



# Resilient Energy Infrastructure

Addressing Climate-Related Risks and Opportunities

September 2019





## Forward-Looking Information

Forward-looking information, or forward-looking statements, have been included in this document to provide information about us and our subsidiaries and affiliates, including management's assessment of our and our subsidiaries' future plans and operations. This information may not be appropriate for other purposes. Forward-looking statements are typically identified by words such as "anticipate," "believe," "estimate," "expect," "forecast," "intend," "likely," "plan," "project," "target" and similar words suggesting future outcomes or statements regarding an outlook.

Forward-looking information or statements included in this document include, but are not limited to, statements with respect to the following:

- The global energy future, including the factors and trends that are expected to shape it.
- The transition to a low-emission economy and the expected role of different energy sources.
- Innovation and new clean technologies driving competition and change in the energy sector.
- Expectations and forecasts regarding commodity prices and supply and demand.
- The two energy scenarios (International Energy Agency's New Policies Scenario and Sustainable Development Scenario) used to test the resilience of our strategy and energy infrastructure in our liquids pipelines, gas transmission and midstream, and gas distribution and storage businesses, and our investments in renewable energy.
- The trends that shape the scenarios and the expected impact of the NPS and SDS on energy markets generally and on Enbridge specifically.
- Our scenario analyses in the Sustainable Development Scenario, including our resiliency strategies for a carbon-constrained world in each of our liquids pipelines, gas transmission and midstream, and gas distribution and storage businesses.
- The effectiveness of our risk management strategies, including in mitigating climate-related risks.
- The value of existing infrastructure assets given the complexity and uncertainty associated with building new oil pipelines, and the sufficiency of pipeline and other transportation infrastructure.
- Our investment focus on maintaining and enhancing existing assets while positioning for future growth opportunities.
- Our methane reduction strategies and protocols.
- Our positioning and optimization of our infrastructure, investment in and application of new technologies, and development of new energy efficiency products, services and programs to provide emission reductions and support energy reliability and affordability.
- Our growth and diversification of our assets to reflect a changing global energy mix.
- Expectations relating to laws and government policy, the expected impacts thereof, our ability to contribute to the development thereof, and the steps we are taking to understand potential liabilities, including development of an internal carbon price to model financial impacts of carbon-related compliance.
- Our plans to develop GHG emission targets to reduce the carbon intensity of our operations—both GHG emissions which occur directly from sources that are owned or controlled by the Company (Scope 1) and GHG emissions from the generation of purchased electricity consumed by the Company (Scope 2)—and add new metrics and incentives for tracking and reporting on our emission reduction performance.

- Expectations regarding the impact of the stock-for-stock merger transaction completed on February 27, 2017 between Enbridge and Spectra Energy Corp. (the Merger Transaction) including our combined scale, financial flexibility, growth program, future business prospects and performance.
- Expected future financial and operating performance, financial strength and flexibility, growth and expansion opportunities, strategic planning and execution of our strategic plans.

Although we believe these forward-looking statements are reasonable based on the information available on the date such statements are made and processes used to prepare the information, such statements are not guarantees of future performance and readers are cautioned against placing undue reliance on forward-looking statements. By their nature, these statements involve a variety of assumptions, known and unknown risks and uncertainties and other factors, which may cause actual results, levels of activity and achievements to differ materially from those expressed or implied by such statements. Material assumptions and risks include the following: the expected supply of and demand for crude oil, natural gas, natural gas liquids and renewable energy; prices of crude oil, natural gas, natural gas liquids and renewable energy; exchange rates; inflation; interest rates; availability and price of labor and construction materials; operational reliability; customer and regulatory approvals; maintenance of support and regulatory approvals for our projects; anticipated in-service dates; weather; the timing and closing of dispositions; the realization of anticipated benefits and synergies of the Merger Transaction; governmental legislation; acquisitions and the timing thereof; the success of integration plans; impact of the dividend policy on our future cash flows; credit ratings; capital project funding; expected earnings before interest, income taxes and depreciation and amortization (EBITDA); expected earnings/(loss); expected earnings/(loss) per share; expected future cash flows; estimated future dividends; the development and performance of technology and new energy efficient products, services and programs; assumptions relating to long-term energy future scenarios; and Enbridge's carbon price outlook. Assumptions regarding the expected supply of and demand for crude oil, natural gas, natural gas liquids and renewable energy, and the prices of these commodities, are material to and underlie all forward-looking statements, as they may impact current and future levels of demand for our services. Similarly, exchange rates, inflation and interest rates impact the economies and business environments in which we operate and may impact levels of demand for our services and cost of inputs, and are therefore inherent in all forward-looking statements. Due to the interdependencies and correlation of these factors, the impact of any one assumption on a forward-looking statement cannot be determined with certainty. We caution readers that the foregoing list of factors is not exhaustive. Additional information about these and other risks and uncertainties can be found in our applicable filings with Canadian and U.S. securities regulators (including the most recently filed Form 10-K and any subsequently filed Form 10-Q, as applicable). Except to the extent required by applicable law, Enbridge assumes no obligation to publicly update or revise any forward-looking statements made in this document or otherwise, whether as a result of new information, future events or otherwise. All forward-looking statements, whether written or oral, attributable to us or persons acting on our behalf, are expressly qualified in their entirety by these cautionary statements.

