

MARKET INTELLIGENCE REPORT 2020

Preparing for Growth Through a Slowdown



December 2019



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Managing Director*

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Message from the MANAGING DIRECTOR



TOBY MALLINDER
Managing Director

READY TO GROW THROUGH A SLOWDOWN

A slew of multibillion-dollar private and public sector megaprojects – as well as near record immigration – will help sustain construction activity in Canada amidst an anticipated global slowdown. The most substantial megaproject – LNG Canada's \$40 billion development in BC- is the largest single private sector investment in Canada's history.

The mega-projects range across sectors from energy, petrochemicals and commercial development to mining, and transportation and social infrastructure – and stretch from coast to coast.



\$40 Billion

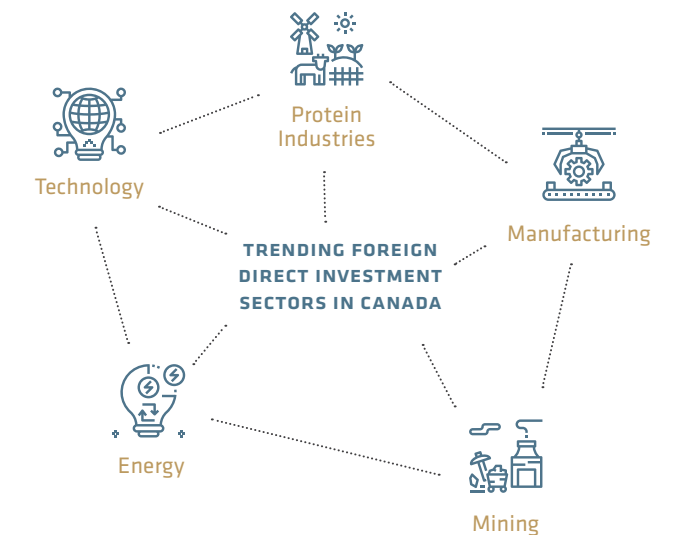
LNG Canada Development

LARGEST PRIVATE SECTOR INVESTMENT
IN CANADA'S HISTORY

RISING FOREIGN DIRECT INVESTMENT SUPPORTS SUSTAINED GROWTH

Collectively these projects reflect the country's underlying economic strength and growing investment appeal. In 2018 – and continuing into early 2019 – Canada recorded the highest foreign direct investment in four years. Even as foreign investment in other developed countries declined, it continued to increase in Canada.

The current influx of capital is energizing growth not only in energy and mining mega-projects, but also in advanced manufacturing, technology, and protein industries, driving demand for new industrial and logistics facilities, and office space.



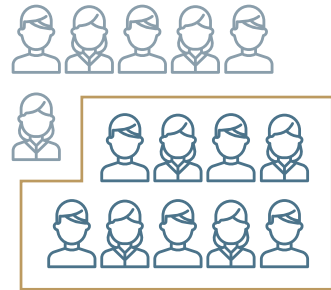
IMMIGRATION SUSTAINS HOUSING DEMAND

The influx of people – more than 300,000 a year in recent years – is also a growth driver. Nearly 60 per cent are highly skilled, and a growing number are in tech sectors that are strengthening Canada’s emergence as a global leader in game-changing fields, such as Artificial Intelligence.

High immigration is also helping to sustain demand in the housing sector. After a decline in 2019 following two years of exceptional growth, housing starts will see moderate growth for 2020, noting decline in some locations when comparing year-over-year figures.

Shifts in demographics as baby boomers age are creating new opportunity in seniors’ housing and purpose-built rentals, and continuing affordability issues are driving innovation and expansion in modular housing (Page 56) and Transit Oriented Development (Page 48). Climate change challenges also continue to spur investment in renewables and energy efficiency (Page 52) and resilient infrastructure.

+300,000 people
IMMIGRATE TO CANADA/YEAR



60% are highly skilled



Technical Advisor of the Year Gold Award 2019

P3 Awards, New York



Great Place to Work Certification

May 2019 to May 2020



#1 Lenders' Technical Advisor Globally

Infrastructure Deals, PPP Projects, by deal count & value, 2019

RECOGNITION OF EXPERTISE IN INFRASTRUCTURE DEVELOPMENT

The success of the PPP procurement model in developing infrastructure in Canada has led to the Canadian model increasingly being adopted worldwide and adapted for local use. With experience on more than 220 PPP projects since 2004, BTY has been a leader in advising on PPPs across sectors – and borders. We now have more than 30 active PPP projects in seven countries – and we are now expanding into Latin America.

Our expertise was recently recognized at the P3 Awards in New York, one of the largest events highlighting the best in the industry. BTY was awarded Gold as the Technical Advisor of the Year for 2019. Our award-winning international team of PPP & Infrastructure Advisory experts shares emerging trends in this investment space on page 42.

This expertise has been long in the making, rooted in our entrepreneurial culture and leadership development program that identifies top talent and gives them opportunities – and mentorship and training – to grow their skills and careers.

The focus on creating an environment where people can grow has also won official recognition. In 2019, BTY became the first and only professional services firm in our class to receive the Great Place to Work certification in North America.

IDENTIFYING OPPORTUNITY AND ADAPTING TO CHANGE

Another strong BTY focus over our first four decades has been identifying opportunities for growth in the industry at large. We have seen companies adapt and grow through multiple swings in the economy. That experience leads us to believe that the industry will continue to innovate and evolve – and be ready to grow through a slowdown.



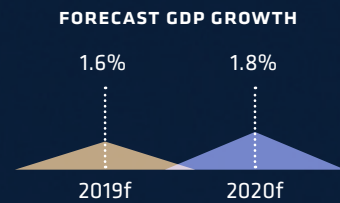
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CANADA'S *Construction Outlook 2020*



OVERVIEW



Multiple factors are expected to keep construction activity strong across the country

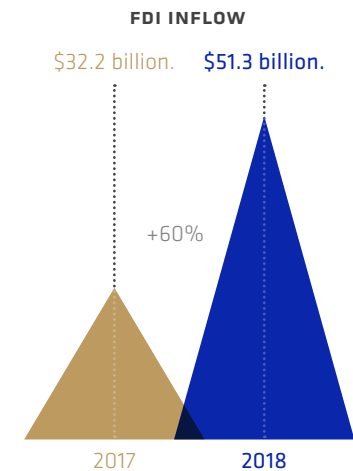
Mega projects in the energy and mining sectors, office and industrial building booms in Canada's three largest cities, and sustained investment in transportation infrastructure are all expected to help ensure healthy workloads in conjunction with limited growth in residential construction.

IMMIGRATION TARGETS¹
 2019: 330,800
 2020: 341,000
 2021: 350,000

FOREIGN DIRECT INVESTMENT
 60% increase from 2017 to 2018

HOUSING STARTS FORECAST
 2019:
 High: 196,000
 Low: 188,500

2020:
 High: 204,300
 Low: 194,000



FOREIGN DIRECT INVESTMENT BOOSTS ECONOMY

Part of the reason for the healthy activity is the increase in foreign direct investment (FDI) in Canada, which continued at a record pace in the first half of 2019 after a 60 per cent increase in 2018.

FDI jumped from \$32.2 billion in 2017 to \$51.3 billion in 2018 even as global capital flows into developed countries declined by 40 per cent. In fact, Canada ranks third in the world as a desirable place to invest (after the U.S. and Germany) in the 2019 A.T. Kearney Foreign Direct Investment Confidence Index.

Much of the new investment has gone into sectors beyond the traditional mainstays of energy and mining. Manufacturing has seen a 450 per cent increase in FDI since 2016, and the technology sector is experiencing strong growth from global companies investing in Canada.

This is driving demand for new office space and e-commerce logistics facilities, as well as attracting tech talent from around the world who are drawn to live in Canada's openly welcoming multi-cultural cities.

CONTINUING HIGH IMMIGRATION LEVELS DRIVE POPULATION GROWTH

Canada's appeal as an immigration destination is easily filling record government targets well above 330,000 per year. This is also playing a part in sustaining strong population growth, which supports demand for new homes, schools, hospitals, and transportation, transit and water and wastewater infrastructure. Immigrants also account for more than 20 per cent of the housing market.

LNG CANADA DEVELOPMENT COULD BE FIRST OF SEVERAL

LNG Canada could kick start an energy industry expansion, with 18 LNG export facilities proposed – 13 in British Columbia, 2 in Quebec and 3 in Nova Scotia.

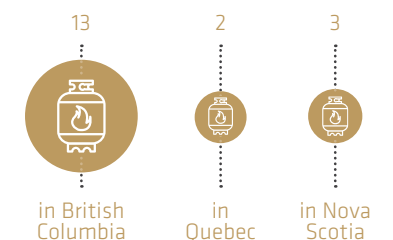
Overall, there are more than 400 projects currently under construction or planned in the resource sector, representing nearly \$600 billion in actual and potential capital investment. Energy projects accounted for 87 per cent of the total value of major projects in that inventory in 2018.

Against this backdrop, the Bank of Canada has maintained its benchmark interest rate through most of 2019 at 1.75% after several increases in 2018.

A higher rate would help dampen inflation, which would also serve to restrain overall construction escalation. The Bank expects the economy to grow by 1.5 per cent in 2019 and 1.7 per cent in 2020. Major private sector forecasters differ only slightly, projecting increases of 1.6 per cent in 2019 and 1.8 per cent in 2020.

