Trends and Prospects

UNECE Committee on Forests and the Forest Industry

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ABBREVIATIONS

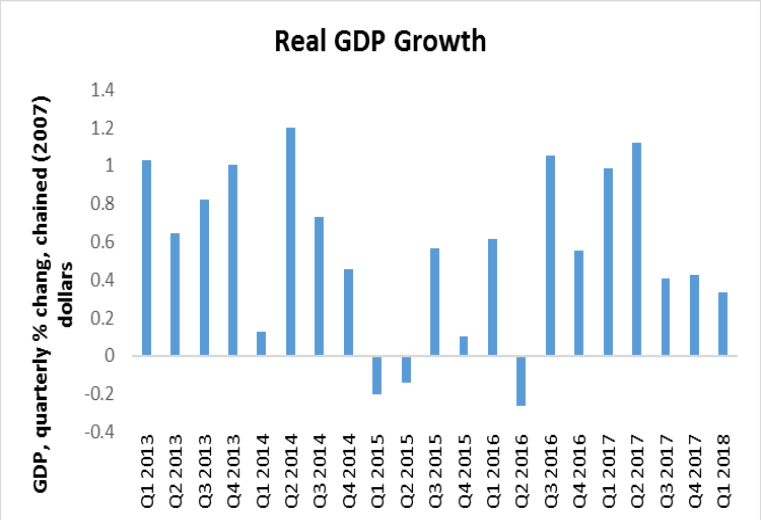
BEK	Bleached Eucalyptus Kraft
CCBFC	Canadian Commission on Building and Fire Codes
CCFM	Canadian Council of Forest Ministers
CCTF	Climate Change Task Force
CETA	Canada-European Union Comprehensive Economic and Trade Agreement
CFIA	Canadian Food Inspection Agency
CFS	Canadian Forest Service
CORSIA	Carbon Offsetting Reduction Scheme for International Aviation
CPTPP	Comprehensive and Progressive Agreement for Trans-Pacific Partnership
CWC	Canadian Wood Council
ECCC	Environment and Climate Change Canada
EMO	Expanding Market Opportunities Program
FIP	Forest Innovation Program
GAC	Global Affairs Canada
GCWood	Green Construction through Wood Program
GHG	Greenhouse Gas
ICAO	International Civil Aviation Organization
IFI	Indigenous Forestry Initiative
IFIT	Investments in Forest Industry Transformation Program
ISPM	International Standards for Phytosanitary Measures
LCEF	Low Carbon Economy Fund
LNG	Liquefied Natural Gas
NAFTA	North American Free Trade Agreement
NBCC	National Building Code of Canada
NBSK	Northern Bleached Softwood Kraft
NDC	Nationally Determined Contribution
NRC	National Research Council Canada
NRCan	Natural Resources Canada
OPEC	Organization of the Petroleum Exporting Countries
OSB	Oriented Strand Board
PCF	Pan-Canadian Framework on Clean Growth and Climate Change
REDD+	Reduce Emissions from Deforestation and Forest Degradation
SBSK	Southern Bleached Softwood Kraft
SDG	Sustainable Development Goal
SFM	Sustainable Forest Management System
TWB	Tall Wood Building
UNFCCC	United Nations Framework Convention on Climate Change
UGW	Uncoated Groundwood Paper
WTO	World Trade Organization

CANADA

I. Economic Overview

General Economic Conditions

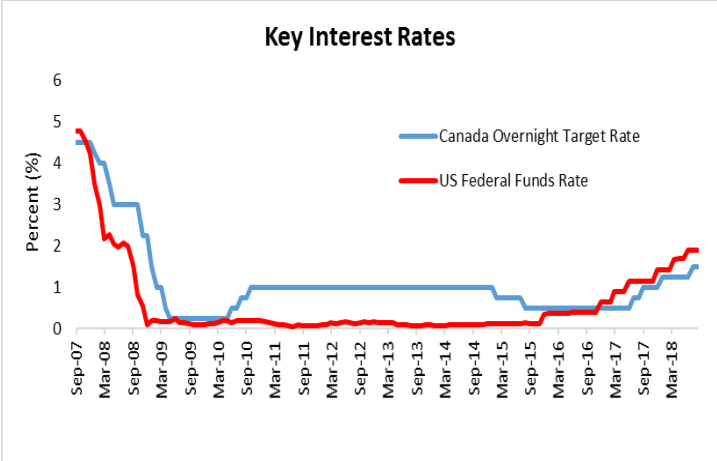
Canada's economy continued to grow into 2018 in tandem with improved global economic conditions. The Canadian economy, measured by real Gross Domestic Product (GDP), grew by 0.3% in the first quarter of 2018, following an increase of 0.4% in both Q3 and Q4 of 2017. Growth was driven by increased outlays on services, while household spending did not change, following 11 consecutive quarterly increases.



Source: Statistics Canada

Annual Canadian GDP growth is projected to average 2.0% from 2018 to 2020. Continued recovery in Canada's largest trading partner, the United States, may support robust Canadian exports. The completion of the U.S.-Mexico-Canada Agreement (USMCA) should contribute to stabilizing and growing trade in North America. Investments by the Canadian federal government in infrastructure, renewable energy, and clean technology will contribute to economic growth and continue to support Canada's commitment to working towards a low carbon economy consistent with global goals.

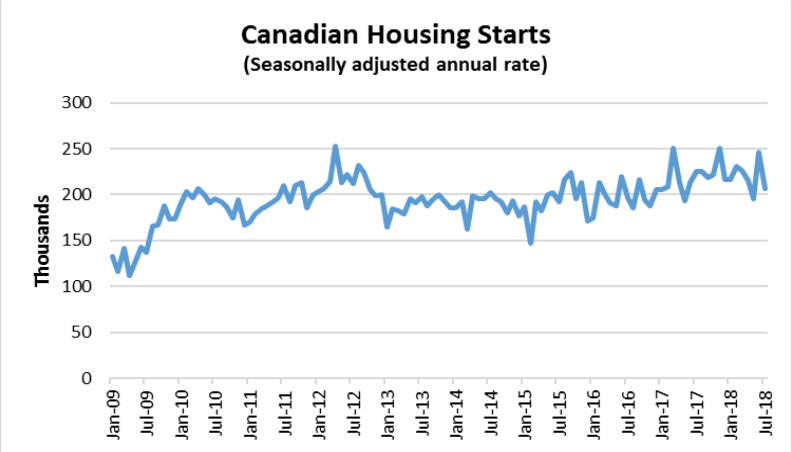
Signaling a positive economic outlook for Canada, in July 2017, the Bank of Canada raised its overnight rate by 0.25%, the first increase in seven years. Over the last year, the bank increased the overnight rate three more times. The overnight lending rate is now set at 1.5%.



Source: Bank of Canada, U.S. Federal Reserve

In recent years, one of Canada's main economic indices, housing starts, has been strong. However, the housing market appears to be cooling due in part to the four interest rate hikes since July 2017 and recent policy actions, such as measures in Ontario to discourage foreign speculation in the southern Ontario housing market and a federal stress test that came into effect

January 1, 2018. Aggregate home prices continued to rise in 2018, although at a substantially reduced rate (1.8%) compared to 2017 (10.7%). Most of the reduced activity can be attributed to softening in sales and prices of single-detached homes in Toronto and Vancouver.



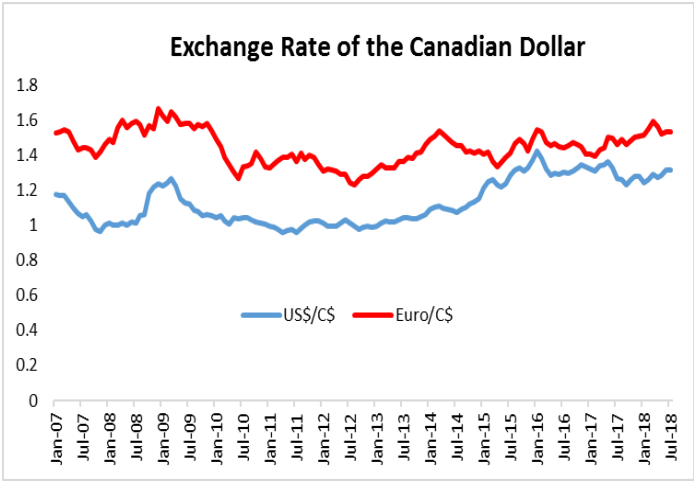
Source: Statistics Canada

The Province of British Columbia is projected to have the largest annual growth in house prices in Canada (5.2%) in 2018, followed by Quebec (3.1%), New Brunswick (2.8%), and Prince Edward Island (2.8%). Prices in other parts of Canada are expected to remain fairly stable, while Saskatchewan and Newfoundland are expected to see slight declines (0.2% respectively). Going forward, the housing market in Canada is expected to continue cooling for a second-straight year due to recent policy changes and rising national interest rates.

The labour market in Canada continues to improve. Employment was up 246,000 jobs (1.3%) in July 2018, compared to August 2017. The unemployment rate also fell by half a point since July 2017, to 5.8%. Of note, the youth (ages 15-24) unemployment rate (11.1%) was significantly higher than the unemployment rate for people aged 55 and older (5.11%) in July 2018.

