# FORESTS, WOOD & CLIMATE CHANGE

## British Columbia's Proactive Response

British Columbia's (B.C.) forests and forest products play an important role in helping mitigate climate change. Growing forests reduce greenhouse gas emissions by absorbing carbon dioxide and the carbon storage continues as they are converted into forest products.

B.C. practises innovation in reforestation to ensure forests are adapted to changing climates while maintaining a reliable supply of quality forest products.

# BRITISH COLUMBIA FORESTS MITIGATE CLIMATE CHANGE

*"Sustainably managed Canadian forests and products made from trees can contribute to the critically important objective of reducing global warming."*

Dr. Stephen Colombo, Canadian Climate Forum[1]

*Younger forests are more efficient in their uptake of carbon than older forests where carbon storage plateaus and can be slowly released as trees decay.*

## Impacts on B.C.'s Forests

Climate change is arguably one of the most important environmental issues facing the planet. It is caused largely by the release of carbon dioxide and other gases into the atmosphere during the burning of fossil fuels.[2] The layer of greenhouse gases thickens causing a "greenhouse effect" that warms the atmosphere. Weather patterns change, leading to extreme events like flooding and drought.

B.C. forests can provide overall net carbon storage, however forest management challenges could result in forests acting as a net carbon source. Healthy growing trees capture more carbon than they release, acting as a "carbon sink". Until 2002, B.C.'s forests stored more carbon annually than they released. However, in recent years, they have been a carbon source as a result of escalating forest fires and die-offs due to the unprecedented mountain pine beetle infestation which resulted in an increase in salvage logging.

### FIRE

Forest fires release massive amounts of carbon dioxide. The resulting debris left on the landscape then decomposes, releasing even more carbon dioxide into the atmosphere.

### INSECTS AND DISEASES

Insect outbreaks are expected to increase as B.C.'s climate warms. Insects, as seen with the mountain pine beetle (which has impacted over 18 million hectares of B.C.'s forests), could expand their historic ranges and cause extensive tree damage or mortality. Changes in temperature and rainfall could reduce the growth rates and vigour of individual trees, putting them at greater risk of insect and disease damage.

### CHANGING CLIMATE

The climate in B.C.'s forests is shifting northward and to higher elevations at a rate that exceeds the ability of many tree species to naturally adjust. Long-term field trials suggest that the changing climate will lead to them being 'maladapted', or less resilient to stress and less healthy and productive.[3]

*"In the long term, a sustainable forest management strategy aimed at maintaining or increasing forest carbon stocks, while producing an annual sustained yield of timber, fibre or energy from the forest, will generate the largest sustained mitigation benefit."*

Intergovernmental Panel on Climate Change[4]

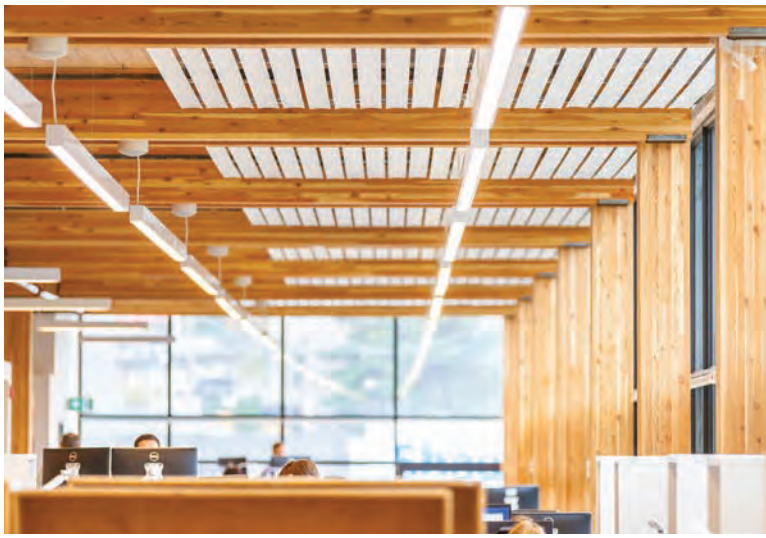
*Photos: Brudder*

## Wood Products Store Carbon

Every year in B.C., 25 to 30 million tonnes of carbon dioxide equivalents are transfered from the province's sustainably managed forests to wood products that end up in consumer goods, buildings and other uses.