Sources: Government of Canada, CMHC, Financial Post, Natural Resources Canada, Bank of Canada

PROPOSED # OF LNG PROJECTS

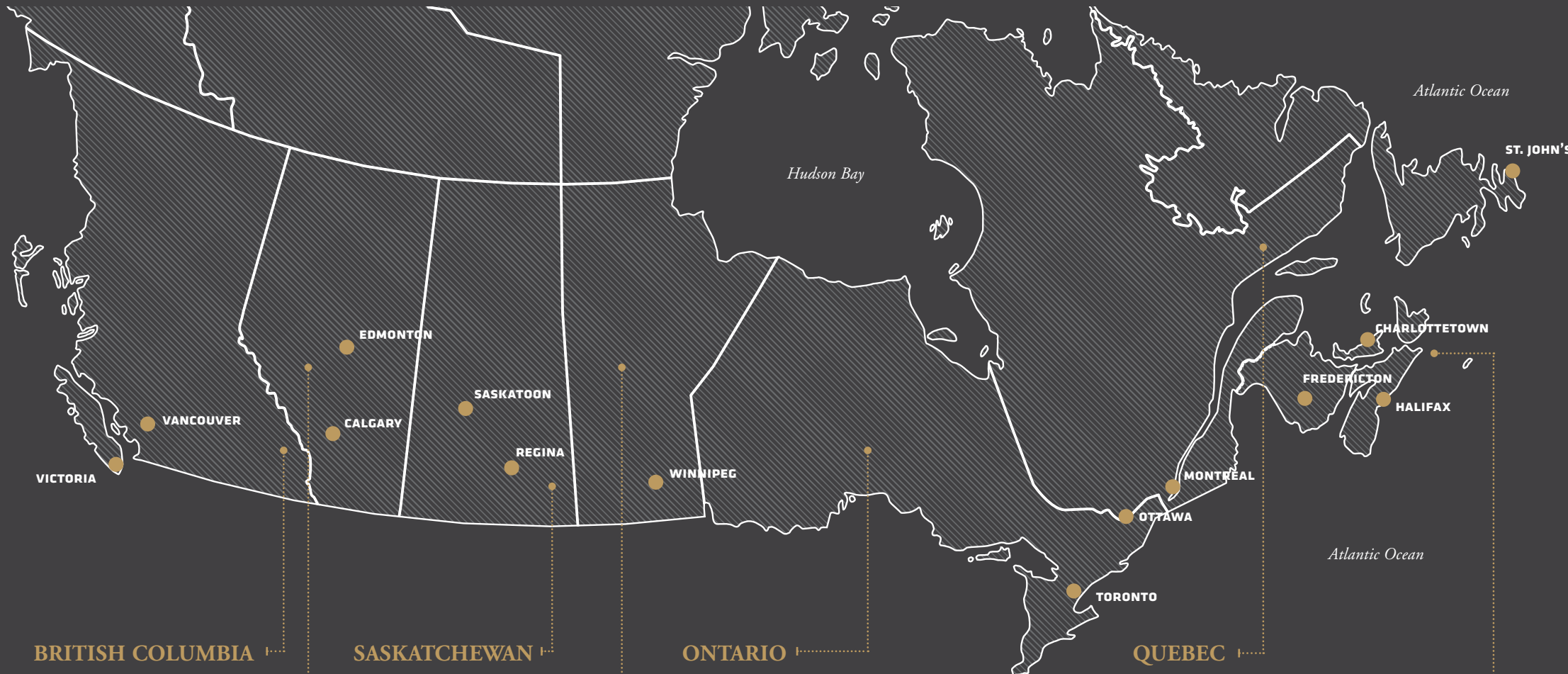


¹Source: Immigration, Refugees and Citizenship Canada

2020 OUTLOOK BY PROVINCE

CANADIAN ESCALATION FORECAST

Ontario	6% to 7%	Manitoba	1% to 2%
British Columbia	5% to 6%	Quebec	4% to 5%
Alberta	1% to 2%	Atlantic Provinces	0% to 1%
Saskatchewan	1% to 2%		



BRITISH COLUMBIA

Massive energy and transportation projects as well as a new wave of office and commercial activity will complement a modest increase in residential building.

ALBERTA

Easing of oil production curtailment, higher oil prices and increased rail transport will help bolster economy as population growth supports a slight increase in residential construction.

SASKATCHEWAN

Steady population growth driven by international immigration will help sustain residential building as investment in energy and extraction sector projects wanes.

MANITOBA

Major investments in energy, food and wastewater treatment will help offset the completion of mega hydroelectric projects and anticipated slower growth in home building.

ONTARIO

Strength in ICI as well as mega infrastructure projects will see Ontario continue to have healthy construction levels even with slower rate of growth in home construction. Key urban centres will continue to experience high cost escalation.

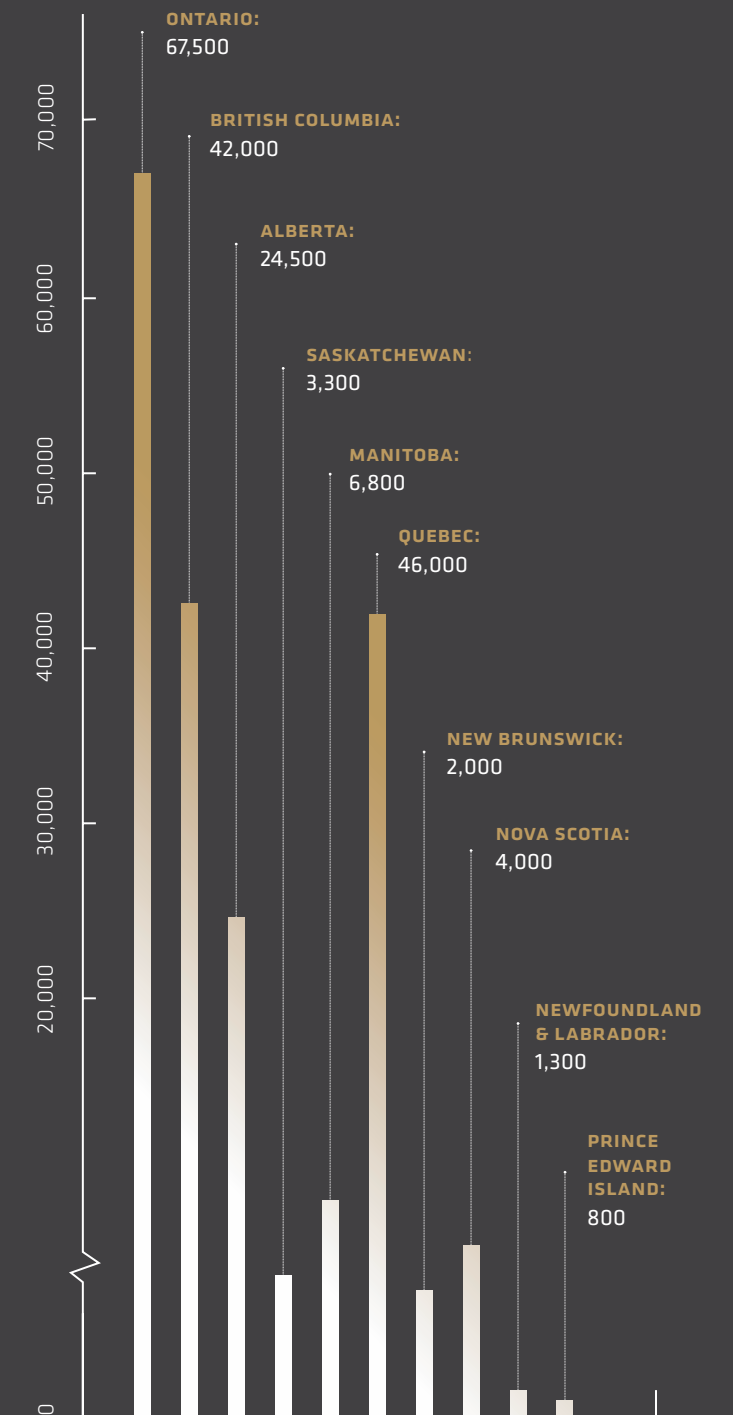
QUEBEC

A strong economy, balanced books with sustained infrastructure spending and strength in ICI are expected to balance a slight decrease in Quebec housing starts.

ATLANTIC PROVINCES

Nova Scotia, PEI and Newfoundland and Labrador will all see healthier construction levels, with higher oil prices, investment and international immigration being prime factors driving growth. In New Brunswick, activity will moderate after a couple of strong years and tighter government spending.

2020 FORECAST HOUSING STARTS



ONTARIO



ICI and infrastructure complement sustained growth in residential building

Ontario can expect to see continued healthy construction activity, particularly in the industrial and commercial sectors, and transportation and social infrastructure.

Expanding e-commerce is driving demand for new logistics centres and Toronto office construction remains strong with several newly announced major developments, including a \$3.5 billion mixed-use development near the CN Tower with two office towers, rental apartments and retail.

With vacancy rates at about 1 per cent in mid-2019, developers in the GTA have about 9.4 million square feet of new office projects under way in 10 to 15 major projects, most of which will be completed between 2020 and 2021.

Infrastructure Ontario has unveiled a pipeline with \$65 billion worth of projects, including multiple transit projects in Toronto and 16 new hospitals across the province. It is understood that majority

of the newly announced projects will not hit the ground until 2021.

Strong population growth projected at 1.8 per cent in 2019 and 1.7 per cent in 2020 will help sustain demand for new residential construction despite continuing affordability challenges. Immigration supports that growth; some 40 per cent of new immigrants to Canada settle in Ontario.

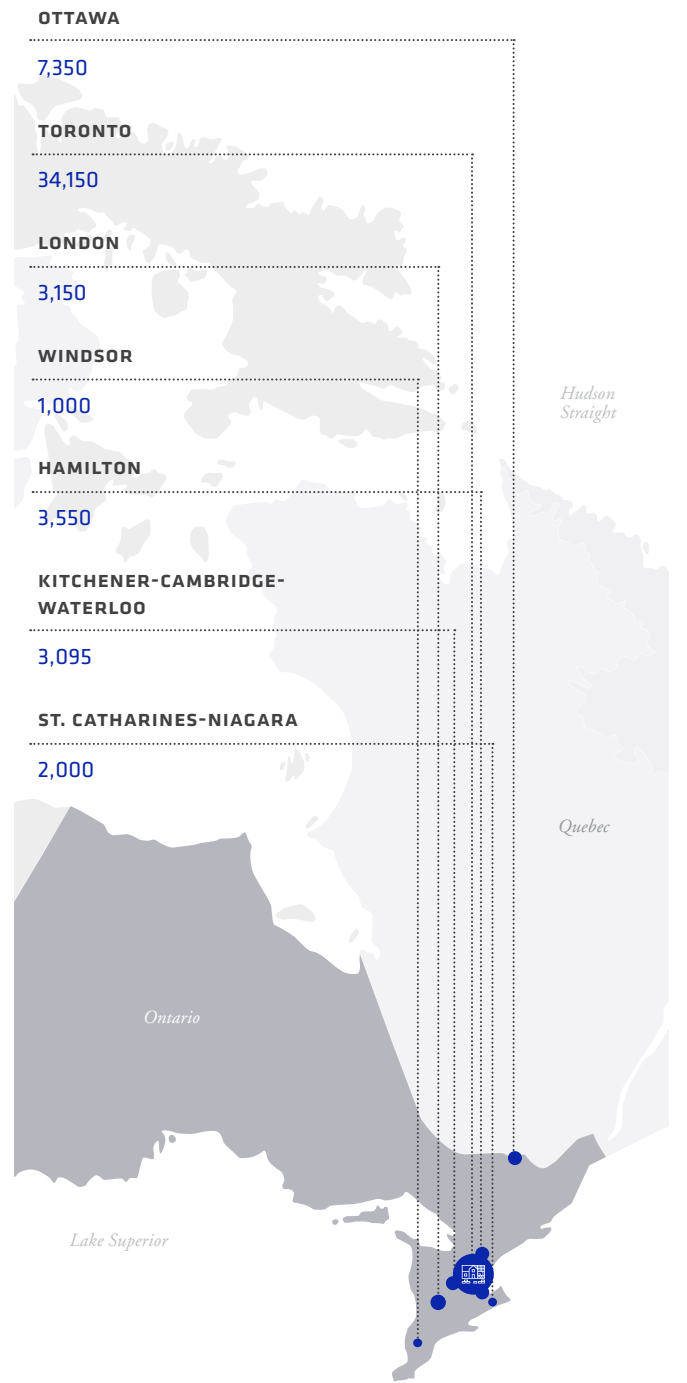
In addition to the GTHA and Ottawa, Southwestern Ontario is also expected to see higher rates of construction cost escalation due to increased volumes of activity in key sectors in conjunction with tight labour supply.