Canadian consumer spending has slowed for the third consecutive quarter, bringing growth in household final consumption expenditure to 0.3% in the first quarter of 2018. This is the slowest pace of household spending growth since the first quarter of 2015. With four interest rate hikes in the last year, consumers have reduced spending on items that are sensitive to interest rates. The economy is now operating near potential, with inflation at 3% in July 2018. This follows a softening in inflation that was seen last year.

The Canadian dollar has weakened against the U.S. dollar since January 2018, falling from $0.80 to $0.76 in July 2018. Similarly, the Canadian dollar has weakened against the Euro since the beginning of 2018, with an August 2018 value of €0.65.

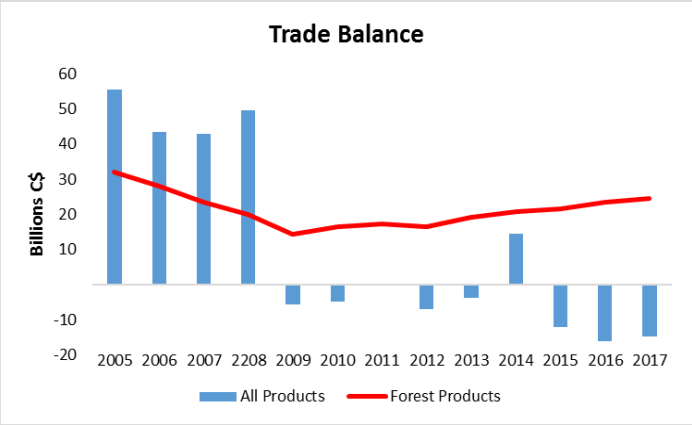


Source: Bank of Canada, U.S. Federal Reserve

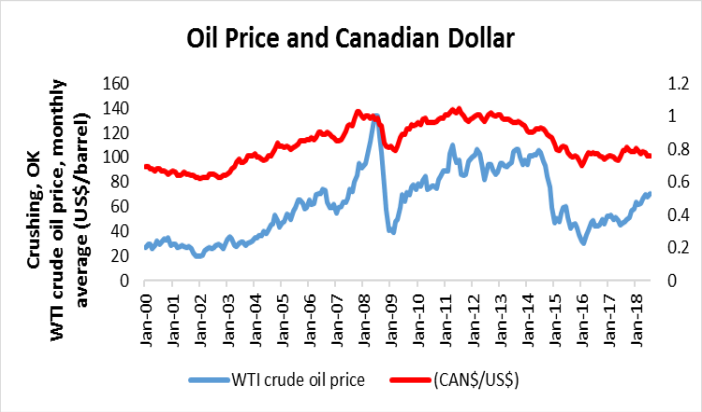
The Canadian-U.S. dollar exchange rate is driven by the relative strengths of the Canadian and U.S. economies. It is influenced by commodity prices, including the price of oil, and other major factors such as Canadian and

American fiscal and monetary policies and growth prospects.

Canada's forest product exports are a major contributor to Canada's trade balance. In 2017, forest product exports stood at $24 billion, up 5% from 2016. After nearly a decade of stability from 2000 through 2008, Canada's trade balance fell dramatically during the global finacial crisis, entering negative territory in the period from 2009 to 2013. The trade balance rebounded in 2014, before returning to a deficit since then (-$14.9 billion in 2017).



Sources: Global Trade Atlas



Sources: US Energy Information Administration, Bank of Canada

II. Policy Measures in Canada Impacting Forest Management and Forest Product Trade

Commitment to Growth and Innovation and to Sustainable Forest Management

Sustainable forest management (SFM) is a way of using and caring for forests to maintain their environmental, social and economic values and benefits over time. Canada is a world leader in SFM, applying it across the country's publicly owned forests, which account for about 92% of Canada's forestland. This is an important commitment and it provides assurance to the international marketplace that Canadian forest products are sourced from forests that are managed sustainably.

Most of Canada's forest (90%) is owned and managed on behalf of Canadians by provincial and territorial governments as public land. Another 2% is federally controlled, 2% is owned by Indigenous Peoples, and the remaining 6% is under private ownership. As a result, federal, provincial and territorial governments all have legislation and regulations in place for the protection and management of their respective forests. The different levels of responsibility are as follows:

- Federal government- international relations and forest products trade; international agreements related to forests; national regulatory frameworks; Indigenous affairs relating to on-reserve land management; management of federal forest lands such as national parks, and; national reporting.[1]
- Provincial and territorial governments- legislation, regulation, enforcement and policies related to forest management; allocation of timber; and, forest inventory.
- Shared responsibilities for federal and provincial/territorial governments- forest science and technology, and; environmental regulation. For example, the National Forest Inventory—a joint data collection system—provides information about Canada's forests to help guide policy, make projections and meet regional, national and international reporting commitments.

Canada is strongly committed to advancing economic growth through the development of our forest resources based on our long-standing SFM principles. All federal, provincial and territorial ministers responsible for forests work cooperatively on areas of common interest via the Canadian Council of Forest Ministers (CCFM). Over the next five years, CCFM will prioritize work on fostering forest sector innovation, protecting forests and communities from wildland fire and other disturbances and promoting Canada's environmental reputation. Cross cutting priority areas include climate change and Indigenous engagement. This collaborative work will be supported by a renewed *Vision for Canada's Forests*.

[1] https://www.nrcan.gc.ca/forests

Canada participates in international initiatives designed to advance SFM globally. In September 2015, the United Nations member states, including Canada, adopted the 2030 Agenda for Sustainable Development. The Agenda includes 17 Sustainable Development Goals (SDGs) and 169 associated targets that aim to improve peace, governance, justice and global sustainable development across all social, economic and environmental dimensions. Canada is committed to implementing these goals, and helping others to reach the 2030 targets.

Sustainable Forest Management Certification

Canada has a comprehensive legislative and regulatory framework that governs forest management in each province and territory to provide assurances that Canada's forests are managed sustainably. These laws, regulations, and policies govern land use planning, forest management, public consultations, Indigenous participation, protected areas, forest tenure, allocation of wood for harvesting, and regeneration of forestland.

Additional third-party sustainable forest management certifications further demonstrate Canada's commitment to inclusive and sustainable forest management practices. Canada has 170 million hectares of forestland independently certified as sustainably managed by one or more of three globally recognized certification systems: the Canadian Standards Association, the Forest Stewardship Council and the Sustainable Forestry Initiative.

Forests and Indigenous Communities

Forests are of tremendous value to communities across Canada – contributing not only economically but also providing important cultural, traditional and spiritual benefits. This is particularly true for Indigenous communities, of which 70% are located in forested regions. As of May 2016, all federal, provincial and territorial governments in Canada have endorsed the United Nations Declaration on the Rights of Indigenous Peoples. Land claim settlements, modern treaties and inclusive forest management practices are all creating opportunities to meaningfully advance the process of reconciliation with Indigenous Peoples in Canada. Changes in the forest sector are improving Indigenous Peoples' access to forest resources and increasing their control over decisions about how forests are used, harvested and managed.

Increasing participation of Indigenous groups in the forest sector labour force offers a key opportunity to mitigate localized labour scarcity, improve facility resiliency and support rural economic development. The forest sector is one of the largest employers of Indigenous Peoples in Canada, with 11,565 Indigenous workers, accounting for 6.2% of the sector's total workforce (higher workforce representation than any other industrial resource sector).

Today, forest businesses and economic development organizations owned and run by Indigenous Peoples are finding new ways to work with forest companies, provincial and territorial governments, forest research institutes and non-profit organizations. Through collaborative and joint venture projects based on mutual respect and cooperation, Indigenous communities and individuals are trailblazing with innovative approaches to forest research, land-use planning, harvest decision-making, product development and market access. These projects are not only creating long-term economic and community development opportunities, but also safeguarding

culturally, spiritually and biologically important ecosystems, ensuring the sustainable management of forests.

Looking forward, Canada has been leading a national engagement process on the Recognition and Implementation of Indigenous Rights Framework, which is meant to ensure greater clarity on how governments work with Indigenous Peoples and create a more inclusive, collaborative process where Indigenous Peoples are engaged as partners and leaders.

Forest Bioeconomy Framework for Canada[2]

To help catalyze innovation in the forest sector, the Canadian Council of Forest Ministers (CCFM)[3] released the *Forest Bioeconomy Framework for Canada* in 2017, a comprehensive and systematic approach to developing Canada's forest sector. It aims to contribute to Canada's low carbon economy and support development of higher value forest products, services and processes. It envisions Canada as a global leader in the use of forest biomass for developing advanced bioproducts and innovative solutions. The framework also contributes to recognition of forests for the spiritual, cultural and recreational benefits they provide.

With new investment, more jobs, continued engagement with Indigenous Peoples, new technologies, and better supply inventory and modeling, the forest industry can sustain its history of innovation, sustainability, and competitiveness. The framework's four pillars and ten objectives are designed to address the challenges and opportunities facing the forest sector. The demand for biomass supply and advanced bioproducts is poised to transform the industry into an active participant in the transition to a low carbon, highly innovative, and sustainable Canadian economy.