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## CEO Message



We are pleased to release our report on climate strategy—*Resilient Energy Infrastructure: Addressing Climate-Related Risks and Opportunities*.

The world is faced with two serious challenges. As global population grows—from 7.7 billion people today to more than 9 billion people in 2040—continued economic development depends on access to more affordable and reliable energy. At the same time, the world needs to address climate change by keeping average global temperatures from rising 2°C above pre-industrial levels. Enbridge believes that the world must find new ways to meet this dual challenge and that the answer lies in finding and pursuing multiple pathways in providing affordable and reliable energy while protecting our environment. We are convinced that innovation can and should happen across the entire energy system. That is, meeting this dual challenge will require more renewable energy and cleaner oil and gas. Global energy systems are already being reshaped, providing significant opportunity for companies that are forward looking.

Enbridge is up for the challenge. Throughout our more than 70-year history, we've demonstrated ability to respond to change and spot opportunity in energy transitions. Being at the forefront of understanding supply and demand fundamentals has helped us to become one of North America's largest and most successful energy infrastructure companies—delivering oil, natural gas, natural gas liquids (NGL) and renewable energy. As a leading energy infrastructure company—with assets positioned across the energy system—we have a unique vantage point from which to capitalize on global energy trends.

This report—which is informed by the Task Force on Climate-related Financial Disclosures (TCFD)—provides insight into how Enbridge sees the transition to a lower-emission economy and the role for our Company within the transition. In preparing this report, we tested the resilience of our strategy and existing assets against two separate International Energy Agency (IEA) scenarios.

This is our first comprehensive climate report. Preparing this report has been and will continue to be highly valuable and is a key part of our strategic thinking. We expect subsequent updates—which will appear in our annual [sustainability report](#)—will be even more granular with respect to risk management, metrics and targets.

The bottom-line result of this first report on the resiliency of our business is that we see strong utilization of our existing assets through 2040 and significant opportunity for growth within each of our businesses. We are investing to ensure that we are positioned to compete in a world that will be defined increasingly by both cost effectiveness and environmental protection, including through emission reductions. We are mitigating risk by employing a low-risk business model where the bulk of our revenue is generated by long-term contracts or highly reliable utility-like commercial constructs—that's a key part of our stakeholder value proposition.

We are also planning prudently for a scenario in which the transition to a lower-emission economy unfolds more rapidly than expected. Enbridge believes that diversification and innovation by incumbent energy companies will play a significant role in the transition to a lower carbon future. We have already made our Company more resilient by diversifying to reflect an evolving global asset mix—notably we've made big investments in natural gas infrastructure and we continue to see significant opportunity in renewable energy, particularly offshore wind and solar. We are confident in our ability to continue reducing emissions intensity while providing consumers with access to the affordable and reliable energy they need and want.

**Al Monaco**  
President &  
Chief Executive Officer

# Executive Summary

This is Enbridge's first report addressing recommendations made by the TCFD. It discusses our evolving approach to integrating climate risks and opportunities into our governance structure and strategic planning, and how we identify and mitigate risks. It outlines the role of our Board and executive leaders in ensuring that climate considerations are part of our decision-making frameworks for risk management, business planning and performance evaluation.

Our annual sustainability reporting—which commenced in 2001—has previously addressed many climate-related issues. This report provides more in-depth discussion about how we view risks and opportunities for our business within the context of evolving energy systems both in North America and globally. Future TCFD-related updates will appear in our annual [Sustainability Report](#).

In this report, we apply two International Energy Agency scenarios—the New Policies Scenario (NPS) and the Sustainable Development Scenario (SDS)—to test the resilience of our strategy and energy infrastructure. We apply the scenarios to our three core businesses—liquids pipelines (LP), gas transmission and midstream (GTM), and gas distribution and storage (GDS)—and to our renewable energy investments. The NPS forms our base-case scenario and we use the SDS as a lower-probability, higher-consequence scenario to stress test our asset base and strategy.