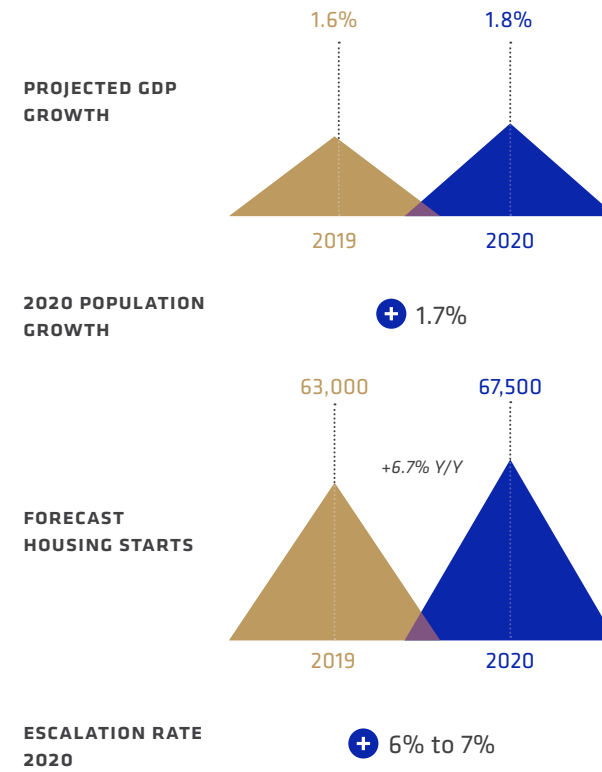
40%

OF NEW IMMIGRANTS TO CANADA SETTLE IN ONTARIO

HOUSING STARTS BY CMA



ONTARIO OUTLOOK



Sources: Conference Board of Canada, Scotiabank, Royal Bank, BMO, Statistics Canada

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BRITISH COLUMBIA

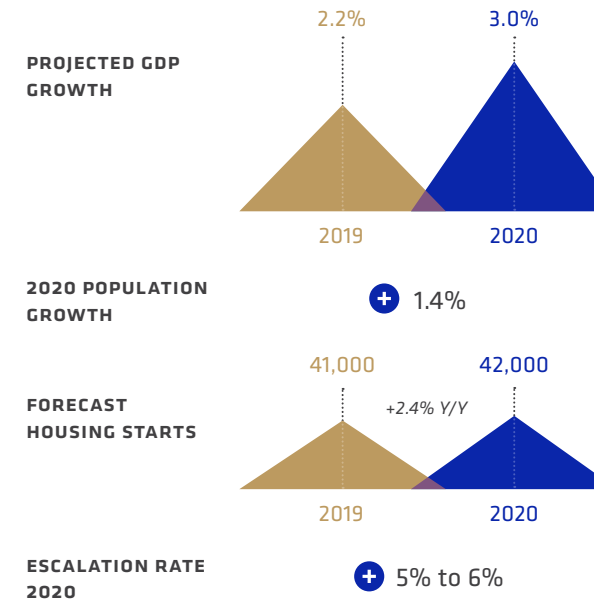


Mega projects balance slower growth in housing starts

The largest private sector investment in Canadian history – the \$40-billion-dollar LNG Canada's liquefied natural gas project in Kitimat, BC – leads a string of infrastructure projects that will help keep workloads healthy and strain an already tight labour supply.



BRITISH COLUMBIA OUTLOOK



Sources: Conference Board of Canada, Scotiabank, Royal Bank, BMO, Statistics Canada

HOUSING STARTS BY CMA



In addition to the ongoing construction of the Site C Dam, other projects include pipelines associated with the LNG project, the twinning of the TransMountain Pipeline, the Patullo Bridge replacement, extension of the subway line in the Vancouver Broadway corridor, and the expansion of Vancouver International Airport. All are stressing an already tight labour market and contributing to price escalation.

BC will also see strong immigration-driven population growth projected at 1.3 per cent in 2019 and 1.4 per cent in 2020. That will help sustain demand for housing, which is expected to see a slight increase in new builds after years of high growth – as well as continuing affordability challenges.

Vancouver is experiencing another wave of investment in retail complex buildings and office tower construction, with multiple properties under construction for completion in 2022 and 2023.

Vancouver Island's two largest urban centres, Victoria and Nanaimo, are experiencing sustained building booms with record numbers of building permits issued early in 2019.

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PROVINCIAL SNAPSHOTS

ALBERTA



Stabilizing energy sector to support modest recovery

Despite spending reductions and tax increases in the provincial budget and continuing flat capital investment in the oil sector, the easing of oil production curtailment – and resulting higher prices – along with anticipated increased oil transportation by rail are expected to help Alberta achieve higher GDP growth of 1.7 per cent in 2020 after a weak 2019.

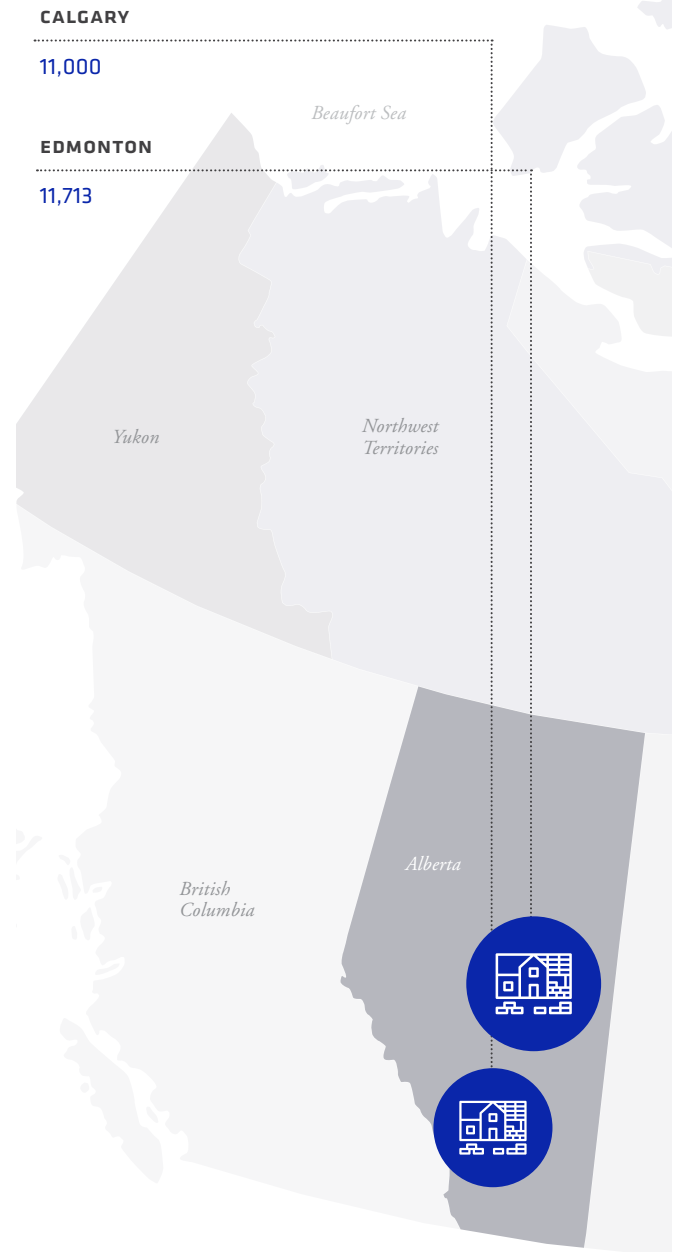
Bright spots in the oil sector include four new petrochemical processing complexes valued collectively at more than \$10 billion, and the resumption of construction on the \$7.4 billion TransMountain pipeline. Growth in investment in renewables – in solar in particular – is set to expand as international power producers invest in the province. Alberta has more than 10 gigawatts of renewable energy projects in the pipeline.

These developments, along with oil prices expected to range between \$55 and \$60 per barrel, and stable residential construction are projected to provide support for a modest recovery.

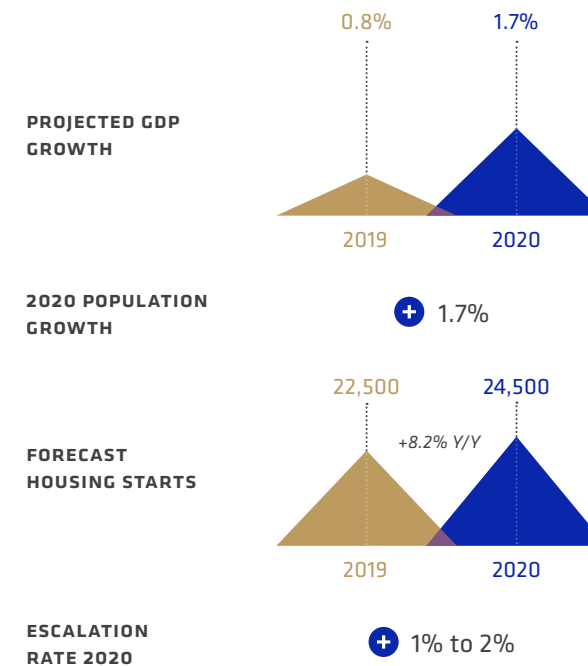
Stability in demand for housing is due in part to the province's population growth. The average annual growth rate is projected to be 1.7 per cent between 2018 and 2022, compared to 1.3 per cent between 2014-2018 period.

