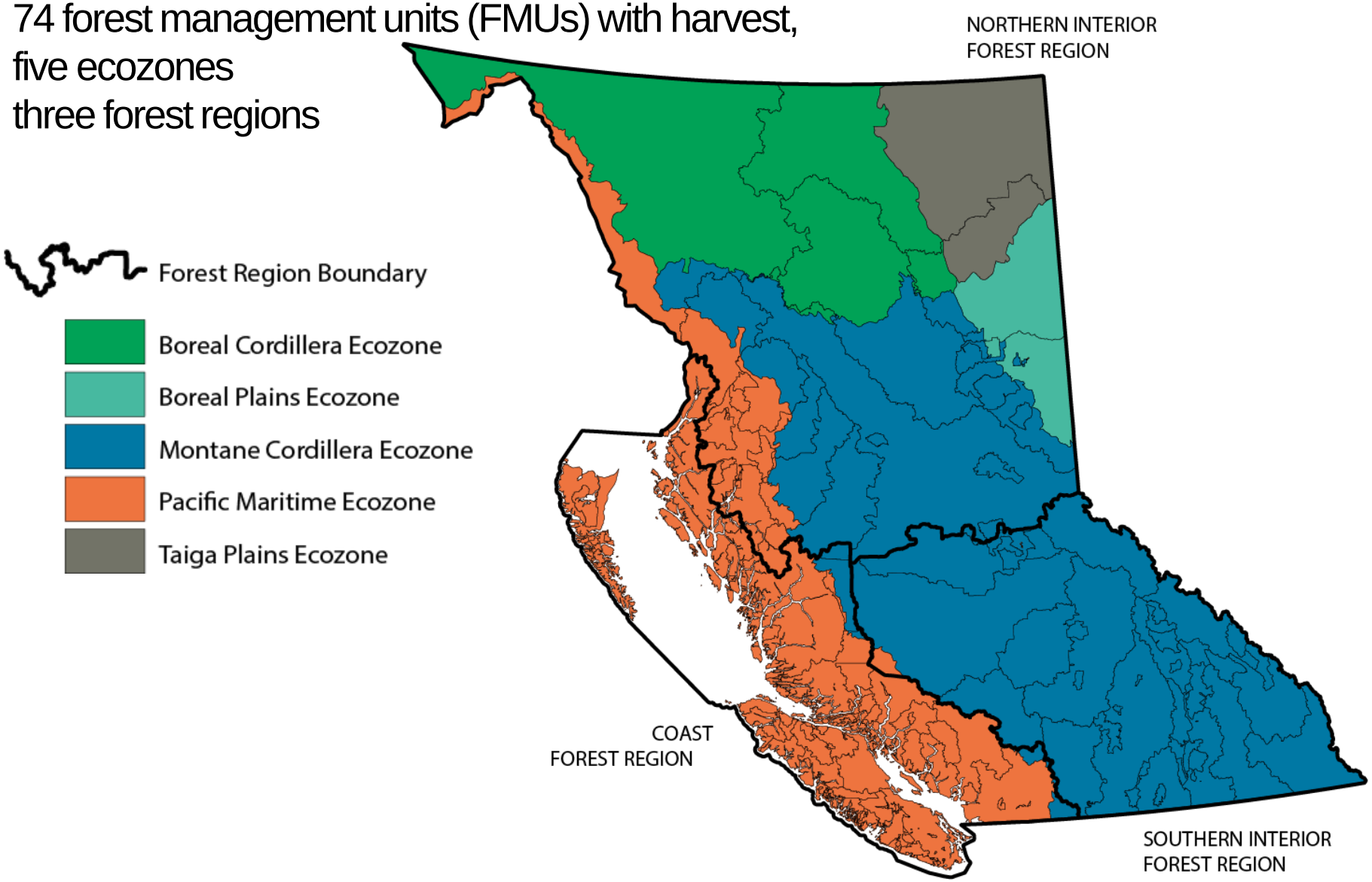
BC Forests

- **55** million hectares forest area
- **21.7** million hectares (40%) Timber Harvest Land Base
- **33.3** million hectares (60%) outside THLB …

- … but some of these areas can also contribute to carbon mitigation, e.g. by rehabilitating areas that were affected by fires or insects that are currently not regenerating or are growing very poorly.
- Careful selection of candidate sites, an understanding of what will happen without mitigation action, investment and monitoring of outcomes will be required to implement mitigation strategies.

Analyses of regionally differentiated mitigation options

74 forest management units (FMUs) with harvest,
five ecozones
three forest regions