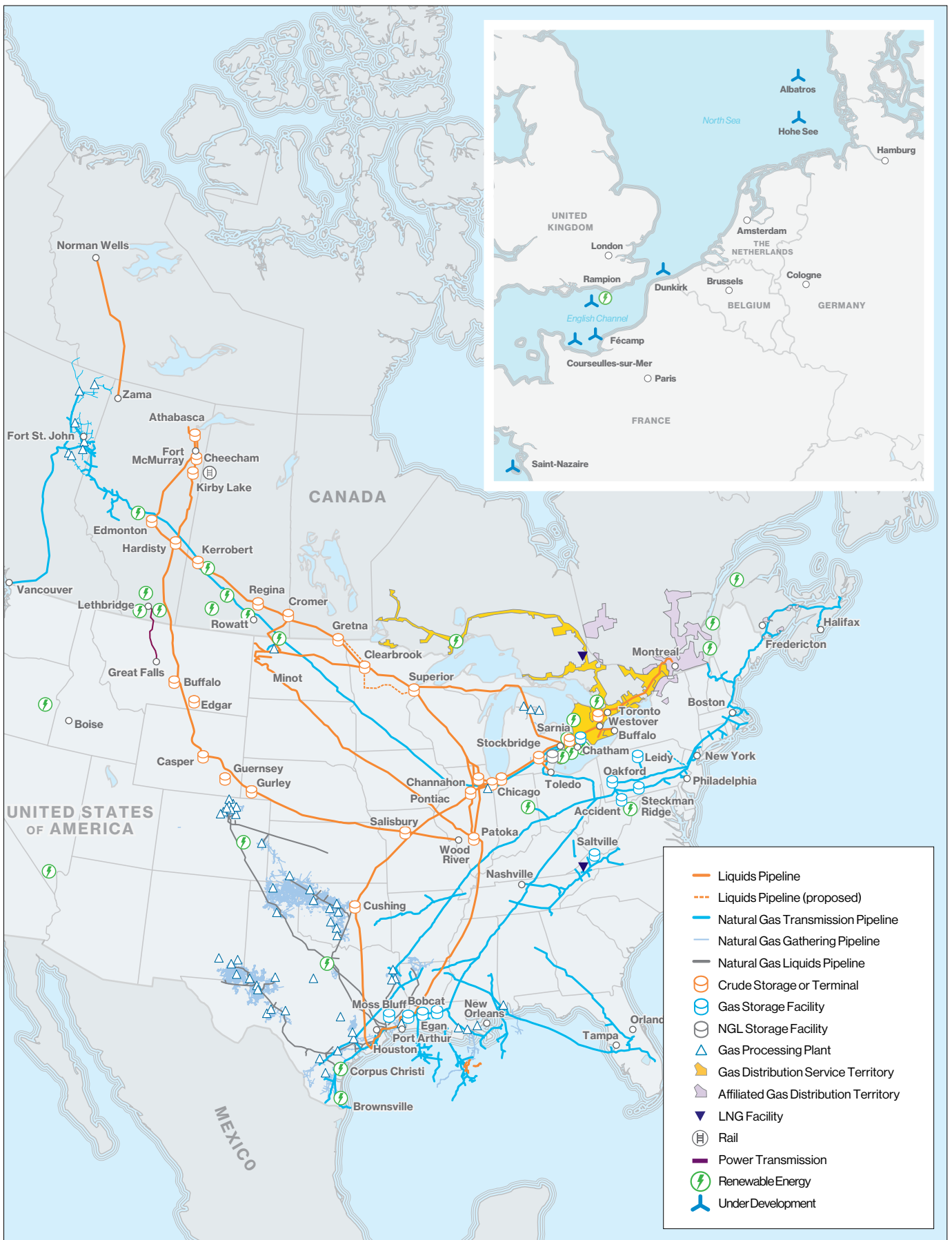
Our analysis indicates that our core assets are resilient under both the NPS and the SDS. Under the NPS, supply and demand fundamentals suggest our assets will be used and useful through 2040 and beyond with significant opportunity for growth within each business unit. Under the SDS, there is still a strong utilization of our assets but there is also a higher volume and cash flow risk to Enbridge in the longer run—particularly in our LP business. Yet, in both scenarios our risk is mitigated by strategically located assets which connect key supply basins with demand-pull markets both within North America and internationally. Our assets are particularly valuable given the North American competitive advantage for supplying oil and gas to the world and the difficulty inherent in building new oil and gas infrastructure in North America.

Our business model further mitigates risk with low-risk commercial structures, low-cost delivery to the best industrial, commercial and consumer markets, long-term contracts, and

strong risk-adjusted returns. That said, if the SDS scenario emerges, we are positioned to transition our business more rapidly to reflect evolving energy supply and demand fundamentals. In recent years, we have become more resilient by diversifying our assets to reflect an evolving global energy mix. We have taken a much bigger position in lower-emission natural gas and we continue to pursue further investment in renewable energy projects. We currently have the capacity—either operating or under construction—to generate more than 1,700 MW (net) of zero-emission energy. We have developed a joint venture with the Canada Pension Plan Investment Board (CPPIB) to grow our existing European offshore wind portfolio.