The CCFM is currently establishing baseline data and beginning to track progress on the implementation of the framework across the country.

Competitiveness Initiatives

The Government of Canada plays a key role in supporting the transformation and progression of the forest sector. In recent years, the federal government has implemented a number of initiatives to enhance the competitiveness of the forest industry by helping the sector develop new products and processes, and take action on new opportunities in both domestic and international markets. Since 2007, the Government of Canada has invested roughly $2 billion in these initiatives, some of which include: encouraging improved environmental performance and energy efficiency through the Pulp and Paper Green Transformation Program; fostering innovation through the Forest Innovation Program and the Investments in Forest Industry Transformation Program; and developing new markets through the Expanding Market Opportunities Program.

[2] https://cfs.nrcan.gc.ca/publications?id=39162
[3] https://www.ccfm.org/english/

The *Softwood Lumber Action Plan*, announced in June 2017, contributed additional funding for market and product diversification for the Canadian forest sector. Through 2019-2020, it provides $63 million for the Forest Innovation Program, $55 million for the Investments in Forest Industry Transformation Program, and $45 million for the Expanding Market Opportunities Program.

Innovation

Government of Canada support spans the innovation continuum from pre-commercial research and development in transformative technologies to later stage programs focusing on proving technologies at the commercial scale.

Forest Innovation Program[4]

The Forest Innovation Program (FIP) provides funding to four main areas: FPInnovations, the Canadian Wood Fibre Centre, Forest Biorefinery Collaboration and standards development.

FPInnovations[5]

The FIP provides funding to FPInnovations, Canada's principal forest industry research institute, to conduct collaborative, pre-commercial research and development in transformative technologies. Funded predominantly by over 200 industry members, the federal government and nine provinces, FPInnovations has developed some 40 new forest product or process innovations at various stages of technological readiness. From the promise of cellulose filaments and cellulosic nanocrystals, to mid-rise and tall wood buildings, to drones providing forest inventory data, to lignin extraction and biofuels, Canada's forest products industry is strongly positioning itself to capitalize on new, higher-value opportunities such as those in the emerging bioeconomy. These new uses will also provide valuable climate change mitigation tools and solutions for a low carbon economy, a key priority for the Government of Canada.

Canadian Wood Fibre Centre[6]

The Canadian Wood Fibre Centre is a collaborative effort between the Canadian Forest Service (CFS) and FPInnovations that conducts upstream research aligned with FPInnovations industry research efforts. Its work in forest inventory, fibre characterisation and production, and genomics is helping to ensure that the Canadian forest industry can get the right fibre to the right mill for the right product in a way that supports industry competitiveness and public confidence. The Centre's work on *Enhanced Forest Inventories* has completely redesigned the best practices for monitoring and managing Canada's forests. This work is recognized internationally in the United States, New Zealand and Australia.

[4] https://www.nrcan.gc.ca/forests/federal-programs/13137
[5] https://fpinnovations.ca/Pages/index.aspx
[6] https://www.nrcan.gc.ca/forests/research-centres/cwfc/13457

Forest Biorefinery Collaboration[7]

The Forestry Biorefinery Collaboration brings together the research capacity of Natural Resources Canada CanmetEnergy and FPInnovations, to further refine the technological solutions needed to support the forest industry's contribution to Canada's bioeconomy. Biorefinery technologies, including bioenergy (e.g. pyrolysis and gasification) and innovative uses of residues (e.g. lignin), support new revenue streams for Canada's mills, which increases their resilience and the security of the employment they provide. Three pulp and paper mills in Canada have added biorefinery applications to their operations, with many more expected. Extracted lignin is being used as an environmentally friendly adhesive in plywood. Gasification and liquefaction technologies are creating biogas and biofuels that can be used for heat, power, and transportation.

Standards Development

The development of national and international standards for novel biomaterials (cellulose nanocrystals, cellulose filaments, lignin, etc.) and their applications is facilitated through the Canadian Standards Association (CSA). This is being done in order to facilitate the regulatory approval and market acceptance of new products. Since 2014, the CSA has produced two national standards and lead the development of one ISO standard for cellulose nanomaterials. The CSA also just recently published a roadmap for the development of standards for lignin and the first standard is expected to be published in March 2020. This is a collaborative effort with the CSA, CFS, FPInnovations, National Research Council and the forest industry working together to produce both Canadian and international standards.

Investments in Forest Industry Transformation[8]

Since 2010, the Investments in Forest Industry Transformation (IFIT) program has been supporting the Canadian forest sector, and the communities that depend on it, to bring about first-in-kind innovation and transformation. The IFIT program has:

- **Improved environmental performance**- production of green electricity and renewable fuels, reduction of greenhouse gas emissions, increased energy efficiency, and carbon capture;
- **Diversified markets with new, higher value products-** new biomaterials, advanced building products and construction materials; and,
- **Increased competitiveness and economic sustainability**- jobs created, jobs secured, new revenue streams for companies, diversification of product portfolios.

To date, the program has funded 33 projects involving mostly world-first technologies, with 70% of projects creating new products or diversifying recipients' product offerings. For every $1 invested by the IFIT program, $5.06 is leveraged from other sources. Over the past year, four

[7] https://www.nrcan.gc.ca/energy/efficiency/industry/processes/systems-optimization/research-development/5603
[8] https://www.nrcan.gc.ca/forests/federal-programs/13139

projects were completed at facilities in Canada that represent first-in-kind innovations. These include:

- Developing the first made-in-Canada Passivhaus wood window system to produce energy-efficient windows for passive houses;
- Developing a portfolio of new, premium value grades of Northern bleached softwood kraft (NBSK) pulp (which have greater fiber bonding performance properties compared to conventional NBSK grades). These grades can be used to produce tissues, towels and personal care products, and also incorporated into non-traditional, growing, and value-added markets such as fiber reinforced materials, including cement applications;
- Implementation of innovative fibre preheating technologies that increase the productivity of two separate particle board and medium density fibreboard facilities; and,
- The first industrial scale corrugating line to create high-end building materials, furniture and packaging using rejected wood fibers.

These projects, along with others funded by the IFIT program, are expected to generate more than $365 million per year in new revenues. In addition, they will increase renewable electricity capacity by 41 gigawatt hours/year and decrease greenhouse gas emissions by 210 kilotonnes/year. In terms of employment impacts, these projects are estimated to secure approximately 4900 jobs in the Canadian forest sector, and to create 374 new innovation-related jobs.

The additional $55 million provided under the *Softwood Lumber Action Plan* will help bring the next wave of innovation to the market and further solidify Canada's position as a leader in forest industry transformation. Recently funded projects include:

- Establishment of the first industrial wood pellet and sawmill complex in Canada that will use a high content of bark in its production line;
- Installation and development of a new converting system for the manufacture of new corrugated products that can be replicated across the Canadian forest products industry;
- Construction of a commercial demonstration facility that will produce 300 tonnes per year of cellulose nano-crystals with state of the art equipment and processes; and,
- Installation and implementation of a waste heat recovery system that harnesses waste heat and uses it in the drying process, instead of being expelled into the atmosphere.

Indigenous Forestry Initiative[9]

The Indigenous Forestry Initiative (IFI) is a proposal-based contribution program initially funded at $1 million per year by NRCan. It supports forest-based economic development for Indigenous Peoples across Canada. As a featured component of Canada's Softwood Lumber Action Plan, an additional $10 million was announced for the IFI in June 2017. In 2017-18, the IFI was over-subscribed, leading NRCan to leverage an additional $1,500,000 from Canada's Strategic Partnerships Initiative to support investments in Northern and Remote Forest Biomass projects.

[9] https://www.nrcan.gc.ca/forests/federal-programs/13125

In the first year of the Softwood Lumber Action Plan, NRCan contributed $3 million to 35 Indigenous communities and organizations to support 30 Indigenous forestry projects. Presently, NRCan is finalizing funding decisions for 21 new and on-going projects. In the last call for proposals, the IFI received over 50 applications, seeking $32 million in total funding.

Markets

Expanding Market Opportunities Program[10]

The Expanding Market Opportunities Program (EMO) helps to increase and diversify market opportunities for Canada's forest sector by promoting the broader use of Canadian wood products, both domestically and abroad.

The program provides funding to forest product associations to support market diversification and expansion activities such as branding, demonstration of Canadian wood-frame construction techniques, international representation through in-market staff, and technical support to address market access and regulatory issues. In addition, the program supports quality assurance and activities that reinforce the forest sector's environmental reputation through the promotion of Canada's strong record on sustainable forest management.

Over the past number of years, this multi-faceted market diversification strategy has helped Canada's wood product sector increase its exports to emerging and fast-growing Asian economies. For example, the value of Canadian wood, pulp and paper exports to China increased to $1.7 billion in 2017, a 29-fold increase since 2002. In addition, Canada is an important lumber supplier to South Korea, with exports totalling $80.9 million in 2017, an increase of 190.7% from 2002. In Japan, market diversification efforts have helped Canadian exporters to capture a dominant share in the emerging industrial wood pellet market, with exports totalling $42.6 million in 2017, an increase of 210% from 2015.

