

## ***Interactive comment on “Quantifying the biophysical climate change mitigation potential of Canada’s forest sector” by C. E. Smyth et al.***

**Anonymous Referee #1**

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I reviewed the manuscript “Quantifying the biophysical climate change mitigation potential of Canada’s forest sector” that I enjoyed reading. The paper presents a modelling analysis applying the CBM-CFS model to assess the mitigation potential of the entire Canadian forestry sector and associated substitution effects. The manuscript is very well structured and presents methods and results in a very clear manner. The discussion addresses all relevant points and clearly describes benefits and limitation of the method chosen. I would like to suggest some minor changes and corrections and have some suggestion for adding to the discussion.

- Page 443, line 10: the reference Nabuurs et al. 2007 is not in the reference list. I appears again in line 18 and 21 on the same page. An alternative citation would be Obersteiner et al. 2010 (see reference list below).

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- Page 443, line 27: The reference Böttcher et al. 2012 referred to here (paper in GCB Bioenergy) according to the reference list is not appropriate. Böttcher et al. 2012 in CBM (see list below) should be cited instead if the authors want to refer to work on substitution effects in forestry.

- Page 444, line 25: the authors do not specify here which pools they look at when they refer to forest management. An explicit list of the carbon pools considered would be helpful at this point.

- Page 447, line 6: a prominent energy source in Canada would be oil from tar sands. Can this be considered? What is the magnitude of this source in the overall energy portfolio? Regarding emissions that could be replaced by biomass there should be significant potentials for mitigation.

- Page 447: An overview table of the substitution options and factors would help to provide a better overview of the methodology applied for calculating substitution effects.

- Page 448 bottom: is soil carbon included in the assessment? The treatment of harvest residues affects soil carbon and such effects should be considered in options that foresee to remove harvest residues for energy production (see work by Vanhala, Repo et al.)

- Page 464, line 10ff: the authors treat HWP use and bioenergy use as alternatives. If wood from HWPs is recovered and used for energy, the cascade is complete and pressure on residue use could be lowered (see Böttcher et al. 2012 CBM). Could this be considered in the analysis? At least as a theoretical option the effects could be calculated rather easily, I guess. At least there should be a discussion of the option of recovering wood after its HWP life.

References:

- Böttcher H, Freibauer A, Scholz Y, Gitz V, Ciais P, Mund M, Wutzler T, Schulze E-D (2012) Setting priorities for land management to mitigate climate change. Carbon

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Balance and Management, 7:5.

- Obersteiner, M., H. Böttcher and Y. Yamagata (2010) Terrestrial ecosystem management for climate change mitigation. *Current Opinion in Environmental Sustainability*. 2: 271-276.

- Pekka Vanhala, Anna Repo, Jari Liski (2013) Forest bioenergy at the cost of carbon sequestration? Review Article. *Current Opinion in Environmental Sustainability*, Volume 5, Issue 1.

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Interactive comment on *Biogeosciences Discuss.*, 11, 441, 2014.