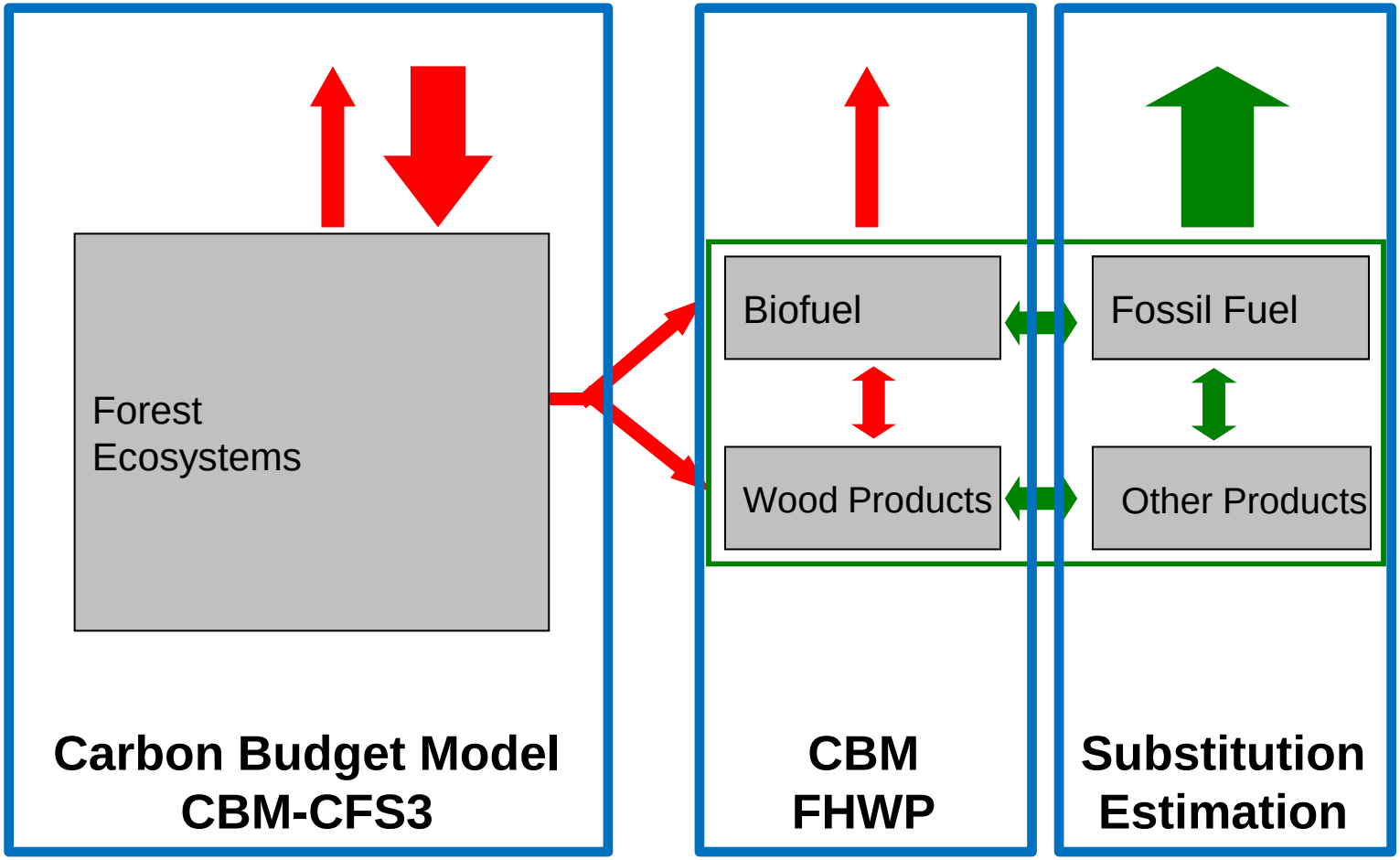
Analysis of mitigation options requires a Systems Perspective

Design of climate change mitigation portfolios in the forest sector should account for changes in C in

- **forest ecosystems,**
- in **harvested wood products**, and
- for changes in emission from **substitution benefits**

relative to a base case.

Mitigation analyses: analytical framework



CBM-CFS3 and CBM-FHWP used for Canada's National GHG inventory reporting. See last slide for supporting publications.

Mitigation Analysis for BC

Study estimates that by 2050, **35% of BC's emission reduction target can be contributed by the forest sector** at less than $100/tonne of CO_2e with additional socio-economic benefits.

Source:

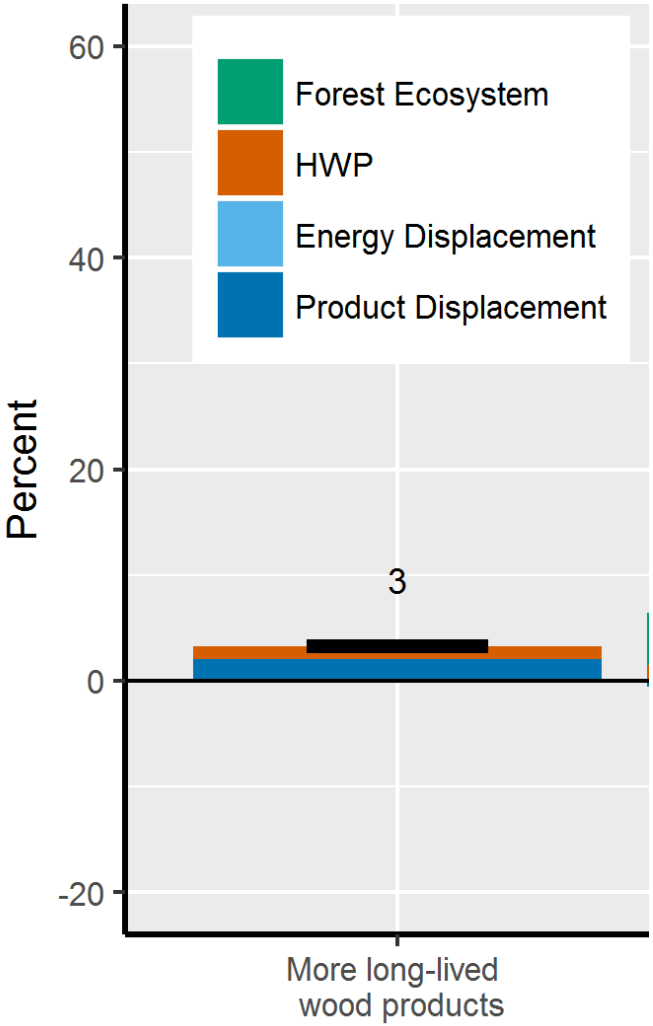
Climate change mitigation strategies in the forest sector:

Biopysical impacts and economic implications in British Columbia, Canada

Zhen Xu, C.E. Smyth, T.C. Lemprière, G.J. Rampley and W.A. Kurz

Open Access at http://link.springer.com/article/10.1007/s11027-016-9735-7.

Cumulative mitigation (2017-2050)
Percent of BC's 2050 Emission reduction target.



More long-lived wood products

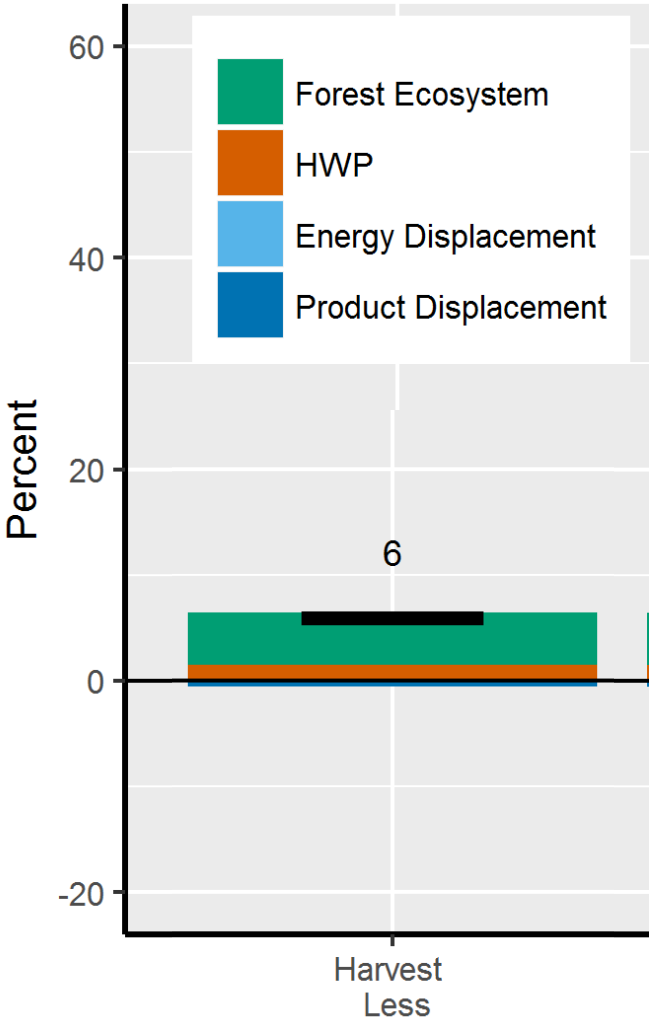
(4% of wood for pulp and paper used for panels)

Increased C storage in wood products.

Greater substitution benefits by using wood instead of emissions-intensive products.

Source: Data from Xu et al., 2017

Cumulative mitigation (2017-2050)
Percent of BC's 2050 Emission reduction target.



Harvest less

(2% less than baseline harvest)

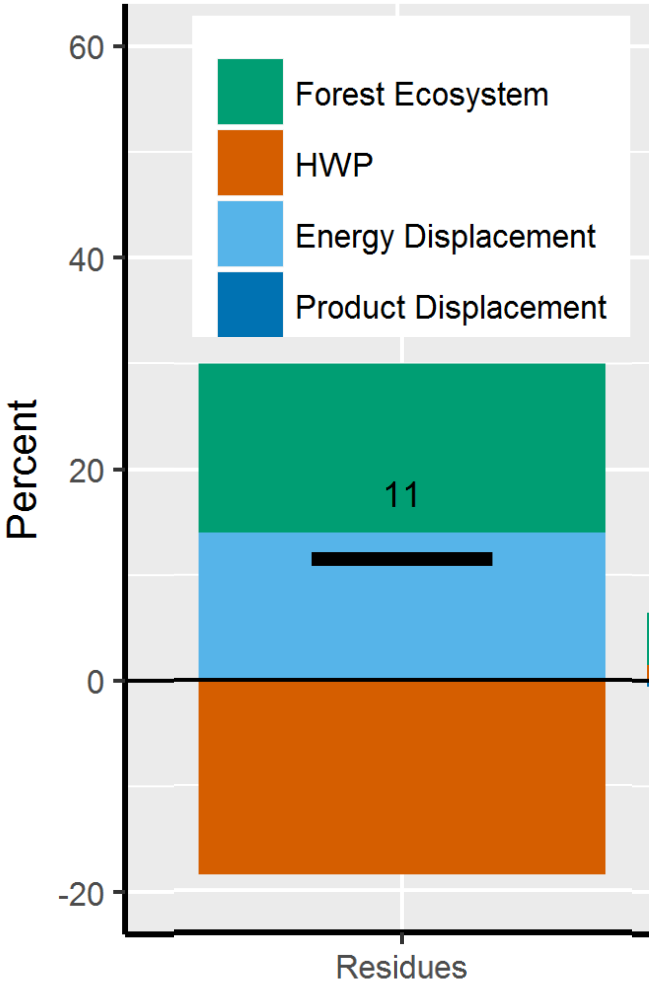
Increased C storage in forests.