Despite high-profile projects such as the Cancer Centre and BMO centre, and its growth as a logistics hub, Calgary's construction industry continues to face challenges, especially in the office sector. Edmonton has seen continued strength in downtown tower development as well as logistics centres. The LRT projects underway in both cities, however, could face cancellation by the belt tightening provincial government.

HOUSING STARTS BY CMA



ALBERTA OUTLOOK



Sources: Alberta Oil & Gas Quarterly Summer 2019, Financial Post, Conference Board of Canada, Scotiabank, TD, Royal Bank, BMO, Statistics Canada

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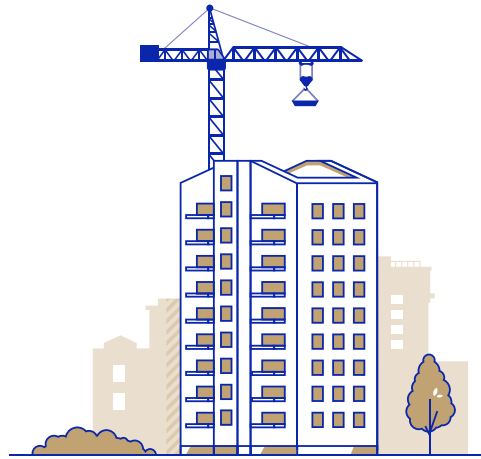


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SASKATCHEWAN



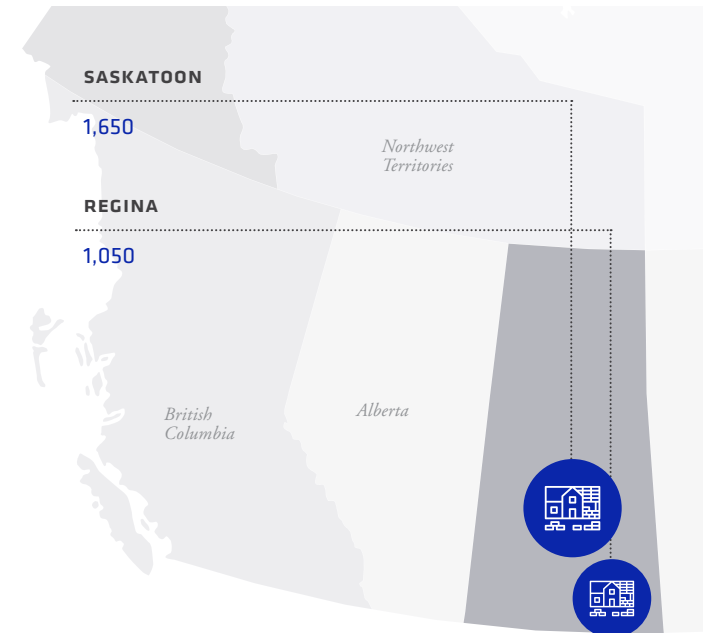
Residential building expected to see moderate increase

Slow but steady population growth driven by net international migration as well as natural increase is helping sustain demand for new housing in Saskatchewan as expansion in other sectors stalls.

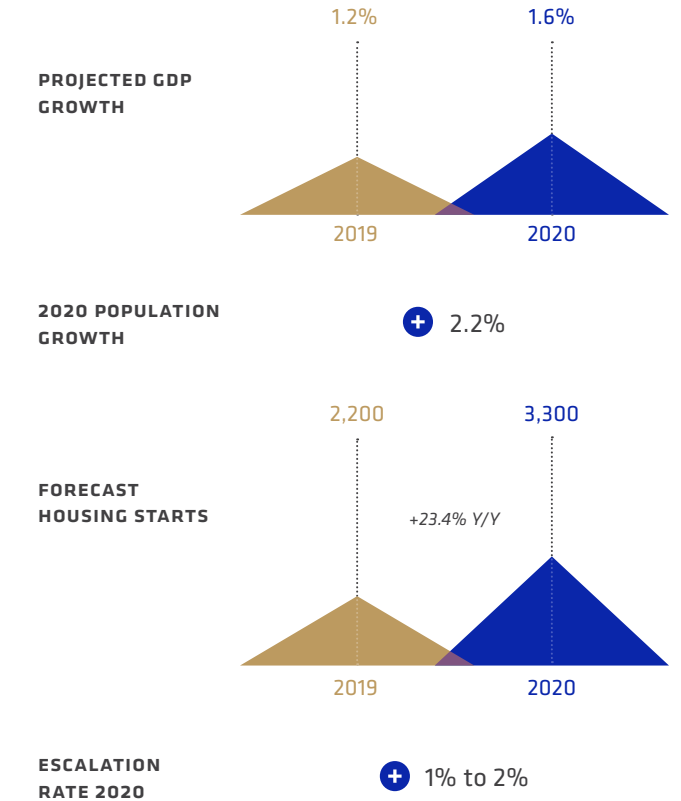
As of mid-2019, the province has enjoyed more than 53 consecutive quarters of population growth.

The provincial government is maintaining its planned spending with crown corporations, including SaskPower, SaskTel and SaskEnergy set to invest more than \$1.6 billion in infrastructure in 2019-20.

HOUSING STARTS BY CMA



SASKATCHEWAN OUTLOOK



Sources: Deloitte, Conference Board of Canada, Scotiabank, Royal Bank, BMO, Statistics Canada

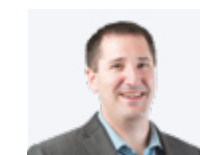


Transportation will account for \$457 million, while \$230 million is earmarked for municipal infrastructure, \$103 million for health facilities, and \$95 million for K-12 education.

Leading private sector projects include the \$2.8 billion Muskowekwan Potash project, and on-going construction on a three-building, \$300-million residential and commercial development in Saskatoon, scheduled for completion in 2021.

Construction on the city's newly approved bus rapid transit system is expected to start in 2022.

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PROVINCIAL
SNAPSHOTS

MANITTOBA



New investments offset completion of major energy projects

Construction has begun on the newly approved \$453 million Manitoba-Minnesota Transmission Project, which is expected to help offset the completion of three multi-year pipeline and hydroelectric projects in 2019 and 2020. The line will expand electricity exports by linking generating stations in northern Manitoba with the newly completed Bipole III transmission line across the U.S. border.

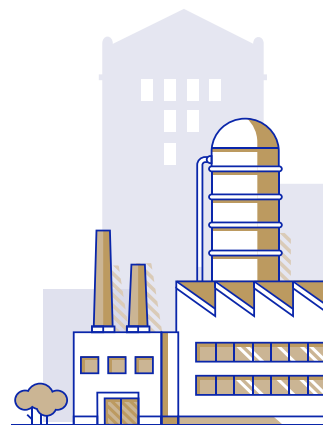
Major new investments in Manitoba's food industry will also help sustain construction activity.

The world's largest pea processing plant, valued at \$450 million, is under construction with operations scheduled to start by the end of 2020.

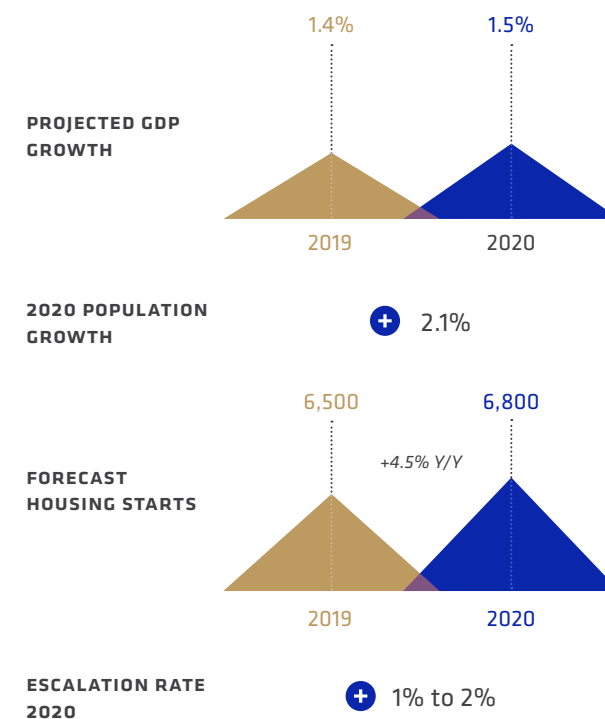
A second \$65 million pea plant and a \$94 million oat processing plant are also in the works.

A long-awaited upgrade to Winnipeg's sewage treatment system is slated to start in 2020 for a 2025 completion. The estimated cost of \$1.63 billion will make it the most expensive capital-construction job in the City's history.

Winnipeg is also seeing an uptick in warehousing. The Winnipeg Airports Authority's 13,000 square-metre logistics facility leads the way.