In North America, the EMO program has supported industry efforts to increase wood use in non-residential buildings such as schools, health care facilities and commercial outlets, and mid-rise buildings up to six storeys. As a result, wood has been used in more than 2,800 non-residential construction projects in Canada and the United States since 2007, representing an estimated $1.4 billion in new wood sales for the wood product sector.

The program has also supported the efforts of the National Research Council of Canada (NRC) to undertake scientific research, which led the Canadian Commission on Building and Fire Codes to unanimously approve new provisions for mid-rise wood construction for up to six storeys in the 2015 edition of the *National Building Code of Canada* (NBCC).

EMO also helps to advance public acceptance of tall wood buildings and achieved a number of milestones under a *Tall Wood Building Demonstration Initiative*. Led by NRCan, with support from the Canadian Wood Council (CWC), FPInnovations, NRC, provinces and industry, Tall

[10] https://www.nrcan.gc.ca/forests/federal-programs/13133

Wood Building (TWB) research and development activities enabled the design and approval process of two projects that are now complete and fully occupied:

- **The Origine Building**[11]- a 13-storey condominium building (12-storey mass timber structure on top of a one-storey concrete podium) in Quebec City, which inspired the Quebec Government's interest in tall wood buildings and led to the publication of Quebec's Guide for Mass Timber up to 12 Storeys in August 2015. The Guide is considered a "pre-approved" alternative solution in the Quebec Building Code making Quebec the first jurisdiction in North America to allow and facilitate the approval of mass timber tall wood buildings up to 12 storeys tall.
- **The University of British Columbia's Brock Commons Tallwood House**[12]- an 18-storey hybrid mass timber super-structure comprised of a one-storey concrete podium, two concrete cores and a 17-storey mass timber structure. The wood super-structure and the façade of the building were completed in September 2016. The building is currently the world's tallest hybrid wood building and is generating significant domestic and international interest from various stakeholders including designers and developers.

Results from research and development activities, funded by NRCan and used to support the design and approval process of the two TWB demonstration projects, have been shared widely with the NBCC Code Committee in support of a code change proposal put forward by CWC to allow 12-storey encapsulated mass timber buildings in the 2020 edition of the NBCC.

As a result of the enhanced funding provided to the program through the *Softwood Lumber Action Plan* in June 2017, Expanding Market Opportunities introduced new flexibilities to the program design to further support export development. In addition, the program is working with partners to identify potential demonstration projects in key Asian markets and to continue to showcase Canadian-style wood construction techniques and applications of mass timber materials. This initiative will contribute to positioning Canada as a world leader in tall wood construction.

Green Construction through Wood [13]

The Government of Canada is building on the success of the *Tall Wood Building Demonstration Initiative* by investing in new programs to facilitate greater market and regulatory acceptance of tall wood buildings. The Green Construction through Wood (GCWood) program was announced in Budget 2017 as part of the Pan-Canadian Framework on Clean Growth and Climate Change. The program, launched in October 2017, supports innovative wood demonstration projects and the adoption of tall wood buildings in Canadian building codes. GCWood has a budget of $39.8M over four years (2018/19 – 2022/23). The GCWood program funds projects that encourage:

[11] https://www.nordic.ca/en/projects/structures/origine
[12] https://www.naturallywood.com/emerging-trends/tall-wood/brock-commons-tallwood-house
[13] https://www.nrcan.gc.ca/forests/federal-programs/gcwood/20046

- Adoption and commercialization of innovative wood-based products and systems in the construction of high-rise buildings, bridges, and low-rise non-residential buildings;
- Advanced training and education and the development of design tools targeted at designers, specifiers, architects, and building officials; and,
- Research that addresses the gap in technical information needed to facilitate and support revisions to the 2020 and 2025 National Building Code of Canada to allow tall wood buildings up to 12 storeys and beyond from the current 6 storey limit.

The first phase of the GCWood program was opened on October 6, 2017 with a formal call for "Expressions of Interest" to build tall wood demonstration projects. Many proposals were received from across the country. A technical and financial due-diligence process of short-listed projects is currently underway.

Climate Change

Adaptation

In 2008, provincial and territorial premiers, through the Council of the Federation, requested the CCFM Climate Change Task Force (CCTF) to undertake collaborative work on adaptation in forestry. The CCTF has now completed its mandate after eight years of activity from 2008-2016.

The CCTF developed climate change adaptation tools and techniques designed to be readily mainstreamed into day-to-day forest management planning and decision-making. The tools, which are currently being field-tested, include:

- An assessment of tree species vulnerability and management options for adaptation;
- A scalable, nationally-applicable vulnerability assessment framework for sustainable management under climate change;
- A number of adaptation knowledge syntheses; and,
- A guidebook for mainstreaming climate change into sustainable forest management.

In addition, the CCFM supports a Forestry Adaptation Community of Practice[14] to facilitate the sharing of best practices and lessons learned in adaptation among researchers, policy-makers, and forest managers across Canada.

In 2016, recognizing that business and industry lack timely access to applicable information on climate change impacts and adaptation options, the federal government provided funding over five years to enhance competitiveness and increase resiliency in a changing climate. Through the Forest Change initiative, NRCan is working with the forest sector to develop and transfer adaptation information, knowledge, and tools to mainstream adaptation into sustainable forest management policies and practices.

[14] https://www.ccadaptation.ca/en/facop

Consistent with scenarios used by the Intergovernmental Panel on Climate Change, a national integrated assessment of the implications of climate change on Canada's forests and forest industry under a range of climate scenarios has been developed. Provincial and territorial governments continue to promote adaptation actions in support of sustainable forest management. Within several jurisdictions across Canada, vulnerability assessments are being conducted at a regional scale or for a given forest management unit as the basis for incorporating climate change considerations into forest management planning and operations.

Building from the national integrated assessment, the Canadian Forest Service has continued to engage with stakeholders to facilitate regional scale adaptation using case studies that share best practices, models and tools across Canada. The goal of this work is to assess existing and potential climate change impacts, explore adaptation options and take steps to mainstream climate change adaptation into sustainable forest management practices.

Within the Climate Change Adaptation Platform, the Forestry Adaptation Working Group, chaired by the Canadian Forest Service with members from Canada's provinces, territories, forest industry and academia, produced a *State of Play* (2017) report[15]. This report described the current state of adaptation activities, forest policy and regulations across Canada. NRCan also disseminates adaptation information and tools to the public such as maps, synthesis reports, guidebooks, climate projections and decision-support systems to help translate science into action and inform sustainable forest management decisions in the context of a changing climate.

International Efforts

With the adoption of the Paris Agreement under the United Nations Framework Convention on Climate Change (UNFCCC) in December 2015, countries, including Canada, committed to putting forward their own emissions reduction targets, known as nationally determined contributions (NDCs), as well as raising the ambition of their climate change efforts over time.

Canada actively participates in UNFCCC negotiations, including on the development of guidance for the implementation of the Paris Agreement. In these negotiations, Canada supports the inclusion of forest and other lands in a manner that contributes to reducing anthropogenic emissions and enhancing anthropogenic carbon removals. Canada believes that sustainable forest management should play a key role in mitigating the effects of climate change.

Canada also participates in the development of methodological frameworks to *Reduce Emissions from Deforestation and Forest Degradation* and to enhance sustainable forest management in developing countries (REDD+). The final REDD+ methodological guidance under the UNFCCC was adopted in 2015 and, since then, the focus of global REDD+ efforts has been on facilitating implementation. To that end, Canada supports multilateral REDD+ initiatives such as the Forest Carbon Partnership Facility, where Canada is a donor to both the Readiness and Carbon Funds. In 2017, Canada took a lead role in coordinating consultations for the operationalization of results-based payments for REDD+ under the Green Climate Fund, a part of the financial mechanism of the UNFCCC.

[15] https://cfs.nrcan.gc.ca/publications?id=38871

Canada provides international climate finance in support of mitigation and adaptation actions by developing countries. In 2015, Canada announced a new climate finance package valued at $2.65 billion over five years, including a $300 million contribution to the Green Climate Fund, which is aimed at supporting projects, programs, policies and other activities (including REDD+) to address climate change in developing countries. Further announcements regarding the allocation of the $2.65 billion package are expected.

Domestic Emission Reduction Efforts

In May 2017, Canada submitted its NDC to the UNFCCC, confirming its previous pledge to achieve an economy-wide reduction in GHG emissions by 30% below 2005 levels by 2030. This pledge is in addition to Canada's commitment to reduce GHG emissions by 17% by 2020.

Pan-Canadian Framework on Clean Growth and Climate Change[16]

In March 2016, Canada's First Ministers released the Vancouver Declaration in which the federal, provincial and territorial governments agreed to create a plan to reduce GHG emissions, create clean jobs, support economic growth, and increase Canada's resiliency to the impacts of climate change. In December 2016, the governments adopted the Pan-Canadian Framework on Clean Growth and Climate Change (PCF). This framework has four main areas:

1. Carbon pricing;
2. Complementary (mitigation) actions to reduce GHGs;
3. Adaptation and climate resilience; and
4. Clean technology and innovation.