Mountain Equipment Co-op's (MEC) new headquarters is an example of how using wood can help meet all code and safety requirements while also providing an environmental advantage.[5]

The total carbon dioxide emissions avoided by using wood rather than other construction materials equals more than 5,000 metric tonnes – enough to offset the emissions of 1,030 cars on the road for one year.[6] Building with wood presents a significant emissions reduction opportunity for the built environment.



*Top: Mountain Equipment Co-op's Vancouver headquarters uses wood as a building material to support its commitment to sustainability. Photo: KK Law*

## Adapting B.C.'s Forests to a Changing Climate

B.C. is recognized as a global leader in sustainable forest management, meeting the environmental, social and economic needs of current and future generations from provincial forests.

To maintain this leadership, the province is adapting forest management policies and practices to address a changing climate and ensure sustainable, high-value forests.

### PLANTING FOR THE FUTURE

Climate change predictions suggest that the suitability of some B.C. tree species for reforestation could be impacted by the expected changes in climate. A key strategy for sustaining productive forests is through assisted migration – the planned movement of a species to mimic natural population or range expansion. To enable this, B.C.'s Chief Forester has modified the existing standards for seed use to reflect the extension to higher elevations for most tree species. For example, western larch can now be planted north of its traditional range.

B.C. reforestation practices reflect the planting of seedlings in areas where future climate conditions are expected to be optimal for species growth.

These practices will also work to maintain healthy ecosystems which are vital to our well-being and to retain biodiversity.

### APPLYING RESEARCH FOR FUTURE FORESTS

The Province of B.C.'s Ministry of Forests, Lands and Natural Resource Operations invests in research to study the potential impacts of climate change to B.C. forests. By making information available to provincial forestry professionals, climate change adaptation can be advanced. Provincially funded resources include:

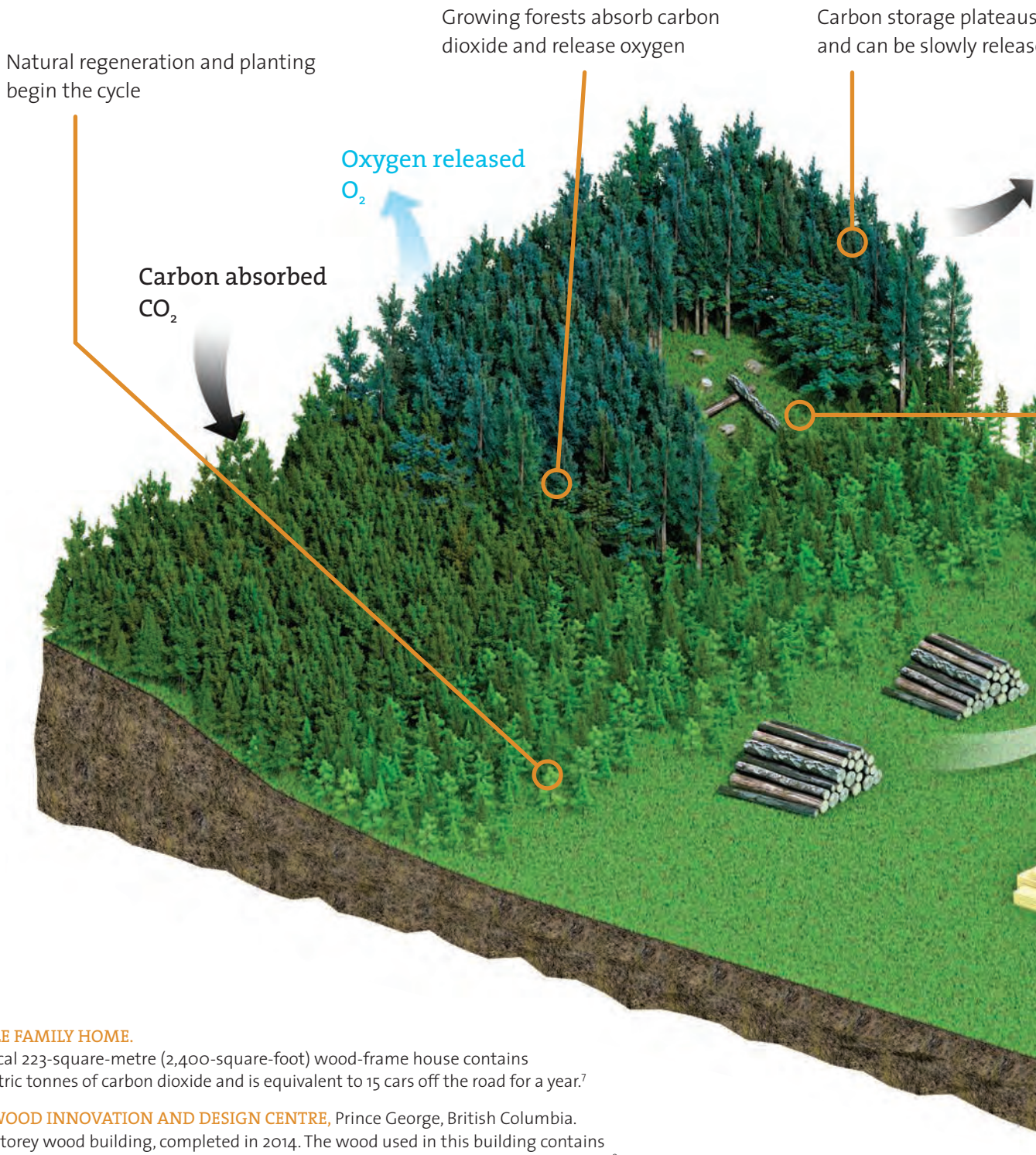
- ClimateBC – A computer modeling tool which utilizes historical weather station data and general circulation models to predict future seasonal and annual climate variables in B.C.
- Tree Species Selection Tool – An online database which identifies the most suitable tree species to plant in each region of B.C. considering conditions in a changing climate.

Forestry professionals can better manage for future natural disturbances, regeneration and growth changes by using these tools to create a scenario of what is expected to happen to B.C. forests.

*Left: The carbon storage cycle of a forest continues following harvesting and reforestation. Harvesting trees at the optimal time in their growth cycle and regenerating the landscape with seedlings. Photo: Michael Bednar*

*Right: Assisted migration: B.C. forestry professionals plant seedlings in areas best suited to the species in anticipation of a changing climate. Photo: Michael Bednar*

# TACKLE CLIMATE CHANGE BY USING WO




1 **SINGLE FAMILY HOME.**
A typical 223-square-metre (2,400-square-foot) wood-frame house contains 24 metric tonnes of carbon dioxide and is equivalent to 15 cars off the road for a year.[7]

2 **THE WOOD INNOVATION AND DESIGN CENTRE,** Prince George, British Columbia.
A six-storey wood building, completed in 2014. The wood used in this building contains 1,099 metric tonnes of carbon dioxide and is equivalent to 290 cars off the road for a year.[8]

3 **BROCK COMMONS PHASE 1,** University of British Columbia. An 18-storey wood building, to be completed in August 2017. The reduced carbon footprint and embodied energy of tall wood buildings plays an important role in sustainable development and carbon storage.