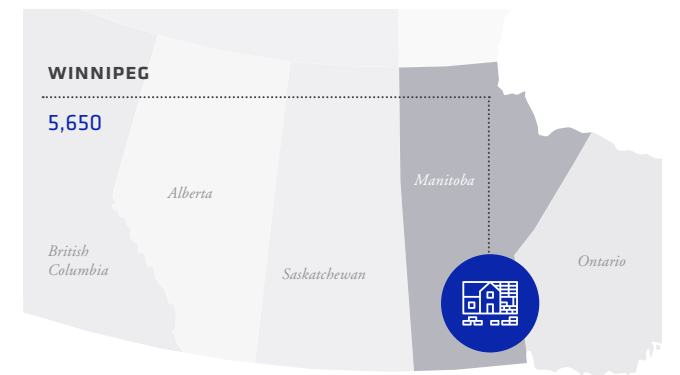


MANITOBA OUTLOOK



Sources: Conference Board of Canada, Scotiabank, Royal Bank, BMO, Statistics Canada

HOUSING STARTS BY CMA



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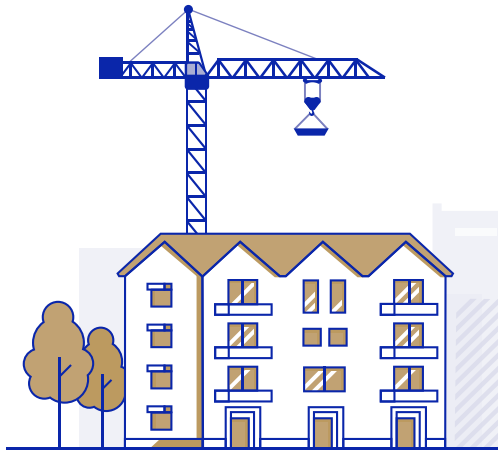


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QUEBEC

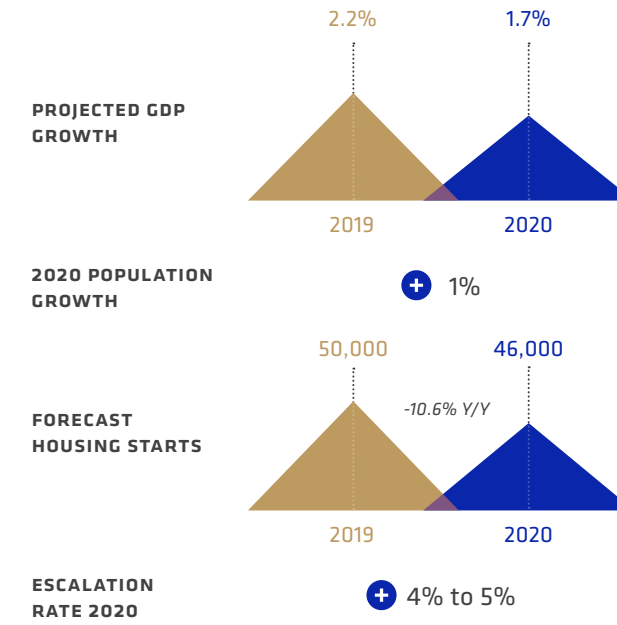


Strong economy continues to support construction across sectors

Quebec's continued economic strength, and the provincial government's balanced budgets and sustained commitment to infrastructure, will help keep construction activity healthy across sectors as the province's growth spurt over the past two years moderates.

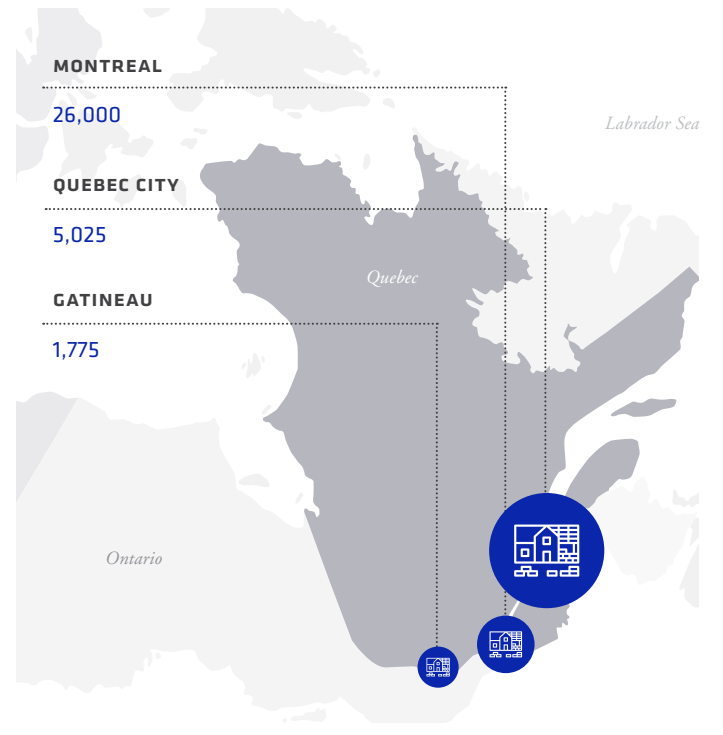
Led by a \$700 million mixed-use project that broke ground in September, Montreal's condo building boom is expected to continue. Other growth areas, including seniors' housing and multi-family projects, will sustain residential construction even as overall housing starts are expected to decline.

QUEBEC OUTLOOK



Sources: Conference Board of Canada, Scotiabank, Royal Bank, BMO, Statistics Canada

HOUSING STARTS BY CMA



Low vacancy rates and strong international demand, especially from the tech sector, continue to spur office construction, with an estimated 3.2 million square-feet under construction in Montreal in mid-2019.

Both Montreal and Quebec City are seeing sustained demand for new warehousing and logistics facilities. The Quebec City area also has a \$550 million commercial and residential development and a new hospital complex.

Government infrastructure spending of \$10.4 billion in fiscal 2019/2020 will be followed up by an average of about \$11 billion a year over the next 10 fiscal years. Major transportation projects include the \$4.2 billion Champlain Bridge, the \$6.3 billion REM integrated light-rail network, and a \$2.5 billion upgrade to Pierre Elliott Trudeau International Airport. Social infrastructure spending includes \$1.5 billion for a new hospital in suburban Montreal.

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PROVINCIAL
SNAPSHOTS

ATLANTIC CANADA



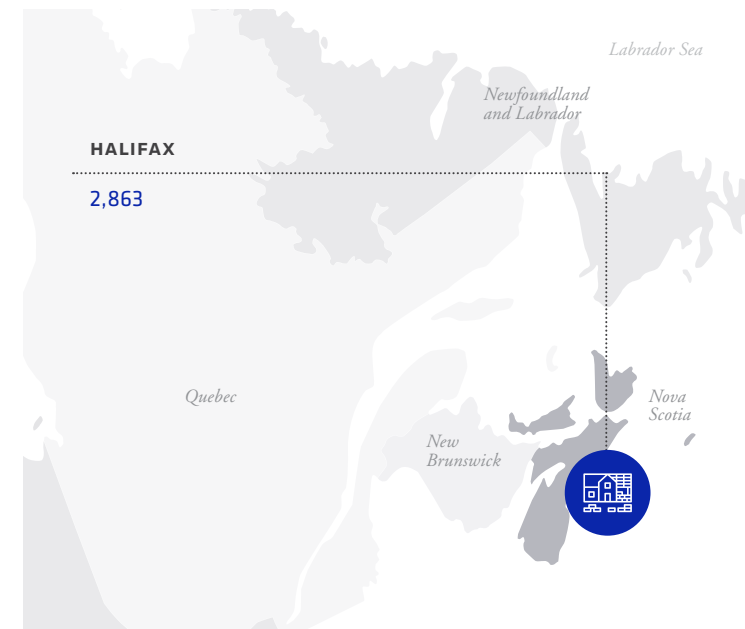
Nova Scotia is projected to be a top performer in the Atlantic Provinces with the redevelopment of the QEII Health Sciences Centre in Halifax, decommissioning of offshore natural gas wells, large-scale shipbuilding, and highway construction projects. Strong immigration in Halifax is fueling population gains and strengthening housing demand.

New Brunswick saw record immigration levels in 2018 that continued into 2019, which should help maintain a baseline of demand for housing despite a sharp drop in both residential and non-residential investment in early 2019. The government has reined in spending so there will be fewer dollars for funding new infrastructure.

Newfoundland and Labrador's increased non-residential investment and commodity production - oil and nickel - will help the province rebound from negative growth in 2018. Construction at Voisey's Bay nickel mine and the West White Rose offshore oil project lead capital spending. Outmigration continues to hinder population growth.

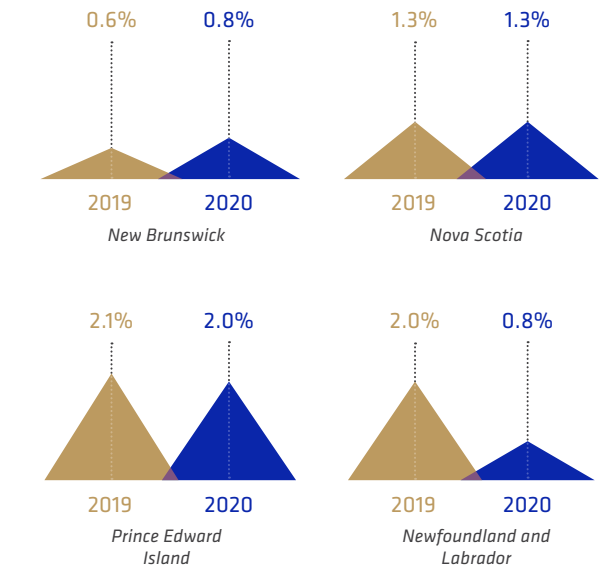
Prince Edward Island is also experiencing healthy population growth that is accompanying increased tourism and strong investment in industrial, commercial and institutional sectors. The province's robust performance of the last two years is expected to continue into 2019 and slow slightly in 2020.

HOUSING STARTS BY CMA

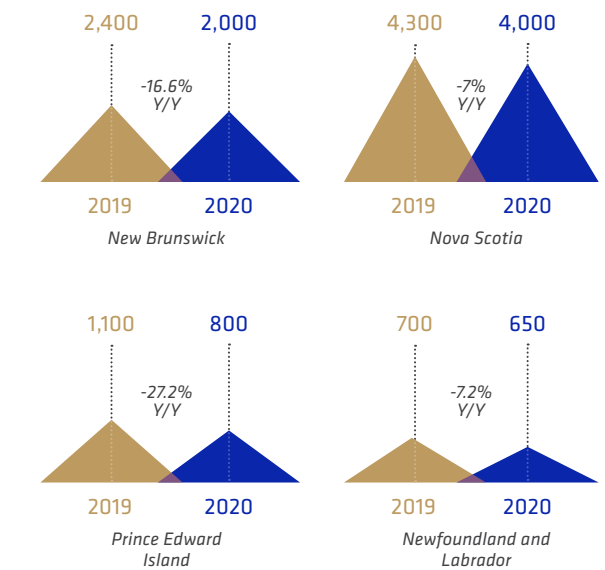


ATLANTIC CANADA OUTLOOK

PROJECTED GDP GROWTH



FORECAST HOUSING STARTS



ESCALATION RATE 2020 + 0% to 1%

Sources: Conference Board of Canada, Scotiabank, Royal Bank, BMO, Statistics Canada



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EASTERN EUROPE & CENTRAL ASIA



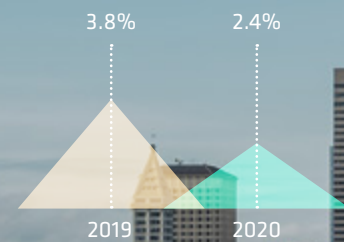
INTERNATIONAL MARKETS In Focus

UNITED STATES

Growth to slow in non-residential building construction as mega projects thrive

After a projected increase of 3.8 per cent in 2019, growth in overall non-residential building is forecast to slip to 2.4 per cent in 2020. Mega projects in transportation, airports and power will support a projected rise in the overall value of new construction in the U.S. from \$1.3 trillion in 2018 to \$1.45 trillion in 2021.