There are four specific forest-related commitments:

1. **Increasing stored carbon**- protect and enhance carbon sinks, including in forests.
2. **Increasing the use of wood for construction**- encourage the increased use of wood products in construction, including through updated building codes.
3. **Generating bioenergy and bioproducts**- identify opportunities to produce renewable fuels and bioproducts.
4. **Advancing innovation**- enhance innovation to advance GHG-efficient management practices in forestry.

Federal Carbon Pricing Benchmark

The federal government has established a benchmark to ensure that carbon pricing applies to a broad set of emission sources throughout Canada starting in 2018. Provinces and territories have flexibility to implement a carbon tax, cap and trade, or alternative carbon pricing system, and all revenues raised will remain in the jurisdiction of origin. The benchmark also includes legislated increases in stringency. For jurisdictions using a carbon tax, the tax should start at $10 per tonne

[16] https://www.canada.ca/en/services/environment/weather/climatechange/pan-canadian-framework.html

in 2018 and rise by $10 per year to $50 per tonne in 2022. For jurisdictions using a cap and trade system, the annual caps should produce emission reductions corresponding to what a carbon price would produce. The federal government will introduce a backstop – an explicit price-based carbon pricing system– that will apply in jurisdictions that do not meet the benchmark. The overall carbon pricing approach will be reviewed by 2022 to assess the path forward.

The Low Carbon Economy Fund

To support new provincial and territorial actions under the PCF, the Canadian federal government launched the $2 billion Low Carbon Economy Fund (LCEF) in mid-2017. Enhancing carbon sinks and reducing GHG emissions from the forest sector is one priority area. The LCEF will support projects that meet the following criteria:

- Material reductions in GHG emissions;
- Incremental to existing actions;
- Contribute to meeting Canada's 2030 emission reduction target; and,
- Cost-effective.

The LCEF has two envelopes. One of the envelopes, the $1.4 billion Leadership Fund, will support commitments by provinces and territories that have adopted the PCF, with each province or territory receiving a specific funding allocation. Through fall 2017, provinces and territories put forward proposals for consideration. Bilateral funding agreements are currently being finalized with most jurisdictions. The remainder of the LCEF funds will support the implementation of the PCF and the Low Carbon Economy Challenge, in which projects will be selected from among those submitted by provinces and territories, municipalities, Indigenous governments and organizations, businesses and not-for-profit organizations.

The Role of Forests

In its NDC, Canada indicated its intent to account for the land sector, as well as for harvested wood products, and to exclude the impacts of natural disturbances. However, the impact of forest management activities on GHG emissions and storage can be difficult to measure due to significant inter-annual variability caused by natural disturbances. Starting with its 2017 *National GHG Inventory Report*, Canada applied a more advanced approach for estimating anthropogenic emissions and removals in managed forests that separates forest stands impacted by anthropogenic and natural drivers. As a result, emissions and removals from stands dominated by the impacts of natural disturbances are now temporarily excluded from GHG inventory reporting until they attain commercial maturity and re-enter reporting or are directly affected by forest management activities. In the 2018 National GHG Inventory Report, Canada further refined this approach (see the 2018 National GHG Inventory Report for details[17]).

As indicated in its NDC, Canada expects that the land sector including forests will provide an important contribution to its broader climate change mitigation efforts. Federal, provincial and

[17] https://www.canada.ca/en/environment-climate-change/services/climate-change/greenhouse-gas-emissions/inventory.html

territorial governments are currently exploring how best to achieve forest-related mitigation, including through changes in forest management, increased afforestation, increased use of harvested wood as a substitute for emissions-intensive products, and increased use of harvest residues for bioenergy in place of fossil fuels. Provincial and territorial governments are vital in these efforts as they own over 90% of Canada's forests.

Provincial/Territorial Actions

Each of Canada's provinces and territories is taking action to address climate change and reduce GHG emissions, but this section only summarizes actions of the four largest provinces. More details on actions of all provinces and territories are available in Canada's *Seventh National Communication* to the UNFCCC, which was released in December 2017[18].

In 2012, the Government of Quebec launched its *Climate Change Action Plan 2013-2020*[19] to work toward its GHG emission reduction target of 20% below 1990 levels by 2020. In 2013, Quebec launched a GHG cap and trade system which linked with California's system in 2014. Other measures under Quebec's Action Plan include establishment of green building standards and promotion of renewable energy. Quebec's *Residual Forest Biomass Program* finances projects to use residual forest biomass for energy. In 2015, Quebec adopted a target of a 37.5% reduction below 1990 levels by 2030, based on the outcomes of a public consultation process on climate change targets. Quebec's *Wood Innovation Work Plan* unveiled in 2016 supports the transformation and modernization of the forest products industry, with over $86 million in government investments by 2022.

In 2015, the Government of Ontario announced a GHG emission reduction target of 37% below 1990 levels by 2030. The province had already committed to reduce emissions 15% by 2020 and 80% by 2050. A core measure to achieve these goals was a price on carbon, to be implemented through a cap and trade program linked to Quebec and California. Another set of measures related to forests. Ontario's 2016 Climate Change Action Plan[20] aimed to develop a Land Use Carbon Inventory and a Forest Carbon Policy Framework. Measures included enhanced carbon storage in natural systems by expanding the Greenbelt (a large area of environmentally sensitive land and farmlands in Southern Ontario)[21], protecting grasslands, and increasing tree planting. Ontario created a 50 Million Tree Program to plant trees on the settled landscape of the province to restore forest cover over the fragmented landscape. By 2017, the program had planted over 20 million trees involving over 4,000 landowners. A new provincial government was elected in Ontario in June 2018 which, during its election campaign, pledged to repeal Ontario's cap and trade system and set up an emissions reduction fund to invest in new emission-cutting technologies. It is working on a new provincial climate change plan that is expected in fall 2018.

[18] https://unfccc.int/files/national_reports/national_communications_and_biennial_reports/application/pdf/82051493_canada-nc7-br3-1-5108_eccc_can7thncomm3rdbi-report_en_04_web.pdf
[19] http://www.mddelcc.gouv.qc.ca/changementsclimatiques/plan-action-fonds-vert-en.asp
[20] https://www.ontario.ca/page/climate-change-action-plan
[21] http://www.mah.gov.on.ca/Page187.aspx

In 2015, the Alberta government released its new Climate Leadership Plan[22] based on an Advisory Panel's recommendations[23]. The Climate Leadership Plan includes a $20/tonne carbon price starting in 2017, which rose to $30/tonne in 2018. The Alberta government expects that its carbon levy will raise $9.6 billion by 2020, all of which will be reinvested in the Alberta economy. Three billion four hundred million dollars of the revenues will be allocated for large scale renewable energy, bioenergy and technology under the broader goals of diversifying the Alberta energy industry and creating new jobs. In 2011, the province implemented a Renewable Fuels Standard to accelerate the use of fuels derived from renewable sources.

In 2016, the Government of British Columbia released its Climate Leadership Plan[24] highlighting a set of sector-specific actions to help meet British Columbia's emissions reduction target of an 80% reduction below 2007 levels by 2050. To enhance the carbon storage potential of British Columbia's public forests, the plan commits to the rehabilitation of under-productive forests; recovery of more wood fibre; and reducing the emissions from the burning of wood slash. In early 2017, British Columbia announced the Forest Carbon Initiative, an investment of $150 million to restore up to 300,000 hectares of forests impacted by mountain pine beetle and wildfires. The initiative aims to enhance the carbon storage potential of the province's public forests by increasing the rate of replanting and fiber recovery and by improving forest management practices to capture the carbon benefits of reforestation, while avoiding emissions from burning slash. The province has estimated that the ten-year program could to lead to a reduction of annual GHG emissions of up to 11.7 Mt by 2050.

Update on Progress

In December 2017, Canada published the first annual *Synthesis Report on the Status of Implementation of the PCF*[25]. The report indicated that, in the first year of implementation, federal, provincial, and territorial governments made good progress in putting the PCF into action and are on track to achieve the first-year milestones. Funding has been mobilized to support many of the new actions included in the PCF, including significant transfers from federal to provincial and territorial governments, as well as to representatives of Indigenous Peoples and Indigenous governments. New regulations to cut emissions have been drafted, along with policies and programs to build resilience and support clean technologies in all jurisdictions. Governance, reporting, and oversight structures are tracking overall progress throughout Canada.

Canada's GHG National Inventory Report[26] (published in April 2018) showed that emissions were 704 Mt CO_2e in 2016 or 3.83% below 2005 emissions. Canada's latest emissions projections, which were published in the Seventh National Communication and Third Biennial Report to the UNFCCC in December 2017, projected emissions of 722 Mt by 2030, well above Canada's target of 517 Mt in 2030.