Small reduction in emissions from wood products.

Increased emissions from greater use of non-wood products.

Source: Data from Xu et al., 2017

Cumulative mitigation (2017-2050)
Percent of BC's 2050 Emission reduction target.



Increased use of residues for bioenergy, reduced pile burning.

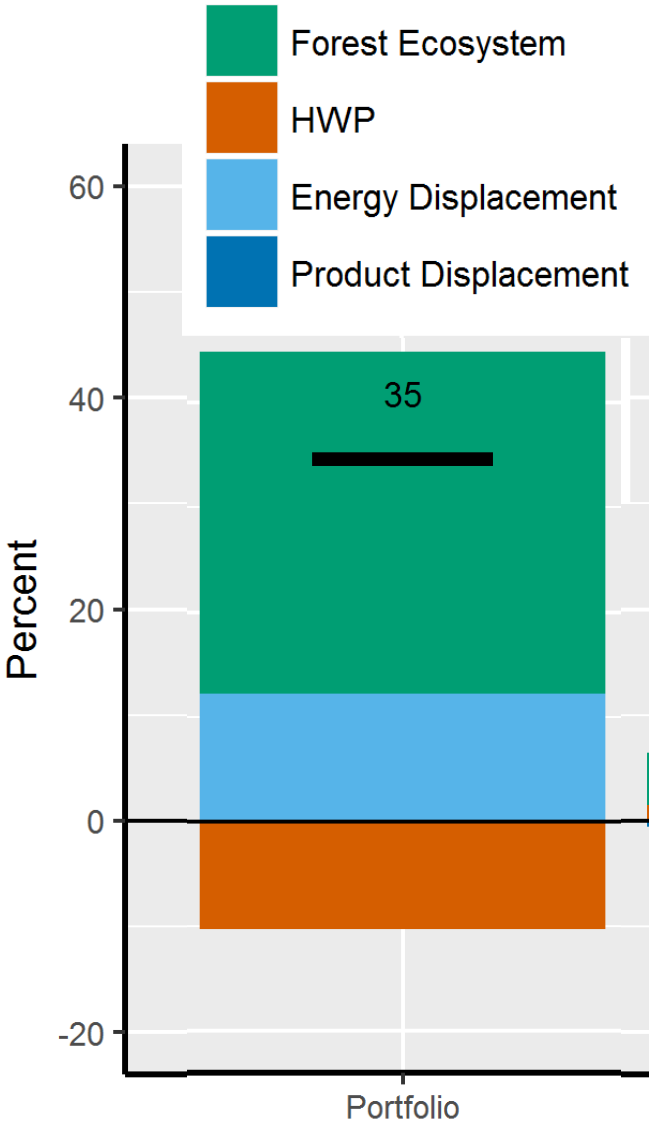
Reduced C emissions from forests.

Reduced emissions from fossil fuel burning.

Increased emissions from wood products (bioenergy).

Source: Data from Xu et al., 2017

Cumulative mitigation (2017-2050)
Percent of BC's 2050 Emission reduction target.



Portfolio of best options

Reduced C emissions from forests.