NON-RESIDENTIAL BUILDING CONSTRUCTION



HEALTHCARE LEADS NON-RESIDENTIAL BUILDING GROWTH

While most non-residential segments are forecast to see lower growth rates, healthcare is the lone exception with activity expected to rise from 2.7 per cent to 3.7 per cent.

Growth forecasts for 2019 and 2020 include:

- **Commercial and industrial total** – from 2.5 per cent to 1.1 per cent. Demand for logistics facilities remains a prime driver of industrial growth, while high-growth, creative and life sciences are fuelling office building.
- **Institutional total** – from 4.9 per cent to 3.7 per cent. Growth in public safety (5.9 per cent) and education (4.4 per cent) segments will remain robust in 2020 even if at slightly lower levels than 2019.

HEALTH CARE BUILDING CONSTRUCTION



COMMERCIAL & INDUSTRIAL CONSTRUCTION



INSTITUTIONAL CONSTRUCTION



MASSIVE ENERGY PROJECTS IN MULTIPLE SECTORS

The largest energy projects are Alaska LNG (US\$45 billion), Corpus Christi LNG in Texas (US\$24.5 billion) and Driftwood LNG (US\$16 billion) in Louisiana. Texas has the most energy and utility projects valued at almost US\$153 billion.

Projects in the energy sector include electricity generating stations and transmission lines in addition to oil and natural gas facilities and pipelines.

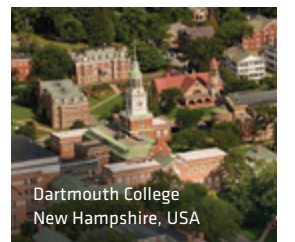
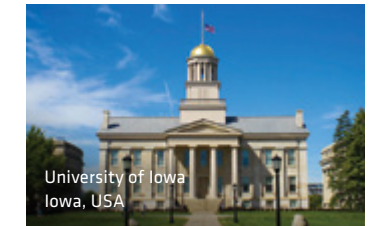
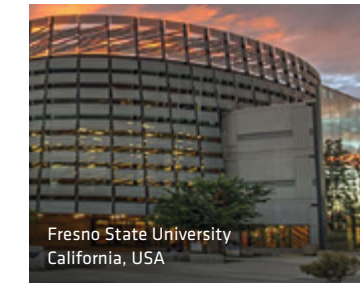
There is also growing activity in district energy redevelopment and expansion across the country. BTY is providing Lenders' Technical Advisory services for Fresno State University's Heating & Cooling project in California, Denver's National Western Center District Energy Project in Colorado, the University of Iowa Utility System, and Dartmouth College's Green Energy Project in New Hampshire.

MEGA PROJECTS IN TRANSPORTATION AND ENERGY

With numerous cities across the country carrying out transit expansion programs, transportation mega projects are key in supporting overall growth in the industry. There were 89 major heavy rail, light rail, streetcar, bus rapid transit, and commuter rail projects under construction across North America; the vast majority of them are in the United States. One of the largest is the US\$9.2 billion Honolulu Area Rapid Transit (HART) – light rail, for which BTY is providing Lenders' Technical Advisory Services.

A US\$13 billion expansion and upgrade of JFK Airport leads numerous redevelopment projects at airports across the United States, including Jet Blue's Terminal 6 and 7 Replacement at JFK valued at US\$3 billion. BTY is providing LTA services on that project as well as Newark Liberty International Airport's Consolidated Rent-a-car Facility, Los Angeles International Airport's Consolidated Rent-a-car Facility, and LaGuardia Airport's Central Terminal Building.

RECENT DISTRICT HEATING & COOLING PROJECTS BTY IS PROVIDING TECHNICAL ADVISORY & PROJECT MANAGEMENT SERVICES FOR:



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INTEREST RATE CUTS COULD RENEW RESIDENTIAL GROWTH

The residential sector is forecast to see moderate growth as family formation among millennials drives demand for new homes – with potential interest rate cuts spurring renewed expansion. The strongest demand is for multi-family and apartments; single-family homes can expect weaker growth. Housing affordability continues to be a critical issue, exacerbated by construction costs (labor and materials) accelerating well beyond the level of inflation and the increase in nominal incomes.

Sources: American Institute of Architects (AIA) Construction Consensus Forecast, 2019 Dodge Construction Outlook, FMI Construction Outlook, Construction Dive

UNITED KINGDOM

Infrastructure and housing mainstays amid continuing Brexit uncertainty

GOVERNMENT TO INVEST £600 BILLION IN



infrastructure projects over the next 10 years.

Infrastructure and housing are expected to provide stability as uncertainty and delay concerning Brexit related changes persists. They continue to have a negative impact on construction industry growth, especially in the commercial and industrial sectors.

Major projects such as the £4.2 billion Thames Tideway Tunnel and £19.6 billion Hinkley Point C nuclear power station are among the largest underway. They will help maintain overall activity levels when the £18.25 billion Crossrail completes in 2021.

The government pipeline for the next 10 years has £600 billion worth of projects to improve infrastructure in energy, transport and other sectors. Major projects include the £1 billion Silvertown Tunnel, East West Rail, modernization of the M6 motorway, and Hornsea Project One, which would be the world's largest offshore wind farm.

A review of one of the largest proposed projects, the £56 billion HS2 high-speed rail project, and others could, however, contribute to a drop in total industry growth of up to 1.7 per cent in 2019 and continue to hold back growth to 2021.



Chesterfield House Phase 1 (Build-to-Rent)
London, UK



30% Construction Cost Reduction

BY REDUCING WASTE, DUPLICATION AND DO-OVERS

SLOWER RATE OF GROWTH IN PRIVATE HOUSING

The UK's largest construction sector is private housing, which has been the major growth driver for several years. Analysts expected new builds to decline by 2% in 2019, and then rebound with 1 per cent growth in 2020.

Increased home building in the north, supported by the Help to Buy scheme, is expected to offset decline in the south. Both private and public rental segments have performed well over the past two years throughout the country, with more institutional funds flowing to Build to Rent (BtR) projects.

EXPERTISE IN BUILD TO RENT

BTY's long-term experience in BtR schemes in North America in combination with expertise in Employers' Agent services in the UK makes its offering unique. BTY's MRICS professionals provide owners, developers and architects project solutions from early concept design and business case development to finalisation of design and construction project controls.



Apartments For London, Modular Residential Projects
London, UK

EXPANSION OF MODULAR TO MEET CONTINUED HIGH HOUSING DEMAND

Uncertainty from Brexit related changes notwithstanding, there is continued high demand for housing and affordability remains a daunting challenge. Government support for offsite building, which accounts for an estimated 8 per cent of industry output, is expected to help meet the target of 300,000 new homes by 2022.

Although the additions to the housing stock have increased for five successive years, the rate of growth has slowed significantly. Only 222,000 housing units were added in 2017/18.

Modular construction for accelerated, large-scale development using factory-manufactured units is an important part of the solution. Modular has made tremendous gains in quality and efficiency

that can reduce delivery time from 40 to 50 per cent.

Efforts to reduce cost and increase productivity in on-site building include value engineering, and improved procurement and scheduling processes. They can lower construction costs by up to 30 per cent, by reducing waste, duplication and do-overs.



40-50% Schedule Reduction

USING MODULAR OVER TRADITIONAL CONSTRUCTION

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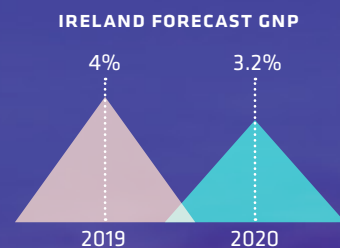


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IRELAND

Ireland set for strong construction performance in 2020

Continuing uncertainty over post-election Brexit plans in the UK notwithstanding, Ireland is well positioned for strong construction performance for 2019 and 2020. Assuming that much the same customs and trading conditions will remain in place, the country's GNP is forecast to grow by 4.0 per cent in 2019 and 3.2 per cent in 2020.



This healthy economic backdrop is expected to underpin robust growth in output of the construction sector. Construction output in 2018 was just over €20 billion and is expected to add another 10 per cent in 2019 to about €22 billion.

Sources: Government of Ireland, Economic and Social Research Institute, Irish Times, RTE, PWC Global Economic Outlook, Bank of Ireland, KPMG, CSO

RESIDENTIAL CONSTRUCTION EXPANSION CONTINUES

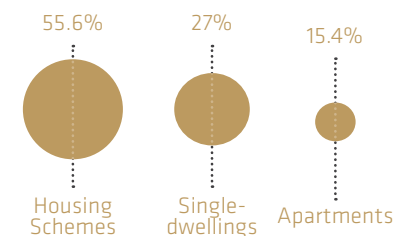
Residential construction has been strong through 2019. In the first half of the year completions were just under 9,200 dwellings, an increase of more than 17.5 per cent from 2018.

Housing schemes continue to reflect majority of housing stock being delivered, contributing 57.6 per cent of total Q2 2019 completions. Single dwellings at 27 per cent, and apartments at 15.4 per cent made up the balance.

There is also a strong transitional shift underway with apartment completions up 55.6 per cent over the same period in 2018, compared with 15.5 per cent for single dwellings and 2.6 per cent growth in scheme completion figures.

Institutional investors are also becoming more dominant in the market, with significant funding of housing stock, especially for build-to-rent and purpose-built student accommodation.

RESIDENTIAL CONSTRUCTION BREAKDOWN



While high rents and affordability issues continue, the influx of investment, much of it international, is enabling the launch of projects that would otherwise have progressed at a slower pace if reliant solely on domestic funding.

The commercial office sector is expected to continue a strong showing, albeit at lower levels than in recent years. Ireland had the EU's highest share of investment accounted for by non-residential construction, largely due to commercial real estate development, with much of that in Dublin.

There is also strong growth from international inward investment in the Irish data centres market, with capacity in Ireland expected to double by 2025. Similarly, both the pharmaceuticals and microprocessing industries continue to attract significant investment with projects in the pipeline such as Intel's multi-billion-euro expansion to its premises in Leixlip.