[22] http://www.alberta.ca/climate-leadership-plan.aspx
[23] http://www.alberta.ca/documents/climate/climate-leadership-report-to-minister.pdf
[24] https://climate.gov.bc.ca/app/uploads/sites/13/2016/10/4030_CLP_Booklet_web.pdf
[25] https://www.canada.ca/content/dam/themes/environment/weather/climatechange/PCF-FirstSynthesis_ENG.pdf
[26] https://www.canada.ca/en/environment-climate-change/services/climate-change/greenhouse-gas-emissions/inventory.html

Major Forest Disturbances in Canada

Wildland Fire in Canada

Since 1990, about 7,400 wildland fires (fires that occur in forests, shrub lands and grasslands) burn approximately 2.5 million hectares in Canada each year. The frequency and size of fires is expected to rise with climate-related factors such as warmer temperatures, fluctuating precipitation levels, increased lightening strikes, and drier forest conditions. This may result in longer fire seasons with increased incidents of large and intense wildfires. These wildfire events can have a significant impact on rural and Indigenous communities that are located in remote areas where forests burn frequently, resulting in thousands of people evacuated each year because of fire and smoke. Wildfire can also have a considerable effect on ecological goods and services, including carbon storage, timber supply, biodiversity, water, and traditional and recreational uses of the forest. In 2016, wildfires burned 1.4 million hectares of forest in Canada, or 0.4% of the country's forested area. Although not all of that burned area consists of merchantable forests, the impact on timber supplies can be significant. For example, in the province of British Columbia in 2017, wildfire resulted in the loss of an estimated 53 million cubic feet of merchantable timber, an amount equivalent of to one year's annual allowable cut for the province.

Since the 1970s, the area in Canada burned annually by wildfire has more than doubled, resulting in rising wildfire management costs, with the sharpest increases occurring since the mid-1990s. From an average annual cost of $290 million in the early 1970s, spending on fire management reached more than $900 million in 2013, and has topped $1 billion in more recent years. With the number of fires and the area burned each year projected to increase due to climate change, these costs will likely continue to rise.

Until the 1970s, the goal of fire management in Canada was suppression – to put out all forest fires. However, as knowledge has improved about the ecological benefits of forest fires, it has become clear that suppressing all fires is neither ecologically wise nor physically possible. Wildland fires are a natural part of the forest ecosystem and important in many parts of Canada for maintaining the health and diversity of the forest. This understanding has resulted in fire management practices that includes a range of options, from letting fires burn themselves out to quenching them. In addition, the use of prescribed fires offer a valuable resource management tool for enhancing ecological conditions and eliminating excessive fuel build-up.

Given the rising costs, impacts to communities and the need to work collaboratively on wildfire management and research, provincial, territorial and federal governments are working together to advance the 2016 *Canadian Wildland Fire Strategy*[27] through a range of actions. These include improving cross-jurisdictional preparedness and response capability, increasing investments in fire research innovation and enhancing commitments to resilient communities. In September, 2018, CCFM Ministers reiterated their commitment to collaboratively accelerating implementation of the Canadian Wildland Fire Strategy.

[27] https://www.ccfm.org/english/coreproducts-cwfs.asp

Pests

Spruce Budworm in Eastern Canada

Spruce budworm is one of the most damaging pests in North America, with most regions of Canada reporting damage by defoliation each year. During major outbreaks, spruce budworm causes disruptions to the forest industry and affects jobs, recreation and tourism, especially for those communities and regions that are heavily forest-sector dependant. The last extensive outbreak of spruce budworm in Canada reached its peak in the 1970s, and covered more than 50 million hectares across Quebec, Ontario, and Atlantic Canada, resulting in fibre losses of approximately 500 million cubic metres of spruce and fir, with a commercial value of approximately $12.5 billion in Quebec alone.

The most recent spruce budworm outbreak began in 2006 in Quebec. As of 2016, it had spread to cover more than 7 million hectares, with the potential to spread further through Canada's Atlantic provinces, Ontario and the eastern United States. Due to the potential negative effects of an outbreak in eastern Canada, the federal government is working with provincial partners, industry, and academia to test and evaluate early intervention strategies aimed at minimizing the extent of the epidemic by targeting low-population spruce budworm epicentres.

In Budget 2018, the Government of Canada announced funding for $74 million over four years for the Spruce Budworm Early Intervention Strategy Phase II. It leverages an additional $50 million from the provinces of New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland and Labrador, and industry, for a total of $124 million. The strategy aims to equip the Canadian forest sector with an innovative, science-based, and effective pest management approach that can be applied to impending outbreaks of spruce budworm across Canada. Natural Resources Canada researchers will continue to work closely with provincial governments and the forest sector across Canada to develop science-based solutions to protect forests and keep spruce budworm populations low. Research results to date are positive, indicating that an early intervention strategy may be a viable option to manage the spruce budworm.

Mountain Pine Beetle in Western Canada

The mountain pine beetle is a native insect that attacks pines in western North American forests. Since the current beetle epidemic started in the early 1990s, mountain pine beetles have killed more than 50% of British Columbia's commercial pine and caused widespread timber losses in dense stands of lodgepole pine in the central interior of the province. Unfortunately, the beetle has now spread far beyond its historic range into northern British Columbia and eastward into the boreal forest of north-central Alberta. The infestation in and beyond Canada's national parks in the Rocky Mountains creates risks for surrounding provincial forests and forest industry operations. Scientists are assessing the risk that the beetle may continue to spread eastward across Canada's boreal forest.

The Government of Canada is concerned about the impact of the beetle infestation on forest communities and is working in collaboration with the provinces, territories, stakeholders and communities across Canada to respond to the challenges it poses. Research on mountain pine

beetle in newly invaded ecosystems informs a strategic approach to slow the spread of the mountain pine beetle. Collaborative efforts are underway with provincial governments and academia to update the risk assessment of the beetle's spread in boreal and eastern pine forests.

Emerging Issues

The emerald ash borer is an invasive insect that represents a serious threat to urban trees and natural forests in Canada. In the past year, emerald ash borer has been detected in Winnipeg, Manitoba and in Edmunston, New Brunswick. Prior to these announcements, emerald ash borer was only found in Ontario and Quebec. All native North American ash trees are susceptible to the emerald ash borer and it has killed millions of ash trees in southern Ontario, Michigan and surrounding U.S. states. In infested areas, 99% of ash trees are expected to die within 10 years of the first detection of the insect. A study in Canada estimated that, over a 30-year time horizon, the potential costs of emerald ash borer to Canadian municipalities could be $524 million or higher. Upon detection of the emerald ash borer, a rapid research and management response, in collaboration with the Canadian Food Inspection Agency, has proven effective in limiting the economic and ecological impact of the insect.

Trade Policy

In addition to the USMCA with the United States and Mexico, Canada has free trade agreements with:

- The European Union through the *Comprehensive Economic and Trade Agreement* (CETA) (2017);
- Ukraine (2017);
- Korea (2015);
- Honduras (2014);
- Panama (2013);
- Jordan (2012);
- Colombia (2011);
- Peru (2009);
- The European Free Trade Association (2009);
- Costa Rica (2002);
- Chile (1997); and,
- Israel (1997, modernized in 2018).

Canada signed the 11-party *Comprehensive and Progressive Agreement for Trans-Pacific Partnership* (CPTPP) in March 2018.

Canada is also negotiating free trade agreements with Mercosur, the Pacific Alliance, India, Japan, Morocco, the Caribbean Community, the Dominican Republic, Singapore, Guatemala, Nicaragua and El Salvador. Canada is engaged in exploratory trade discussions with ASEAN, China, Turkey, the Philippines, and Thailand. Canada is seeking to incorporate forests as part of these agreements.

Phytosanitary Measures

Canadian experts take an active role in international fora related to phytosanitary measures, including: the North American Plant Protection Organization, the International Plant Protection Convention and the International Forest Quarantine Research Group. Phytosanitary scientific research is conducted nationally and coordinated internationally to ensure that import regulations for internationally traded wood commodities are based on the best available science. The resulting phytosanitary tools and protocols help prevent the introduction of harmful pests into Canada and ensure Canada's export products meet international standards, minimizing the risk of spreading pests to other countries.

Within the International Plant Protection Convention, Canada is a global leader and is active in the development of regional and international phytosanitary standards (e.g. wood packaging standard, ISPM 15, and the international movement of wood standard, ISPM 39). The *Canadian Heat Treated Wood Products Certification Program* is the official certification system for the export of wood products to countries requiring heat treatment. The Canadian Wood Packaging Certification Program certifies that the wood packaging materials for export satisfies the international requirement of ISPM 15.

Facilitating Identification of Timber in Trade

Canada's *Wild Animal and Plant Protection and Regulation of International and Interprovincial Trade Act* and its enabling regulation (the *Wild Animal and Plant Trade Regulation*) prohibit the import of timber and timber products into Canada that were taken, possessed, distributed or transported in contravention of any foreign laws.

Canada is interested in the application and development of science to better track forest commodities in trade and, through national and international collaboration, to contribute to global efforts to address illegality in forest harvesting and international forest product trade. Canada held two timber identification workshops in 2018. One focused on applying the latest scientific methods to identify CITES and non-CITES listed tree species and their geographic origins. The other workshop focused on hands-on tropical wood identification and assessing risk of wood shipments. Over the next two years, Canada will fund domestic research to address priorities identified during these workshops.

III. Market Drivers

The Canadian forest sector continues to recover from the global economic downturn of 2008-09. Recovery in the sector has been driven mainly by a strengthening U.S. economy and housing market, as well as demand in Asia, particularly in China, for wood and pulp products. A weakened Canadian dollar since 2013 has also facilitated exports from Canada and supported the profit margins of Canadian producers.

