Natural Resources Canada | Ressources naturelles Canada

Forest carbon accounting: how does Canada assess the contribution of forests toward reducing emissions?

CANADIAN FOREST SERVICE SCIENCE-POLICY NOTE

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What is forest carbon accounting and why does Canada do it?

Canada has committed to cut its greenhouse gas (GHG) emissions by 40 to 45 percent below 2005 levels by 2030 and achieve net-zero emissions by 2050. All economic sectors have a role to play in achieving these targets, including the forest sector. Each year, Canada reports on its progress in the *GHG National Inventory Report* to the secretariat of the United Nations Framework Convention on Climate Change (UNFCCC) and the *GHG and Air Pollutant Emissions Projections* report or *Biennial Report* to the UNFCCC.

The focus of GHG reporting to the UNFCCC is on the net balance of anthropogenic (human-caused) emissions and removals (their net balance is referred to simply as "emissions" in this note). The goal of the UNFCCC is to limit anthropogenic causes of climate change, which requires countries to report the emissions resulting directly from human activity. These activities include wood harvest and land-use changes such as conversion of forests to agricultural lands.

Compared to other economic sectors, the Land Use, Land-Use Change and Forestry (LULUCF) sector is unique. Both human activities and natural events and processes like wildfire, insect infestations, and tree growth affect its emissions. This adds complexity when determining the direct human influence. Canada, like many other countries, applies specific accounting approaches to determine how changes in anthropogenic emissions in managed forests are contributing to national emission reduction targets.

What accounting approach does Canada use for its managed forest and harvested wood products?

Like many countries, Canada uses reference level accounting to reflect the impact of recent changes in human activity on forest carbon, including carbon contained in harvested wood products (HWP). The approach involves creating a reference level – or a baseline – to compare against actual (or projected) forest emissions. The reference level is an estimate of emissions from Canada's managed forest and HWP that reflects the continuation of past management practices. For any given year, the difference between actual (or projected) emissions and reference level emissions is the accounted amount (Figure 1).

GHG ESTIMATION AND GHG ACCOUNTING ARE DIFFERENT PROCESSES

Each year, Natural Resources Canada updates estimates of GHG emissions and removals from our managed forest and its associated harvested wood products for Canada's GHG inventory. The GHG National Inventory Report is submitted annually to the UNFCCC (see Science-Policy Note *How Canada reports on forest GHG emissions* for more details).

Forest carbon accounting is distinct from the science-based estimation of forest emissions. Accounting applies policy-agreed rules to science-based estimates of forest emissions with the goal of evaluating the impact of recent human activities on achieving emission reduction targets.

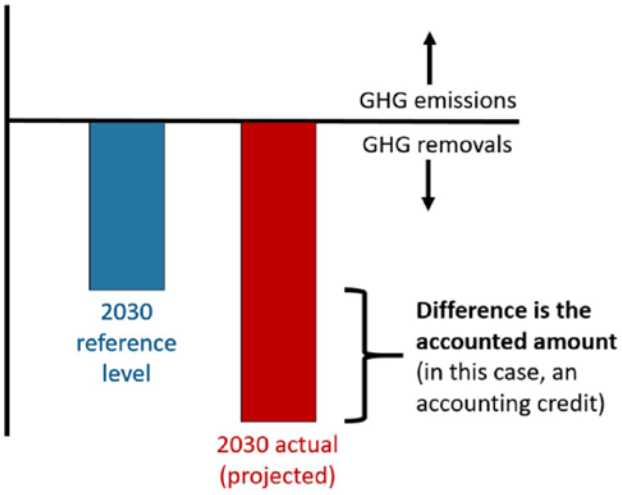
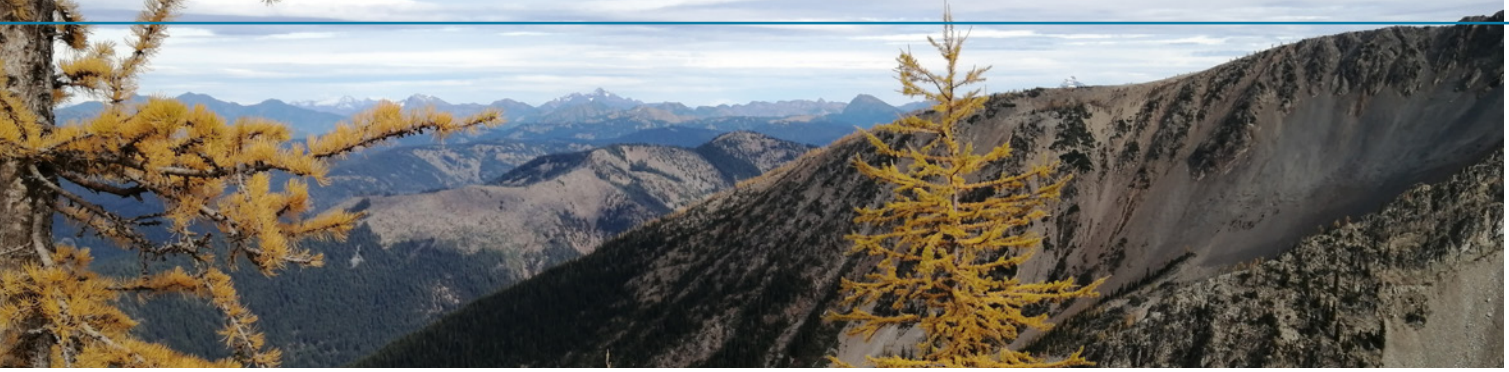


Figure 1. Reference level accounting.