€115 Billion

OVER 10 YEARS TO UPGRADE STATE INFRASTRUCTURE



+1 million people

BY 2040

INFRASTRUCTURE EXPANSION CONTINUES

Project Ireland 2040, which seeks to improve infrastructure throughout the country, also aims to balance Dublin's growing economic dominance with regional development. There are two plans guiding the roll out of Project Ireland 2040.

The first is the National Planning Framework, which focuses on balancing regional development in Dublin, Cork, Galway, Limerick and Waterford. The second is the National Development Plan, a 10-year €115-billion program to upgrade state infrastructure to serve the one million extra people expected to live and work in Ireland by 2040.

The budget for 2020 has a 22 per cent increase in capital spending to support infrastructure development. Major projects in the pipeline include:

- New Metro North
- DART expansion
- M20 Limerick to Cork
- New schools in 23 counties
- 3 new acute hospitals, and new primary care centres
- Water upgrade projects
- Second runway at Dublin airport

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EASTERN EUROPE & CENTRAL ASIA

Robust construction activity with focus on roads and railways renovation

OVERALL CONSTRUCTION ACTIVITY



Projected to grow 3 per cent annually from 2019-2023.

Eastern Europe and Central Asia (EECA) will see strong growth in construction across the board over the next three years, with infrastructure leading the way.

Roads and railways will be in vanguard, with continued expansion of the New Aegean-Baltic TEN-T Corridor in Eastern Europe, and the One Belt, One Road initiative propelling growth in Central Asia.

An increase in authority level interest in developing more projects using PPPs as a financing tool augurs well for continued expansion in the sector in the region.

There has also been an uptick in Secondary Market Transactions (SMT) and refinancing deals. BTY served as the Lenders' Technical, Environmental and Social Advisor for the refinancing of the 3rd Bosphorus Bridge. Valued at US\$2.57 billion, it was one of the top three deals in Europe in 2019.

Eastern Europe is forecast to have overall construction activity grow by 3 per cent annually from 2019 to 2023. Romania launched its first PPP social infrastructure

project, a €250 million DBFM of a regional hospital to replace an existing facility. BTY was named Technical Advisor on the project, which has the potential to kick-start the country's social infrastructure pipeline.

Poland, which has one of Europe's fastest growing economies, and Serbia are leading the pack in infrastructure. Romania, Ukraine, Croatia, Hungary and Bulgaria can all expect solid growth, while expansion will be modest in Russia. Challenges in financing are causing a sharp decline in Turkey's infrastructure development following several years of robust expansion.

Poland plans to invest US\$11.1 billion to develop a high-speed rail network and US\$9.7 billion to construct a new hub airport. In Serbia, road construction and major large-scale projects in energy and railroads are leading the way.

Sources: McKinsey & Company, GlobalData, Eastern European Construction Forecast Association (EECA), June 2019 Report

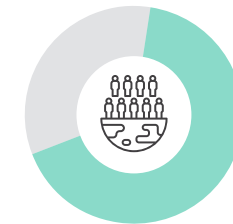
STRONG PROJECT PIPELINE IN CENTRAL ASIA

The US\$1 trillion One Belt, One Road Initiative (BRI) is driving ongoing and planned upgrades to transportation infrastructure across Central Asia.

The region lies between Asian and European markets that now account for two-thirds of the global population, two-thirds of the world's GDP, and more than two-thirds of global trade.

There has also been a marked increase in investment by international financing institutions in both transportation and energy projects in resource-rich Commonwealth of Independent States (CIS) countries, such as Kazakhstan, across Central Asia.

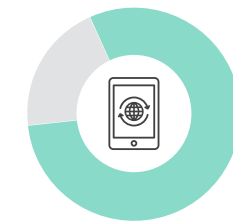
CENTRAL ASIA ACCOUNTS FOR:



two-thirds
of the global population



two-thirds
of the world's GDP



more than two-thirds
of global trade

ONE BELT, ONE ROAD INITIATIVE (BRI):

US\$1 trillion



Connecting economies along the ancient Silk Route



Overland route through Kazakhstan



Trade corridor delivery time to be reduced by ~70%

The BRI seeks to build trade and infrastructure networks connecting economies along the ancient Silk Route, allowing goods to be delivered from China's Pacific coast to Europe. The trade corridor's overland route through Kazakhstan - an alternate to shipping goods by sea - allows delivery time to be reduced from 40-60 days to 13-14 days.

Kazakhstan has an ambitious highway, railway and airport expansion and upgrade program that includes the Big Almaty Ring Road project, a six-lane ring road that includes 21 bridges and 19 viaducts. This is the first PPP project in the country, and BTY is providing Environmental and Social Advisory services on the project.

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MAJOR TRENDS

Shaping Construction

*Insights on Global Infrastructure
Development from*
**BTY'S AWARD-
WINNING TECHNICAL
ADVISORY TEAM**

BRENDAN PAYNE
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**JACK
MCINERNEY**
Director

BEN CONNOR
Senior Project
Consultant

SHARLENE HAY
Director

SAM REKAB
Senior Project
Consultant

***BTY was selected as
2019 Technical Advisor (TA)
of the Year at the 2019
P3 Awards.***

It represents the culmination of more than 25 years of commitment to developing services that support the effective delivery of public-private partnership (P3) projects – and the expertise gained from working on more than 220 P3 projects on four continents.

The Gold Award follows a string of awards in 2017. They included the IJ Global Awards, TA of the Year, Americas; P3 Bulletin Technical Advisor of the Year Silver Award; and being named a finalist as TA of the year for EMEA. This industry recognition inspired our experts to share lessons learned and insight gained along the way as they helped to develop and expand the North American model – and as they now continue to introduce and adapt it in new sectors and new global markets.

Marie Foley is a BTY Director who leads the firm's P3 team for North America. She sees a number of developments, shifts and innovations that are transforming market dynamics and types of projects that can use the P3 procurement model.

ALEX STOIKO
Project Consultant

MARIE FOLEY
Director

JOANNE HENSON
Director

GÖZE DOĞU
Director

TUNCA ATAĞLU
Regional Director, EMEA

SIBEL GÜLEN
Director

SHIFTS IN P3 FOCUS AND EXPANSION OF UNSOLICITED PROPOSALS

There is also a shift of Canadian P3 developer focus from Canada to the United States. Before the balance was 70 per cent Canada, 30 per cent U.S., now it is closer to 40 per cent Canada and 60 per cent United States.

P3 developers are taking more interest in district energy projects.

Another shift is the expansion of public sector authorities accepting unsolicited proposals (USP) for infrastructure development from the private sector. Ontario became the most recent to endorse the practice, which allows government to receive and consider ideas it may not have generated on its own. The Ontario USP program has no limitations on the project size, asset class, delivery model or type of proposal that can be submitted.



REVISITING RISK ALLOCATION

As cities across North America experience a surge in Light Rail Transit projects, Ontario has become one of the continent's most active jurisdictions. Yet concern over risk allocation – with particular regard to time and cost required for relocation of utilities – is making some developers reluctant to pursue projects. Look for a revisiting of risk allocation to reduce the uncertainty about this issue.

Another issue connected to the rapid transit expansion is labour availability at a time when trades are also in high demand in other sectors. Authorities need to monitor the scheduling of project delivery to ensure that labour is not overcommitted.



THINKING LONG-TERM FOR DESIGNING CONTRACTS

BTY Directors Göze Doğu and Sibel Gülen led the development of BTY's comprehensive Environmental, Health, Social and Safety (ESHS) Advisory Services. They note that environmental and social considerations have rapidly become key factors in project financing in emerging markets.

International Financial Institutions now require each project to be developed with a green economy perspective, be resilient with regard to climate change and be energy/resource efficient with smart design.

Responsible and sustainable investing is front and centre for both established and emerging markets. Public asset classes and funds are increasingly looking for ways to invest in sustainable projects. Private equity has been facing demand for sustainable investing and project design worldwide – in developed as well as emerging markets.

INTERNATIONAL FINANCIAL INSTITUTIONS REQUIRE PROJECTS TO INCLUDE:

-  **Green Economy Development Focus**
-  **Climate Resilience**
-  **Smart Design**
-  **Energy & Resource Efficiencies**



The energy sector has shifted towards a renewable future, with inherent sustainability considerations at its centre, as well as technical considerations that increase efficiency and output. The share of renewables in meeting global energy demand is expected to grow by one-fifth in the next five years to reach 12.4 per cent in 2023. Solar has emerged as a renewable leader for its superior reliability, with storage playing an increasingly important role for investors.

Tunca Ataoglu is BTY's Regional Director, EMEA. He led the firm's multiple engagements in Turkey's massive P3 healthcare program and is now spearheading teams expanding service delivery in Eastern Europe and Central Asia.

THINKING LONG-TERM FOR DESIGNING CONTRACTS *continued*

Front-end tender preparation and planning is key for project owners to reach intended results in every project. In P3 infrastructure projects, this is even more important because the contract is much longer than the construction term. A well-defined project attracts more attention from multiple investors, which sharpens competition that ultimately delivers better value for money.

A project is a good project because there is a need for it, not because it is bankable. Bankability should not be a key driver of a project delivery decision. These projects fail at the end, even though they may be deemed bankable at one point.

Sharlene Hay is a Director and team leader for Latin America. The region has both abundant opportunities and significant challenges. There is a wide range among countries in implementing P3 projects. At one end is Chile, where some concessions established in the 1990s are due to

expire and are approaching second and even third tenders. At the other end is Panama, which just passed P3 legislation in September 2019.

Many countries in Central America now have a P3 legal framework in place, with 33 projects totalling US\$5.8 billion in the pre-launch phase. However, 2019 illustrated how volatile the region can be, with the recent unrest in certain countries, including Chile, sending a ripple of caution through the investment community. The political climate is a primary challenge to infrastructure investment, particularly in the P3 market. It's one of the principal reasons that certain tenders in countries such as Chile and Peru did not take place as planned in 2019. Regardless of how these issues play out in 2020 and beyond, however, infrastructure investment remains critical to economic and social progress in the region.



Jack McInerney is a Director, and lead in P3 and Infrastructure Advisory Services in BTY's Dublin office. P3-style procurement and project delivery is seeing a fundamental shift across Europe.

The UK, long a world leader in developing the model for infrastructure delivery, is turning away from the original form and developing new approaches of private innovation and financing in public procurement. The first waves of P3 procurement were highly effective in delivering Core infrastructure across Europe: highways, light rail, hospitals and social projects such as schools and courts.

The next wave of P3 procurement is more focused on Core+ projects, which carry different risks around payment structures.