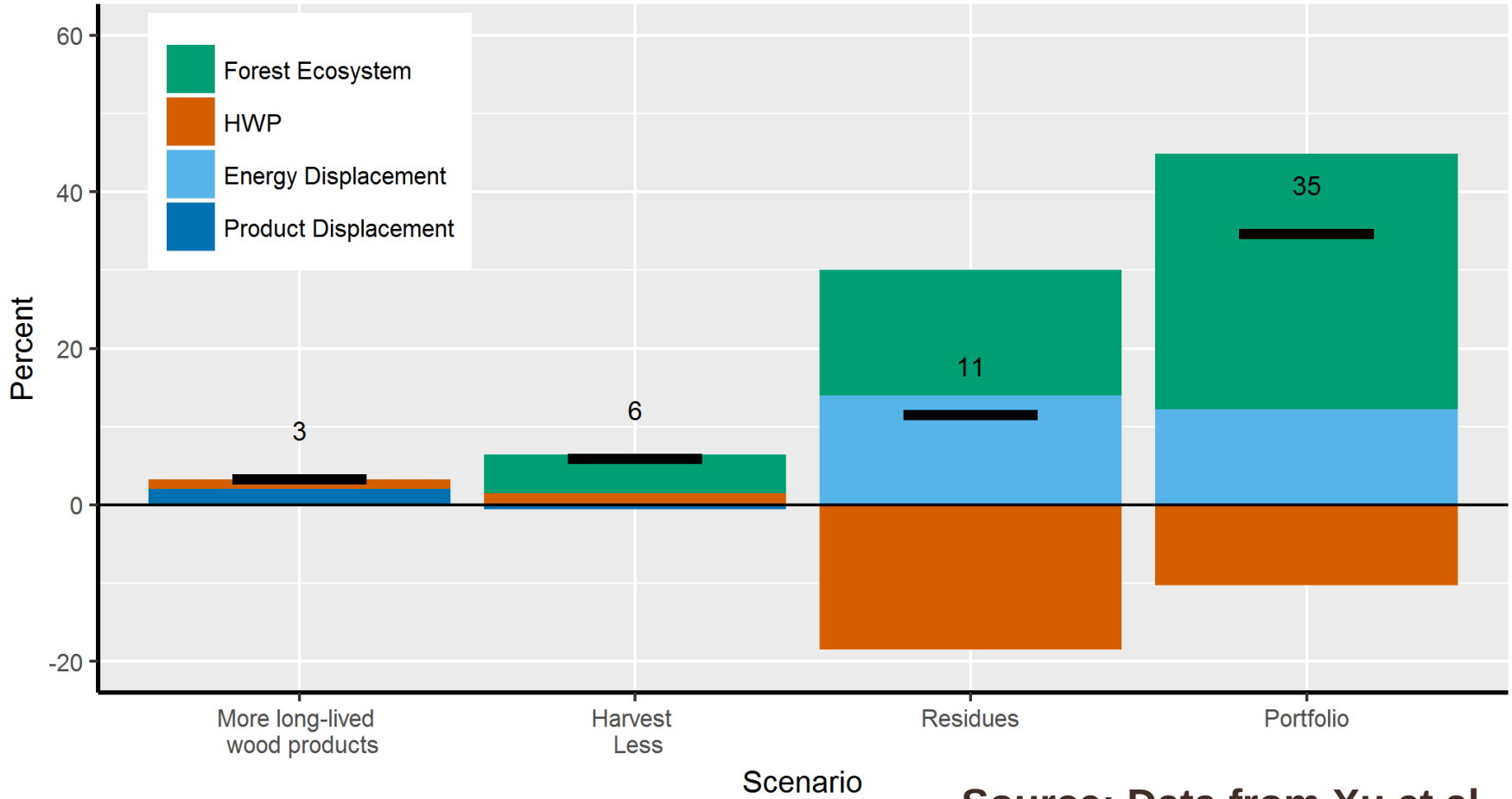
Reduced emissions from fossil fuel burning.

Increased emissions from wood products (bioenergy).