Reference level accounting ensures that progress toward an emission reduction target only reflects the GHG impact of recent changes in forest management and wood use. This ensures the effects of forest management, forest growth, and natural disturbances that happened decades ago are not included in the accounted amount. In the example in Figure 1, only the additional removals relative to the reference level contribute to the accounted amount. The reference level removals do not provide any contribution.

What assumptions does the reference level accounting approach use?

The reference level approach involves developing estimates of actual (or projected) emissions and estimates of reference level emissions. Natural Resources Canada (NRCan) develops these estimates using its science-based Carbon Budget Model. For projections, NRCan works with Environment and Climate Change Canada (ECCC) and provincial and territorial governments to develop assumptions about future human activity. Some assumptions are the same for both the actual and reference level scenarios, while others are different. The differences aim to reflect the outcomes of changes in human activity such as the planting of 2 Billion Trees.

A GLOBAL PERSPECTIVE

At international negotiations under the UNFCCC in 2008, Canada proposed the reference level accounting approach. This was done to address the international goal of ensuring a focus on the impacts of changes in human activity on forests within the field of forest carbon accounting. Countries agreed to the approach in 2011, with guidance for the construction of forest reference levels set by the Intergovernmental Panel on Climate Change (IPCC). Currently, about 30 developed countries use the approach for post-2020 forest and HWP accounting.

Under the UNFCCC Paris Agreement, countries can implement specific forest carbon accounting approaches, as long as they are consistent with the rules of the Agreement and are reported transparently. Reference level accounting is one of several approaches used by countries for forest carbon accounting that is consistent with the Agreement.

Assumptions for events and processes not in direct human control are generally the same in both the actual and reference level scenarios. For example, assumptions about insect infestations are the same in both scenarios, and their GHG impacts cancel out. This method ensures insect infestations do not affect accounted amounts.

Assumptions about forest management differ between the actual and reference level scenarios. For example, wood harvest is not the same. Each year, provinces and territories provide estimates of their expected future wood harvest volume that NRCan uses to project expected emissions for the managed forest and HWP. NRCan models reference level emissions using the assumption that average wood harvest levels from 1990 to 2016 will continue into the future. This ensures that accounting for managed forest and HWP carbon against Canada's GHG emission reduction targets focuses on the effects of recent changes in harvest levels and management. If harvest rates fall relative to past average levels (as has occurred in Canada) then this contributes to reaching the GHG emission reduction target.

What carbon accounting approach does Canada use for afforestation and deforestation?

Canada uses simple net-net accounting to determine the contribution of afforestation (a land-use change that establishes new forest) and deforestation (a land-use change that converts forest to other land uses like urban expansion) to its emission reduction targets. This approach assesses the difference between emissions in a target year (for example, 2030) and Canada's accounting base year (2005). If emissions have decreased relative to 2005, this contributes to reaching the GHG emission reduction target (Figure 2).

Canada and many other countries also use net-net accounting for croplands, grasslands, and wetlands. Canada uses this approach because these lands, as well as land-use changes, generally do not face the same issues in accounting as managed forests such as the legacy impacts of management and natural disturbances in past decades.

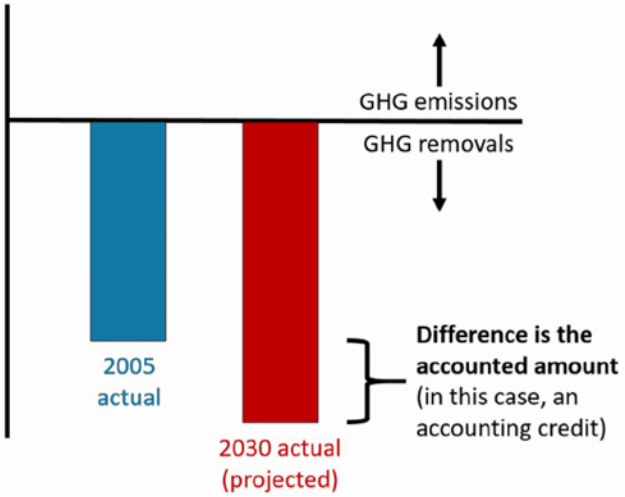


Figure 2. Net-net accounting.

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