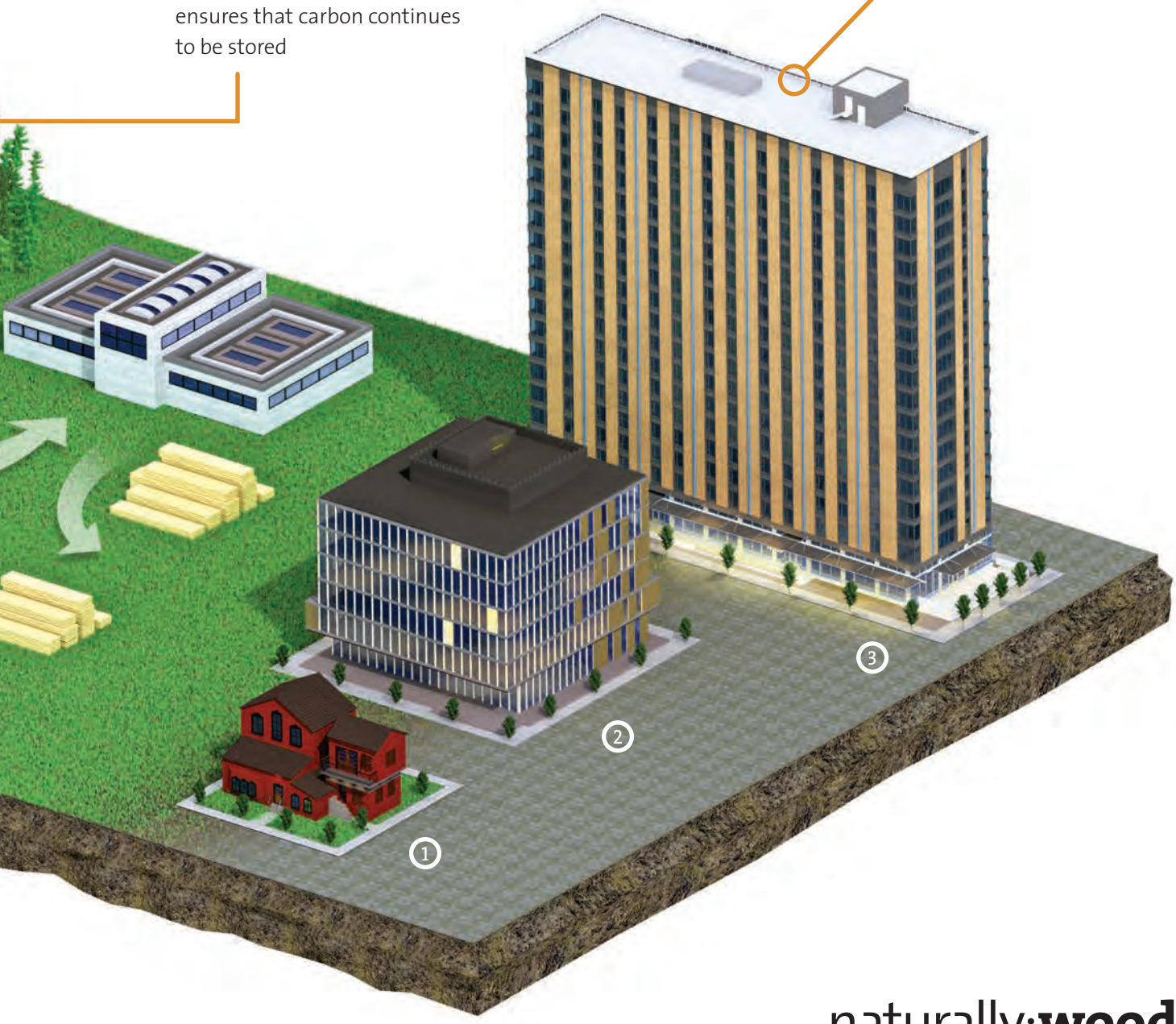
# OD

in older forests
d as trees decay

**Gradual release of stored carbon**

Wood buildings store carbon and it remains stored over the lifetime of the buidling

Harvesting for wood products ensures that carbon continues to be stored




naturally:**wood**®

# Carbon Cycle: Sustainable Forestry & Wood Products

B.C.'s sustainably managed forests filter the air throughout their growth cycle. Growing trees absorb carbon dioxide from the air and convert it to oxygen, which is then released and stored as carbon in their branches, leaves or needles, trunk, roots and surrounding soil.