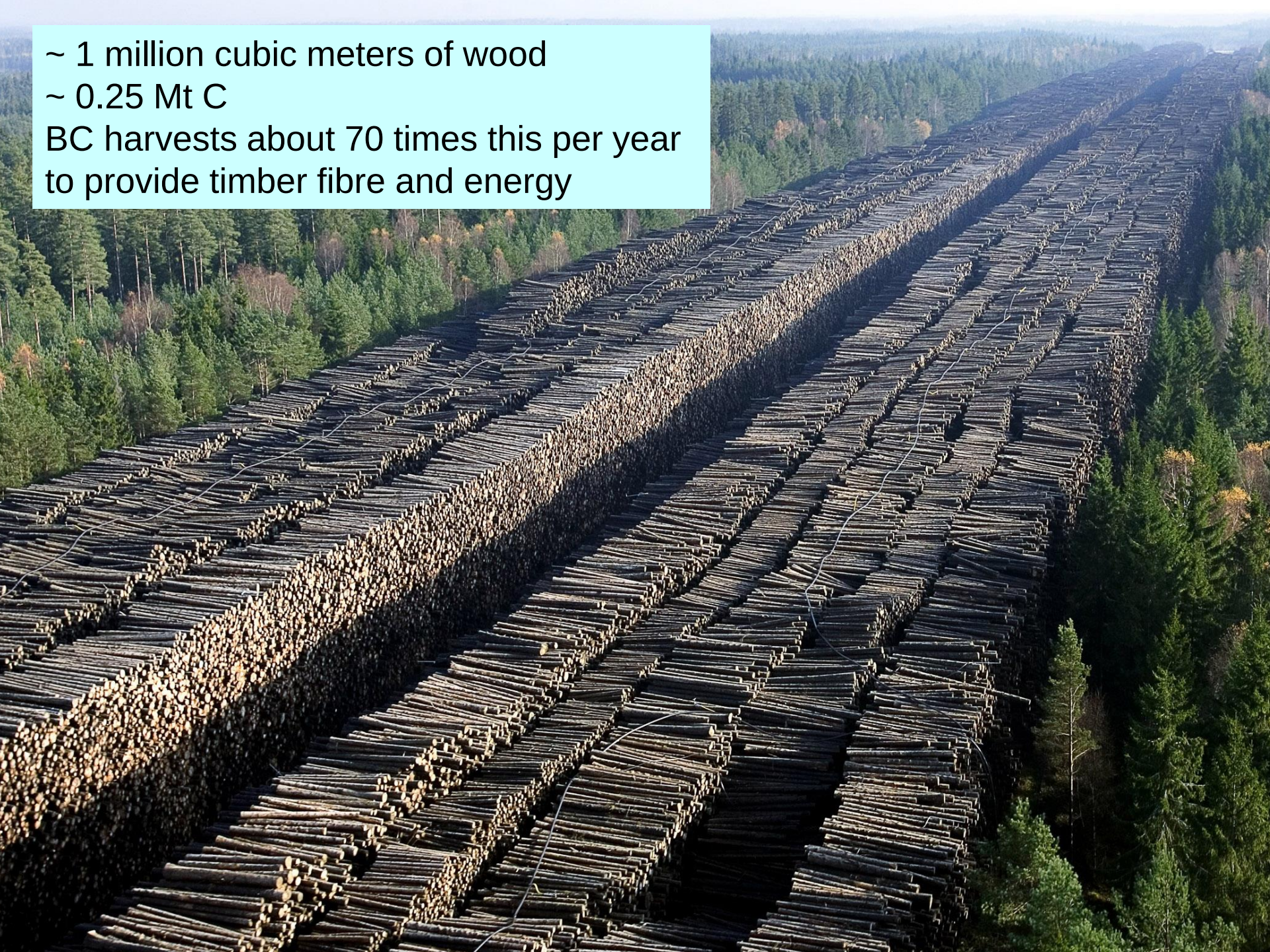
Source: Data from Xu et al., 2017

Cumulative mitigation (2017-2050)

The portfolio of best options examined thus far can deliver 35% of BC's emission reduction target for 2050 if the mitigation activities are implemented soon and are sustained.