Core+ Infra project types are being pursued by countries seeking to extend broadband coverage and move away from fossil fuel use. They include projects for telecommunications, renewable energy, district heating, and electric vehicle charging infrastructure. P3 broadband is taking off across Europe from Finland to Portugal, Spain and Italy. France and Ireland are using it to roll out broadband projects, particularly in rural areas.



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TRANSIT ORIENTED *Development*

Transit oriented development is becoming a go-to solution for cities across North America.

The idea behind transit oriented development – or TOD – is nothing new, but the practice of combining transit infrastructure with real estate development is rapidly gaining ground across North America.

New York City and other urban centres with mature transit systems have been practicing TOD all along, even if not by that name. Now cities that are still expanding their systems such as Vancouver, Toronto, Montreal, Denver, Phoenix and San Diego are all formally pursuing TOD projects.

Metro Vancouver in particular has seen scores of TOD projects since its first rapid transit line launched in 1986. BTY has advised on dozens of them in various capacities over the past 25 years.

New York remains the leader in scale however, with what may be the largest TOD project ever in North America. In the Hudson Yards project, the city's Metropolitan Transit Authority decked over its train yards and sold the rights to developers for \$1 billion to build an entire new neighbourhood on top, with a new subway line extension beneath.

TOD BASICS AND BENEFITS

In TOD, higher density, mixed-use schemes are connected to, next to or within a short walk of transit stations and stops. This helps create vibrant walkable communities that dramatically decrease the need for driving and energy consumption, which are critical to combatting climate change and ensuring energy security.

TOD projects are becoming much more attractive in the U.S., thanks to limited federal funding for public transit, a national housing shortage, and the urgent need to reduce vehicle emissions. Canada, which has a longer track record of integrating private and public sectors in major projects, is also pioneering new approaches to TOD.



TOD BENEFITS FOR PRIVATE AND PUBLIC SECTORS

Public sector participants can benefit directly from increased transit ridership, revitalized neighbourhoods and a boost to economic development. Private sector developers can achieve increased land values, higher rents and real estate performance, as well as more affordable housing opportunities.

There are additional indirect benefits. For the public sector, they include, less traffic congestion, pollution and fuel consumption, reduced sprawl that protects open-space, lower costs for roads and bridges, and increased property and sales tax revenues. The private sector can generate higher retail sales, expand labour pool access, and reduce parking costs.

The evolving TOD model of joint development cuts across regional and municipal (local) policies, plans and bylaws in ways that overcome previous barriers that have in the past stymied combining infrastructure development with real estate. Toronto and Vancouver both already have extensive experience with TOD and are pioneering new approaches.

A new TOD program by Metrolinx is a good example. Metrolinx is an Ontario government agency established to improve the coordination and integration of all modes of transportation in the Greater Toronto and Hamilton Area. It

works in partnership with Infrastructure Ontario, another government agency. Metrolinx has completed 12 Preliminary Design Business Cases for 12 new station locations and will solicit third-party interest for new stations in and around the identified locations, a process that started in Spring 2019.

In Metro Vancouver, TransLink is responsible for the regional transportation network. It has long championed development around transit stations, but TOD accelerated when the Canada Line started operating a decade ago. Its Marine Drive Station became the jumping-off point for modern transit-oriented development in the region. Now TransLink has invited developers to take TOD to the next level as major new transit line extensions are in the planning stage.

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CLIMATE DRIVEN *Investments*

Investment in renewable energy capacity reached US\$272.9 billion in 2018, nearly triple the amount invested in coal and gas-fired generation capacity combined.

RENEWABLE ELECTRICITY
WILL ACCOUNT FOR:



30% of demand by 2023
+24% increase from 2017

Concern over climate change and new regulations are creating a favourable outlook for the continued growth of renewables, especially in the electricity sector. They are projected to provide almost 30 per cent of power demand in 2023, up 24 per cent from 2017. The shift also has benefits for energy security, sustainable growth and employment, with substantial payoffs for both communities and countries.

This investment milestone marks renewables eclipsing oil and gas-fired power generation despite decreases in the capital cost of solar and wind projects, and despite slower rate of investment in China in the latter half of 2019, due in part to a change in policy. China has largely been the world's leading investor in renewable energy over the past decade.


AS INVESTMENT RISES, COSTS DECREASE

Even so, the total amount of global investment in renewables was down 1 per cent in 2018, due to the continued rise in investment purchasing power.

Adjusting for cost declines, renewable power investment is up 55 per cent since 2010. The cost competitiveness of renewables has also increased dramatically. Since 2009, the cost of electricity – when levelized for a consistent comparison of different electricity generation methods – decreased by 81 per cent for solar photovoltaics (PV), and 46 per cent for wind.

Diminishing capital cost and increasing competitiveness have supported the sustained growth of renewables, which have accounted for more than 50 per cent of all additions to capacity in the global power sector since 2011.

Overall, renewable power capacity is set to expand by 50 per cent between 2019 and 2024, led by solar PV, which is expected to account for nearly 60 per cent of forecast growth. On-shore wind will represent 25 per cent of that growth, and off-shore wind 4 per cent.



Global Renewable Energy Capacity to Expand by 50% BY 2024

- **Solar PV** accounts for 60%
- **On-shore wind** accounts for 25%
- **Off-shore wind** accounts for 4%
- **Other renewables energy sources:** 11%



Investment in Renewable Power up 55% (SINCE 2010)

SPURRED BY GREATER PURCHASING POWER COMING FROM:

- **81% decrease** in costs for solar photovoltaics (PV)
- **46% decrease** in costs for wind turbines



TURKEY EMERGING IN EU TOP 5

China, the EU and the United States, followed by India are the leaders in renewable capacity growth. Turkey's on its way to being one of Europe's top five renewable energy countries by 2024. The government plan calls for a 50 per cent increase. BTY has launched their renewable energy service line in Turkey and is looking to expand its market reach in North America.



REDUCING EMISSIONS THROUGH ENERGY EFFICIENCY

Investment in energy efficiency is another critical element to reducing emissions and combatting climate change. One of the most effective ways to improve energy efficiency in urban centres and large complexes such as university campuses, hospitals and stadiums is district heating.

A district heating system typically has a central plant to produce steam, hot water or chilled water, which then pumped through a network of heavily insulated pipes provides space heating, cooling, and or hot water for nearby buildings.

Heating, cooling and hot water account for 60 per cent of energy demand in buildings, most of it traditionally supplied by fossil fuels. Cities accounting for more than half the world's population, use over two-thirds of the world's energy and generate more than 70 per cent of CO₂ emissions.



BTY is providing Technical Advisory and Project Management services on numerous district energy projects across North America. In Canada, where 60 per cent of the country's energy goes to heating and cooling buildings, there are more than 140 district energy installations. In the United States, there are more than 900 district energy installations.

RECENT DISTRICT HEATING & COOLING PROJECTS BTY IS PROVIDING TECHNICAL ADVISORY & PROJECT MANAGEMENT SERVICES FOR:



- Fresno State University
- Denver National Western Center
- University of Iowa
- Dartmouth College



- Enwave 4th Intake Deep Lake Water Cooling Toronto
- Enwave East Expansion Toronto
- Energy Services Acquisition Program Ottawa

Sources: World Energy Association, World Economic Forum, International Renewable Energy Agency, International Institute for Sustainable Development (IISD)

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Momentum in MODULAR BUILDING

High, persistent unmet demand for homes and severe shortages of labour needed to build them are helping to accelerate momentum in modular construction in the U.S. and the United Kingdom.



2D MODULAR

Flat-packed, panelized solutions, delivered to site & assembled



3D MODULAR

Fully fitted out 3D homes, factory built, transported to site & assembled

A new wave of investment is enabling modular manufacturers to develop new capacity and scale up production.

There are two main types of modular, also known as volumetric construction. In 3D, fully fitted out 3D homes are factory built, and transported to the building site for assembly. The 2D model works more like flat-pack home building kits, where panelized solutions are assembled on site.

REDUCING CONSTRUCTION TIME BY 40 TO 50 PER CENT

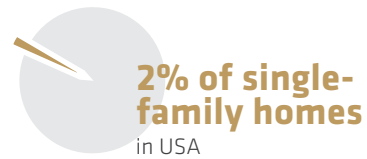
Combinations of 2D and 3D modular have established a track record of shortening construction times by between 40 to 50 per cent, and under the right conditions they can reduce cost by 20 per cent.

Modular methods can deliver the greatest cost savings on projects that are the most labour intensive and have the highest levels of repeatability. Added benefits also include a lower carbon footprint and reduced lifecycle costs.

Modular is most attractive where there are severe shortages of both housing and labour. These conditions now hold sway in many areas of the U.S. and the U.K., and have long been the case in Japan, the world's leader in modular.

Modular currently accounts for only about 2 per cent of single-family homes in the United States, and just 7.5 per cent of new homes in the United Kingdom. In Japan, over 15 per cent of the more than 900,000 homes and apartments built annually are modular.

USE OF MODULAR ACROSS DIFFERENT COUNTRIES FOR NEW HOUSING:



INVESTMENT SUPPORTS MODULAR EXPANSION

Growing investments from major financial institutions are enabling modular housing producers to scale up to respond to the market opportunities. Japan's Softbank, Goldman Sachs, and Amazon have all made substantial investments in modular manufacturers in the U.S. and the United Kingdom.

They see the productivity gains enabled by the method as crucial to capturing a larger share of the underserved residential market, which is valued at US\$550 billion in the United States and £44 billion in the United Kingdom.

Overall, analysts project that by 2030 modular construction could capture real estate market share in the U.S. and Europe valued at US\$130 billion, while delivering annual cost savings valued at US\$22 billion.

Growth is also forecast to be strongest in Asia Pacific – particularly China and India – where burgeoning populations have created sustained demand for affordable housing.



MODULAR'S ROLE IN ADDRESSING AFFORDABILITY

As housing demands decline in Japan due largely to stagnant population growth and an aging demographic, the country's leading modular manufacturers are bringing their expertise to the U.S. and United Kingdom, where unmet housing demand has led to severe affordability challenges in many of the larger urban centres.

The speed of modular building has made it a particularly attractive solution for urgently needed affordable housing, as conventional builders typically develop homes at the rate at which they sell them. They have less incentive to accelerate construction.

The speed – and repeatability – of modular also makes it popular for hotels, student accommodation, and rental properties.

Sources: US Census, MergerMarket, McKinsey, Construction Manager Magazine, Turner Center for Housing Innovation

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