At the landscape level, carbon density is often greater in older forests, but this tells only part of the story. As trees age, carbon storage plateaus and carbon can be released as trees decay or are burned in a wildfire. The slowing of growth marks the best time to harvest mature trees, which absorb less carbon as they age.

Newly planted and growing forests on the other hand, begin carbon uptake as soon as they are planted and continue to do so until they reach a mature age for harvest. After harvest, B.C.'s forest management laws mandate reforestation to regenerate the forest. The newly planted forest begins absorbing carbon dioxide immediately, increasing the pool of stored carbon.

When forest products are used in construction, they continue to store carbon for the life of the structure and beyond when wood fibre is recycled or reclaimed.[9]

The decision to use wood in the Centre for Interactive Research on Sustainability (CIRS) at the University of British Columbia (UBC) helps meet its objective to mitigate environmental impact. The total carbon sequestered (600 tonnes) is greater than the total carbon emitted (525 tonnes) during the extraction, manufacturing, transportation and installation of all other materials used.

*All of the wood for the CIRS building at UBC was from B.C., incorporating a variety of species and products including Douglas-fir glulam beams. Photo: Don Erhardt*

## CIRS BUILDING ENVIRONMENTAL IMPACT OF WOOD USE

Volume of wood products used:
940 m³ (33,196 cubic ft) of lumber and sheathing

British Columbia forests grow this much wood in:
3 minutes

Carbon stored in the wood:
701 metric tons of carbon dioxide

Avoided greenhouse gas emissions by using wood instead of other building materials:
1,473 metric tons of carbon dioxide

Total potential carbon benefit (avoided GHG emissions + carbon stored in wood):
2,173 metric tons of carbon dioxide

415 cars off the road for a year

*Post-construction calculation*[10]

## FOR MORE INFORMATION

**GOVERNMENT OF BRITISH COLUMBIA** http://www.gov.bc.ca
Climate Change Secretariat

**MINISTRY OF FORESTS, LANDS & NATURAL RESOURCE OPERATIONS** https://www.for.gov.bc.ca
Climate Change
Strategic Wildfire Prevention
Tree Species Selection Tool

About 50% of wood products exported from Canada come from British Columbia's sustainably managed forests. This publication is part of the 'Forest Facts' series, published by Forestry Innovation Investment, the Government of British Columbia's market development agency for forest products.

To learn more about other B.C. forest facts, visit:

**naturallywood.com**

*Cover photo: Sail at the University of British Columbia is a two-phase residential project. The buildings are both six-storey wood-frame construction over two levels of underground parking. Photo: Raef Grohne*
*The wood grain featured at the top of this factsheet is yellow cedar.*

Endnotes: [1]Canadian Climate Forum www.climateforum.ca, Forest Products Association of Canada news release, November 19, 2015 [2]Intergovernmental Panel on Climate Change https://www.ipcc.ch [3]Assisted Migration Adaptation Trial https://www.for.gov.bc.ca [4]Intergovernmental Panel on Climate Change Fourth Assessment Report 2007 www.ipcc.ch) [5]MEC Case Study http://wood-works.ca [6]Carbon Calculator, WoodWorks US http://woodworks.org [7]Wood and Climate Change. FPInnovations, 2008 [8]Carbon Calculator, WoodWorks US http://woodworks.org [9]Dovetail Partners, Inc. http://www.dovetailinc.org [10]Estimated by the Wood Carbon Calculator for Buildings, based on research by Sathre, R. and J. O'Connor, 2010, A Synthesis of Research on Wood Products and Greenhouse Gas Impacts, FPInnovations (this relates to carbon stored and avoided GHG)