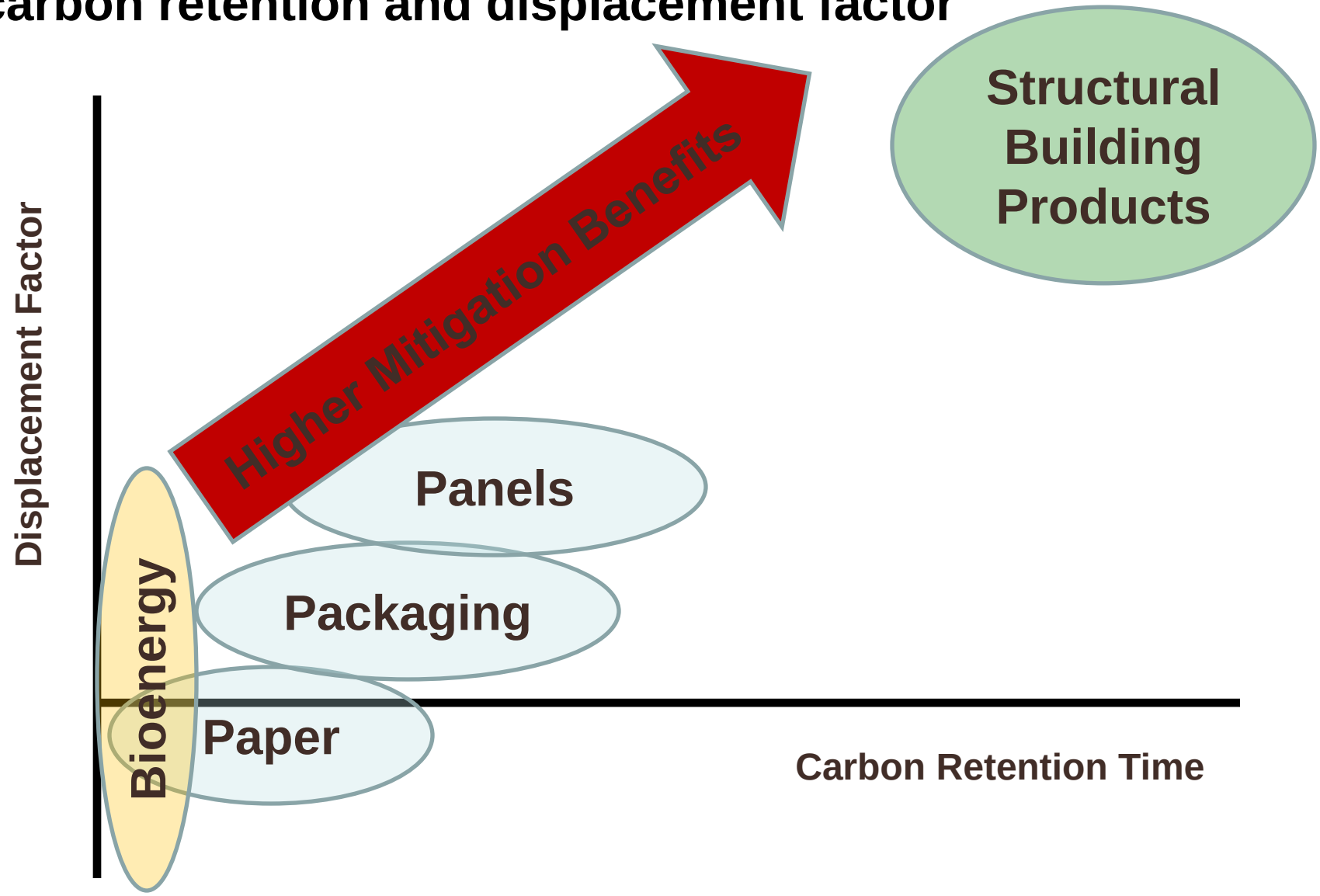


Source: Data from Xu et al., 2017

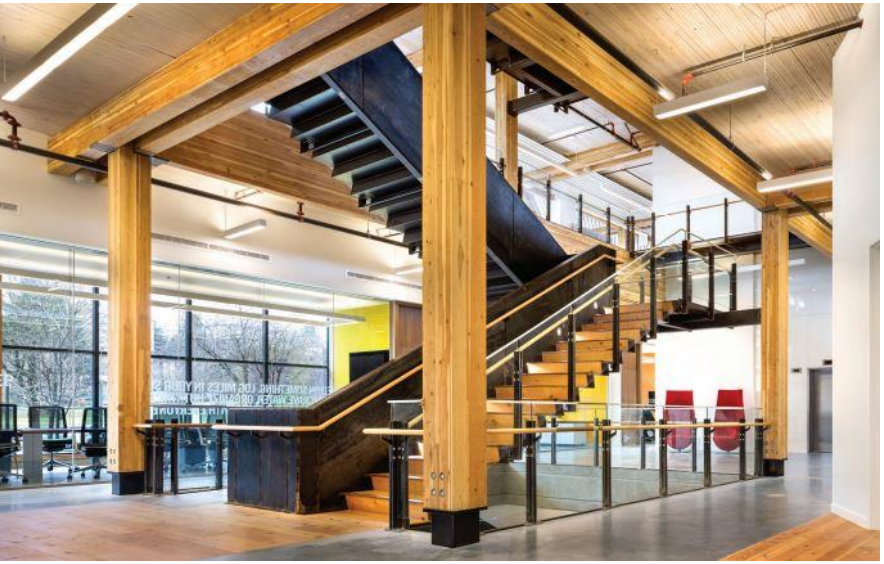


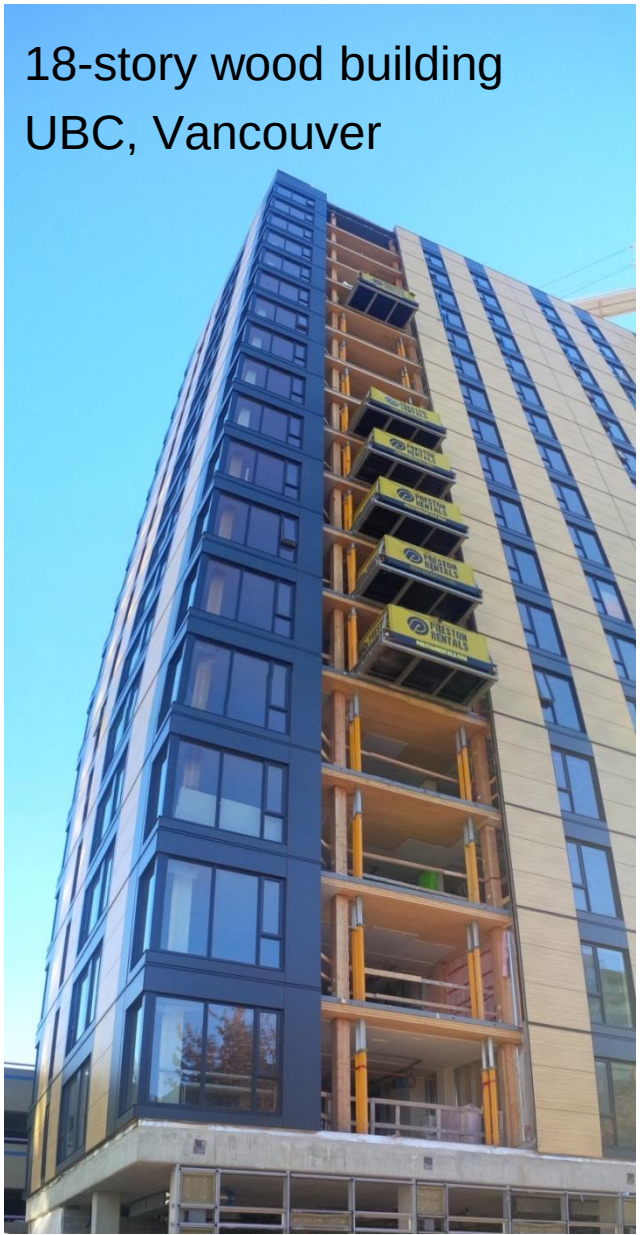
~ 1 million cubic meters of wood
~ 0.25 Mt C
BC harvests about 70 times this per year
to provide timber fibre and energy

Mitigation benefit increases with carbon retention and displacement factor



Mitigation benefits by displacing emissions from concrete and steel through the use of wood products





Reduce emissions from slash pile burning

Alternate uses?

