Factsheet No. 2

What is a Land-based Net Carbon Inventory?

The Oregon Department of Energy will develop and maintain a Land-based Net Carbon Inventory to track the balance of greenhouse gas (GHG) emissions and removals—known as net carbon flux—on Oregon's natural and working lands. The inventory tracks net carbon flux over time that occurs from land management actions and land use changes and is used to inform state climate goals related to carbon sequestration and storage on Oregon's lands.

The warming effect of GHGs, or global warming potential, relative to carbon dioxide is communicated using a carbon dioxide equivalent (CO_2e) unit of measurement. So, the term 'carbon' is often used as a shorthand when talking about GHGs, even when GHGs do not include a carbon atom, like nitrous oxide (N_2O).

Net Carbon Flux

Oregon's lands release carbon into, and sequester carbon from, the atmosphere. They have a carbon balance, or a net carbon flux, calculated from the amounts of GHGs they emit and sequester. This is similar to how a wetland may emit a small amount of methane (CH_4) and sequester a large amount of carbon dioxide (CO_2) to produce a net amount of carbon sequestration.

Oregon's lands also emit GHGs through processes which may be considered natural and/or influenced by human activity. These processes include:

- The breakdown and decay of organic material.
- The nitrogen cycle in soils, which emits nitrous oxide (N_2O).
- Wildfires, including those ignited by humans, which emit carbon dioxide, methane, and other GHGs.

To the extent feasible, the first-generation Land-based Net Carbon Inventory (LCI) in 2025 will estimate emissions and removals of carbon dioxide, methane, and nitrous oxide due to land use, land use change, forestry (including harvested wood products), and disturbance (e.g., wildfires) over time on Oregon's natural and working lands. Understanding the net carbon flux on Oregon's lands allows ODOE, other state agencies, and the Oregon Climate Action Commission to better inform state climate policy and land management programs. The inventory will be updated on a biennial basis.

While Oregon's natural and working lands do not directly reduce GHG emissions from burning fossil fuels, they remove GHGs that have accumulated in the atmosphere. Technological solutions for GHG removal, such as direct air carbon capture and storage, are promising, but currently costly to deploy and will take time to scale sufficiently to help meet climate goals. Carbon dioxide removal is necessary to meet global climate goals, and the Intergovernmental Panel on Climate Change recommends the use of

natural climate solutions alongside technological solutions[1,2]. Natural climate solutions, which are practices that increase or protect carbon held in the land and increase ecosystem resilience, may be less costly and implemented more readily than technological solutions at large scales, while also providing adaptation benefits[1]. Accounting for carbon emissions and removals already occurring on Oregon lands through an inventory is an important step toward achieving our climate goals and part of a concerted effort by partner state agencies and land stewards to increase sequestration and storage.

Accounting for Net Carbon Flux

Oregon's inventory will follow Environmental Protection Agency recommendations for accounting for net carbon flux from all major sources on natural and working lands, which are based on a standardized GHG accounting framework originally created by the Intergovernmental Panel on Climate Change. In this framework, major sources of GHG emissions are called "key categories." The inventory will track net carbon flux from as many key categories as possible, depending on available data and methods (Table 1).

Table 1. Modified Intergovernmental Panel on Climate Change (IPCC) Reporting Categories table for land-based sources of emissions and removals to be tracked by ODOE's LCI[3]. Biomass burning includes wildfires.

Key Category Name	Code	Sub-Category Name
3B1 Forest Land	3B1a	Forest Land remaining Forest Land
	3B1bi–3B1bv	All Other Lands converted to Forest Land
3B2 Cropland	3B2a	Cropland remaining Cropland
	3B2bi–3B2bv	All Other Lands converted to Cropland
3B3 Grassland	3B3a	Grassland remaining Grassland
	3B3bi–3B3bv	All Other Lands converted to Grassland
3B4 Wetland	3B4a	Wetland remaining Wetland
	3B4bi–3B4bv	All Other Lands converted to Wetland
3B5 Settlement	3B5a	Settlement remaining Settlement
	3B5bi–3B5bv	All Other Lands converted to Settlement
3B6 Other Land	3B6a	Other Land remaining Other Land
	3B6bi-3B6bv	All Other Lands converted to Other Land
3C Aggregate Sources and Non-CO_2 Emissions on Land	3C1a	Biomass Burning in Forest Land
	3C1c	Biomass Burning in Grassland
	3C1d	Biomass Burning in Lands
3D Other Agriculture, Forestry and Land Use	3D1	Harvested Wood Products

Key Resources

1: https://www.ipcc.ch/report/ar6/wg3/downloads/outreach/IPCC_AR6_WGIII_Factsheet_CDR.pdf
2: https://www.nature.com/articles/s41467-023-44425-2
3: https://www.ipcc-nggip.iges.or.jp/2019rf/pdf/1_Volume1/19R_V1_Ch04_MethodChoice.pdf