The current wealth of the sector is still reliant on traditional trading partners (the U.S.) and on traditional uses of wood (pulp, paper and softwood lumber). However, the ongoing strength of emerging markets has contributed to significant market diversification over the past decade. While in 2006, 78.2% of forest product exports were destined to the U.S., this percentage has dropped to 68.0% in 2017. The demand for wood products and wood pulp in Asia, and China in particular, has grown significantly over the past decade as economies expand. The share of forest product exports destined for China increased from 3.3% in 2006 to 15.3% in 2017. More specifically, the value of Canadian softwood lumber exports to China has increased by 1566% since 2006. Likewise, demand for Canadian pulp has been strong in China, which has seen exports increase by 221% since 2006. Unlike pulp and wood products, China is not a big market for Canadian paper products since they produce their papers domestically or import mostly from the U.S.

Emerging Opportunities

While many traditional markets for Canadian forest products have matured, there are still opportunities for growth by pursuing developing or emerging markets, and new opportunities in already existing markets. This includes the increased use of wood in non-residential and mid-rise construction, and expanding offshore export opportunities for Canadian wood products in emerging markets. Furthermore, consumer preferences and government priorities to move toward a clean, low-carbon economy are increasing market demand for sustainably produced forest products, such as engineered wood products that store carbon for the lifetime of the building, and bio-products and bioenergy that substitute for fossil fuel-based products. The bioeconomy in Canada is a rapidly emerging sector with innovations and opportunities in new materials, new processes, and more value-added uses from forest fibre.

Challenges

Canada's forest sector faces challenges such as fibre supply availability in some regions and rapidly declining demand for some paper products. In addition, the reliance on exports exposes the sector to risks from currency fluctuations, low cost competitors, trade disputes and protectionism, and long transportation routes/costs.

Energy Prices

In August 2018, the price of West Texas Intermediate oil in North America reached U.S. $67.63 per barrel, significantly higher than lows of roughly U.S. $30 per barrel in 2016.

Natural gas prices remain weak in North America due to an oversupply in the market, largely related to the surge in shale gas production in the U.S. The abundant supply of cheap gas in Canada and the U.S. has led to a new wave of liquefied natural gas (LNG) development with several export projects under construction in the U.S. and a number of others under consideration in Canada. Propane prices have also seen significant declines due to excess supply in the market. Liquid propane prices peaked in February 2014 (CAD $1.06 per litre), then decreased by about half to $0.52 per litre in October 2015. Since then, the price has recovered somewhat to $0.89 in July 2018.

Lower energy costs have had a mixed impact on the competitiveness of the forest industry. For traditional wood products, the lower cost of transportation and oil-based resins (an input material for certain panels and engineered wood products) have improved margins. However, the low cost of natural gas puts many bioenergy producers, as well as pulp and paper mills, running on bioenergy at a pricing disadvantage.

Exchange Rates

The Canadian dollar appreciated against the U.S. dollar between 2009 and 2012, reaching parity in 2012. It decreased over the course of 2013 to U.S. $0.97 and 2014 to U.S. $0.91. The Canadian dollar value fell significantly in 2015 to U.S. $0.78, largely in part to the weakness in oil prices coupled with two Bank of Canada interest rate cuts and a rate hike by the U.S. Federal Reserve. The Canadian dollar strengthened to a high of U.S. $0.82 in September 2017, for the first time since May 2015. The Canadian dollar has weakened since to $0.76 in July 2018. Continued weakness of the Canadian dollar against the U.S. dollar benefits the forest industry, since most Canadian forest products are sold in U.S. dollar terms, while the sector pays most of its costs in Canadian dollars. One negative impact of the Canadian dollar depreciation is that firms with U.S. dollar denominated debt have higher debt servicing costs.

Outside of the U.S. market, the exchange rate has been less beneficial to Canadian forest products' competitiveness. In recent years, other countries' currencies—such as the Russian ruble and the euro—have depreciated against both the Canadian and U.S. dollars. As a result, Canadian producers have had to contend with increased competition in some international markets, such as China.

U.S. Housing Market

The U.S. housing market is a major driver behind softwood lumber and wood panel demand in North America. The U.S. housing market has strengthened considerably from the depths of the 2008 recession, though the recovery continues to be slower than anticipated. In the first 6 months of 2018, annualized starts averaged 1.3 million units. This level of housing starts is still below the long-term (20-year) average of 1.4 million annual starts. Another feature of the housing recovery is a greater proportion of multi-family housing starts, which has averaged about 33% since 2013, up from about 25% between 2007 and 2012. The higher proportion of multi-family housing starts dampens softwood lumber demand, as single-family homes use about three times the amount of structural lumber as multi-family units.

National Building Code Changes

The Canadian Commission on Building and Fire Codes has approved new provisions that allow wood-frame construction up to six storeys. The changes are reflected in the 2015 edition of the *National Building Code of Canada (NBCC)* [28]. The 2015 edition of the NBCC was published in early 2016. NRCan, along with the Canadian Wood Council (CWC), FPInnovations, the National Research Council (NRC), the Governments of British Columbia, Ontario and Quebec, and a number of other provincial and municipal authorities, play a key role in supporting these code changes.

These new provisions are crucial to construct larger and taller wood buildings, and will help to foster greater use of wood in public and private buildings across Canada. For example, since changes facilitating greater wood use for construction were implemented in British Columbia in 2009, over 319 wood mid-rise buildings have been initiated.

NRCan, the CWC, NRC and FPInnovations continue to work together to support code changes that would facilitate the construction of taller and larger wood buildings (up to 12 storeys) targeting the 2020 edition of the NBCC. NRCan has provided funding under the Expanding Markets Opportunities Program and the Green Construction through Wood (GCWood) Program to support the code change process (i.e., developing the code change proposal and facilitating code committee meetings) and research needed to fill knowledge gaps identified by the code committee. The technical information will also be used to support performance-based codes planned for 2025, which will not differentiate between materials, but rather focus on their performance to meet the building code intent.

[28] https://www.nrc-cnrc.gc.ca/eng/publications/codes_centre/2015_national_building_code.html

IV. Developments in Forest Products Markets Sectors

Bioenergy

In 2016, bioenergy accounted for the second largest share of renewable energy production (heat and electricity) after hydroelectricity in Canada. The Canadian forest sector provides over 80% of biomass-based energy in Canada, mainly for cogeneration of heat and power for use in industrial processes and sale to third- parties.

Bioenergy accounted for 56% of forest sector energy use in 2014, up from 49% in 2000. Between 2004 and 2014, the sector has also reduced its energy consumption by more than 35%. Cleaner fuels and more energy efficient processes have helped the forest sector to reduce its GHG emissions by 49% during the period.

In 2016, the biomass actual capacity in the pulp and paper facilities was 3,427 MW for the production of heat and 1,384 MW for the production of power. Independent power producers are also using biomass as a fuel: this sector has a production capacity of 622 MW for power and 188 MW for heat.

The wood pellets industry is a growing subsector of the Canadian forest industry. Canada's wood pellet production capacity has grown from 500,000 tonnes in 2002 to 3.41 million tonnes in 2016. Exports represented about 82% of the total production in 2016. The UK is the main destination for Canadian exports with a total of 1.7 million tonnes exported in 2016 (70% of Canada's wood pellet exports). Canadian wood pellets are sustainably produced: approximately 90% of wood pellet production is from mill residues. The domestic market is still small (estimated at a maximum of 616,750 tonnes in 2016). In the short and medium terms, demand for Canadian wood pellets will likely be affected by the Federal Government 2030 coal phase-out plan, by the content of the new European Union Renewable Energy Directive (2021-2030) and by emerging markets in Japan and South Korea. Potential impacts from political changes in the United States and Brexit in the European Union are difficult to predict.

Developing liquid fuels from biomass is an important focus for Canada, including ethanol, biodiesel, and other wood-based biofuels. Since 2010, the Federal Fuel Regulation has required a minimum of 5% ethanol in gasoline. Provincial mandates may exceed the 5% minimum requirement. Since 2011, 2% biodiesel content in diesel has been required (unlike in the U.S., there is no separate cellulosic biofuel element). Canada also has a Renewable Fuel Standard, which will provide another opportunity for the development and use of wood-based biofuels.

Biojet fuel could play an important role in reducing GHG emissions in Canada. In 2016, Canada became a signatory to the International Civil Aviation Organization (ICAO) Carbon Offsetting Reduction Scheme for International Aviation (CORSIA). The agreement requires the aviation industry to become carbon neutral by 2020 and reduce total carbon emissions by 50% by 2050. The forest sector can contribute to GHG reduction efforts through innovation in clean energy as well as by providing a source of emissions reductions/removals for trading in compliance markets such as ICAO's CORSIA.

Value-Added Wood Products[29]

In 2017, Canada exported about $5.1B of value-added products, mainly to the U.S. (95%). Exports of value-added wood products increased 6% compared to the previous year.

Sawn Softwood (also known as Softwood Lumber)

In 2017, Canada produced 48.2 million cubic metres[31] of sawn softwood, a 29% increase compared to 2010. However, production has not yet reached pre-recession levels. North American sawn softwood prices were very strong in 2017 and into the first half of 2018 due to improved demand, trade barriers, supply-side issues, and market conditions. However, American duties on Canadian sawn softwood brought volatility to the market, which is expected to continue.