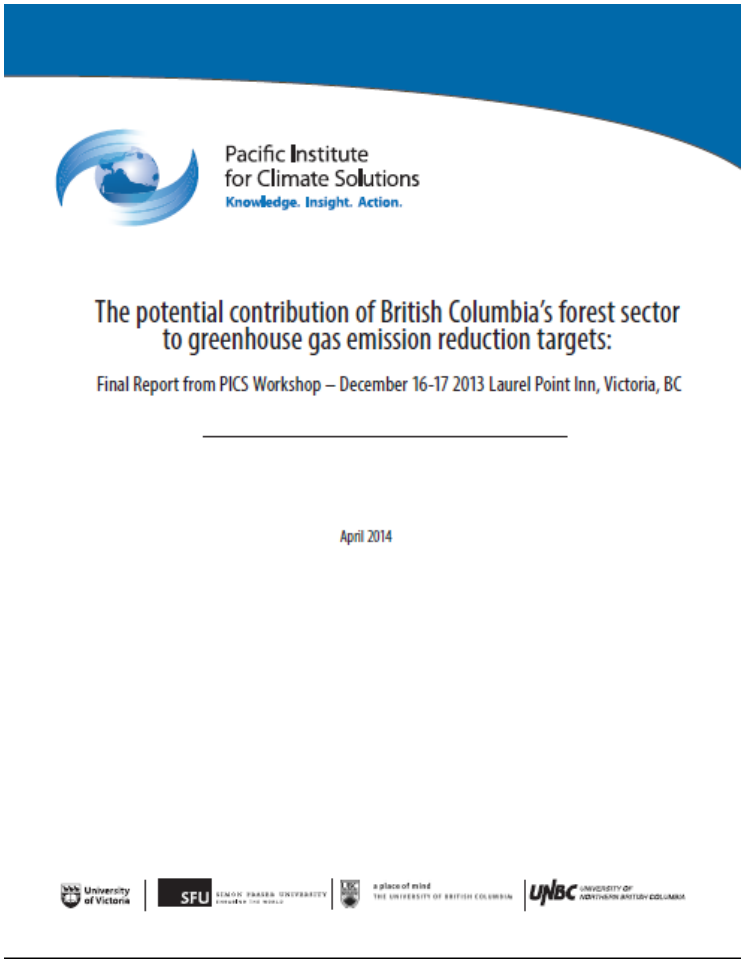
Can we capture energy and reduce non CO_2 emissions?

Climate change impacts affect mitigation options

- Impacts of environmental changes on forests will be **both positive and negative**: growth, mortality, disturbances.
- Understanding **where, when and how** these impacts will occur is necessary to design effective climate change mitigation and adaptation strategies.
- PICS project will inform the design of regionally-differentiated mitigation strategies.

PICS: Forest Carbon Management Project
3 research themes:

- Design and evaluate regionally-differentiated climate change mitigation options;
- Assess the impacts of climate change on proposed mitigation strategies and develop potential adaptation options to avoid or reduce these impacts; and
- Design and evaluate policies, institutional and financing options for forest carbon mitigation.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The potential contribution of British Columbia's forest sector to greenhouse gas emission reduction targets:

Final Report from PICS Workshop – December 16-17 2013 Laurel Point Inn, Victoria, BC

April 2014

Conclusions

- 2°C goal of the Paris Agreement cannot be reached without
  - reduction in burning of fossil fuels and
  - the global forest sector contributing to net negative emissions.
- PICS team's research therefore focuses on:
  - how the forest sector can mitigate climate change,
  - how forests will respond to the changing environment, and
  - what policies can help achieve mitigation objectives, cost-effectively and with the support of the public.
- Results show that BC's forest sector can make a significant contribution to climate change mitigation and that this contribution increases if mitigation actions start soon and are sustained into the future.

Werner Kurz

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Publications at:

http://cfs.nrcan.gc.ca/publications/search?query=Kurz

Recent Publications with links

Kurz et al. 2016. **Climate change mitigation through forest sector activities: principles, potential and priorities**. Unasylva 246 (67): 61-67. www.fao.org/3/a-i6419e.pdf

Lemprière et al. 2017. **Cost of climate change mitigation involving's Canada's forest sector.** Canadian Journal of Forest Research. DOI: 10.1139/cjfr-2016-0348 http://www.nrcresearchpress.com/doi/pdfplus/10.1139/cjfr-2016-0348

Smyth et al. 2016. **Climate change mitigation potential of local use of harvest residues for bioenergy in Canada**. Glob. Chg. Biol. Bioenergy. DOI: 10.1111/gcbb.12387 http://onlinelibrary.wiley.com/doi/10.1111/gcbb.12387/abstract

Smyth et al. 2016. **Estimating product and energy substitution benefits in national-scale mitigation analyses for Canada**. Glob. Chg. Biol. Bioenergy. DOI: 10.1111/gcbb.12389 http://onlinelibrary.wiley.com/doi/10.1111/gcbb.12389/abstract

Xu et al. 2017. **Climate change mitigation strategies in the forest sector: biophysical impacts and economic implications in British Columbia, Canada**. Mitigation and Adaptation Strategies for Global Change. DOI: 10.1007/s11027-016-9730-z http://link.springer.com/article/10.1007/s11027-016-9735-7.