The U.S. remains the primary destination for Canadian sawn softwood exports, and U.S. demand for Canadian softwood lumber is rebounding thanks to improvements in the housing market. In 2017, Canada exported 24.1 million cubic metres[31] of sawn softwood to the U.S., a decrease of 5% over 2016. On November 1, 2017, the U.S. Department of Commerce issued final countervailing and anti-dumping duty determinations on certain softwood lumber products from Canada. These duties have caused instability in softwood lumber prices and export levels, and are expected to continue to do so, especially as Canada brings challenges through the WTO and NAFTA.

China is a significant offshore market for Canadian sawn softwood products and exports have increased tremendously over the last decade. From 2006 to 2016, sawn softwood exports to China increased by 1675% on a volume basis. However, in 2016, the Canadian sawn softwood export volume to China decreased by 10%, which was followed by a further decline of 6% compared to 2016, and in the first six months of 2018, exports further decreased by 19% compared to the same period in 2017. Slower growth in China, increased competition from Russian and European producers, and high North American prices have contributed to the decline of Canada's sawn softwood market share in China. Nonetheless, with continued urbanization and economic growth, as well as increasing environmental conscientiousness, China will likely remain a key market for sawn softwood in the years to come.

Oriented Strand Board (OSB)

OSB represents 82% of Canada's total structural panel exports. Most of this (94%) is destined for the U.S., where it is mainly used in housing. OSB exports suffered during the downturn in the U.S. housing market that began in 2008, but have grown as the housing market picked up. Due to increased demand, the price of OSB rose 15% in 2018 relative to the previous year.

[29] In Canada, value-added wood products include wood windows and doors, factory-built homes, millwork and joinery products, shingles and shakes, containers and pallets, wooden furniture, engineered wood products such as I-beams and roof trusses, and other structural products.
[31] Figures above have been adjusted to reflect actual volumes as opposed to nominal.

Paper and Paperboard

The total value of Canadian paper and paperboard products exports declined in both 2016 and 2017 by 3.8% and 1.7%, respectively. Aside from falling demand for newsprint and other graphic paper as electronic media becomes more common, U.S. duties on paper and paper products have negatively affected Canadian paper exports. In July 2015, the U.S. Department of Commerce imposed tariffs on Canadian supercalendered paper based on allegations that Canadian exporters receive subsidies (this trade dispute was resolved in 2018). In August 2017, a petition was filed with the U.S. Department of Commerce requesting anti-dumping and countervailing duties on Canadian exports of uncoated groundwood (UGW) paper, which includes newsprint. On August 2, 2018, final countervailing and anti-dumping duties were announced. On August 29, 2018, U.S. International Trade Commission determined that U.S. paper producers are not materially injured by Canadian imports and that no antidumping or countervailing duty orders would be issued against Canadian UGW.

The outlook for packaging paper and household and sanitary papers is positive. Given the decline in newsprint and other graphic paper demand around the world, a large number of producers are converting from graphic paper to packaging, tissue and specialities. This has increased competition and depressed growth potential for new entrants in these sub-segments.

Wood Pulp

In 2017, the total value of Canadian wood pulp exports increased 9% compared to the previous year. In 2012, China surpassed the U.S. to become Canada's number one pulp export market. Although Canadian wood pulp exports to China decreased by 5% in 2017, they still account for 46% of Canadian wood pulp exports. Wood pulp exports to the U.S. increased 0.1% in 2017, accounting for 31% of Canadian wood pulp exports overall.

The Chinese market is expected to keep growing, fuelled by two main factors. First, China has greatly expanded its paper capacity. Second, China has significantly reduced its domestic non-wood pulp capacity (e.g. reed, bamboo and bagasse), causing Chinese paper producers to further source pulp supplies from international markets.

However, other low-cost foreign suppliers are challenging Canadian wood pulp exports to China. For instance, Southern Bleached Softwood Kraft (SBSK) and Bleached Eucalyptus Kraft (BEK) are partial substitutes for Canadian Northern Bleached Softwood Kraft (NBSK) in some (primarily Asian) paper markets. While products requiring premium reinforced pulp cannot utilize SBSK or BEK as a substitute, producers of non-premium products may be willing to sacrifice some quality and substitute SBSK or BEK if the price differential to NBSK is sufficiently large. SBSK and BEK substitution for NBSK in China may increase for uses that do not require premium strength. In addition, new NBSK capacity coming from Europe and Russia are challenging Canada's position in China's pulp sector.

Canadian dissolving pulp exports grew significantly in the past decade but fell substantially in recent years. China fell from Canada's top market for dissolving pulp in 2015 to third today. Exports have been on a downward trend since China imposed anti-dumping duties, reducing its share by 65% between 2014 and 2017. Conversely, exports to India, Indonesia and Thailand

have all been growing. By value, India was the primary market for Canadian dissolving pulp exports (28%) in 2017 followed by Indonesia (18%), China (17%), and Thailand (13%).

Overall, low-cost producers, new capacity in South America, Europe and Asia, and trade disputes are all affecting the Canadian pulp sector, challenging Canadian competitiveness and increasing the need for market diversification (new products as well as new countries).

Conclusion

Increasingly diverse and resilient, the Canadian forest industry has weathered some serious storms of late, which have compelled it to evolve. Today, non-traditional forest products have become more important to the industry and are fostering new clean-tech development opportunities. Forestry is leading the way in the burgeoning bioeconomy; helping to reduce greenhouse gas emissions and transition Canada to a low-carbon economy. In addition, the popularity of building materials that come from renewable resources such as wood is increasing worldwide, providing new opportunities for Canadian wood products. This, in turn, increases Canada's international competitiveness in emerging markets such as Asia. Forestry continues to be an important driver of economic growth and social wellbeing in Canada, and the forest sector is presenting more and more opportunities for Indigenous communities to manage their traditional forest land while also creating jobs.

The Government of Canada will continue to demonstrate environmental leadership, support the competitiveness of its forest sector, and work to optimize the value of its forests. Canada's vision is for an innovative, globally competitive forest sector—rooted in sustainable forests—creating prosperity for Canadians.

Appendix

Statistics and Prospects

*** Figures for 2018 and 2019 are estimated/forecasted**

Sawn Softwood (000 Cubic Metres)

	2016	**2017**	**2018***	**2019***
Production	48,161	48,159	48,699	49,812
Apparent consumption	16,188	17,825	17,967	17,603
Imports	662	741	767	759
Exports	32,634	31,076	31,499	32,968

Veneer sheets (000 Cubic Metres)

	2016	**2017**	**2018***	**2019***
Production	670	760	770	773
Apparent consumption	167	163	175	180
Imports	70	72	76	67
Exports	573	670	672	660

Sawn Hardwood (000 Cubic Metres)

	2016	**2017**	**2018***	**2019***
Production	1,563	1,336	1,372	1,406
Apparent consumption	1,630	1,400	1,444	1,436
Imports	596	645	658	647
Exports	529	581	586	617

Oriented Strandboard (OSB) (000 Cubic Metres)

	2016	**2017**	**2018***	**2019***
Production	7,002	7,153	7,380	7,995
Apparent consumption	1,696	1,363	1,079	1,337
Imports	132	147	90	89
Exports	5,438	5,937	6,391	6,747

Plywood (000 Cubic Metres)

	2016	**2017**	**2018***	**2019***
Production	2,205	2,253	2,284	2,293
Apparent consumption	2,807	3,325	3,332	3,203
Imports	1,228	1,742	1,838	1,616
Exports	625	670	791	707

Particleboard (including OSB) (000 Cubic Metres)

	2016	**2017**	**2018***	**2019***
Production	8,763	8,898	9,120	9,741
Apparent consumption	3,104	2,825	2,594	2,863
Imports	722	751	761	736
Exports	6,382	6,824	7,287	7,615

Medium density/high density (MDF/HDF) (000 Cubic Metres)

	2016	**2017**	**2018***	**2019***
Production	955	1,038	1,095	1,088
Apparent consumption	1,130	1,035	1,044	1,030
Imports	851	617	613	576
Exports	676	610	665	634

Fibreboard (000 Cubic Metres)

	2016	**2017**	**2018***	**2019***
Production	1,145	1,218	1,285	1,278
Apparent consumption	1,293	1,192	1,231	1,206
Imports	1,017	808	803	755
Exports	870	834	858	827

Wood Pulp (000 tonnes)

	2016	**2017**	**2018***	**2019***
Production	17,037	16,839	16,710	16,651
Apparent consumption	7,446	7,450	7,137	6,992
Imports	313	522	425	382
Exports	9,904	9,911	9,998	10,042

Paper and Paperboard (000 tonnes)

	2016	**2017**	**2018***	**2019***
Production	9,911	9,867	9,785	9,753
Apparent consumption	5,500	5,572	5,473	5,415
Imports	2,861	2,916	3,020	3,029
Exports	7,272	7,211	7,331	7,366

n/a – Data are unavailable
Figures in grey shading and blue font indicate revised 2017 data

Note 1: Figures above have been adjusted to reflect actual volumes as opposed to nominal. Figures are consistent with those provided for the *2018 UNECE Timber Committee Forecasts (Forest Products).*