We are also encouraging and applying clean technology across our entire energy system. Each of our businesses has a role to play in meeting demand while reducing emissions. We believe that applying data analytics to our businesses will improve the efficiency of our operations while achieving economic and climate benefits. Our LP business is using Drag Reducing Agent—a product injected into crude oil to reduce pipeline fluid friction—to allow certain pump stations to be bypassed, thus reducing total electricity consumption. Our GTM business unit has been—and continues to be—instrumental in supporting the switch from coal to natural gas and renewables in the U.S. Our GDS business is deploying technologies for producing pipeline-quality natural gas with a lower-carbon footprint, including renewable natural gas (RNG) and power-to-gas (P2G) technology, which uses renewable energy to produce hydrogen. We are providing our GDS customers with access to better products, services and programs for cost and emissions reduction through energy efficiency and Demand Side Management (DSM).

The metrics and targets section of this report shows that our efforts are paying off. At an enterprise level, we have set and met two “top-down” GHG reduction targets. The data demonstrates that we've made some progress reducing emissions on an intensity basis but we have more work to do. We are challenging each of our business units to develop “bottom-up” targets for reducing direct and indirect (Scope 1 and Scope 2) GHG emissions (see glossary on Page 27 for definitions). We will also be exploring new and modified metrics to help ensure effective performance and reporting of GHG emissions associated with our business. These mechanisms will help to ensure that our strategy and asset base remain resilient over the long term.



# 3.0

## Strategy and Scenarios

In this section, we take a closer look at the climate dimension of the energy that we deliver as informed by IEA scenarios.

### 3.1

#### Climate Resiliency across Enbridge Business Segments

Climate change impacts each of our business units differently. This section takes a closer look at each of our business units—LP, GTM, and GDS—through the lens of the IEA’s NPS and SDS.

We chose the IEA scenarios to develop our assumptions because—while they are not perfect—they are widely recognized, transparent and comparable across our sector. We find the scenarios to be useful tools for exploring different futures arising across complex energy systems.

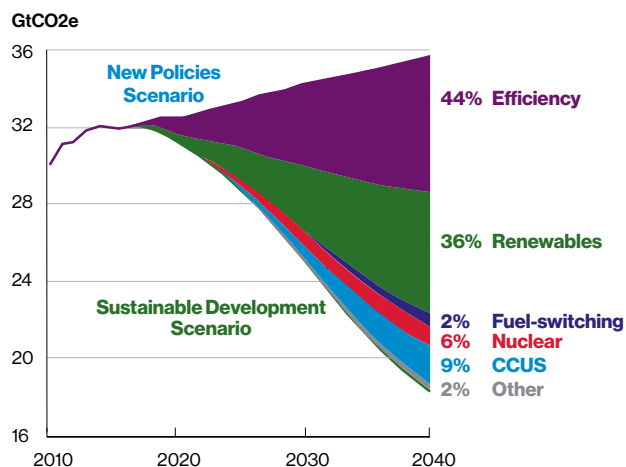
At Enbridge, we use the NPS and SDS in our strategic planning process. Our base case is grounded in the NPS and we use the SDS to stress test our assets against a lower-probability, higher-consequence set of assumptions which would give rise to a more rapid transition to a lower-emission energy base while also accelerating a transition in our business mix.

The NPS is a “forecasting” scenario based on current policies and assumes implementation of announced commitments by governments that are signatories to the Paris Agreement. Under the NPS, global emissions continue to rise through 2040 (a 25% increase between 2017 and 2040) and the world is not on a path to meet emission reduction goals articulated in the Paris Agreement. The SDS is a “back casting” scenario—a more aggressive scenario—which assumes an energy future that would meet three energy related UN Sustainable Development Goals (SDGs): (1) achieving universal energy access; (2) reducing GHG emissions in line with the Paris Agreement; and (3) reducing the severe health impacts of air pollution.

The SDS is fully aligned with the Paris Agreement’s goal of holding the increase in global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C.

In the NPS, total energy-related emissions rise 10% to almost 36 gigatonnes of carbon dioxide equivalent (GtCO<sub>2</sub>e) in 2040. In the SDS, total energy-related emissions are reduced by more than 45% to 17.6 GtCO<sub>2</sub>e by 2040. This chart shows that the biggest differences between the two scenarios relate to the pace of adoption of energy efficiency, renewable energy and carbon capture, utilization and sequestration (CCUS) technologies.

#### Global CO<sub>2</sub> Emission Reductions in the NPS and SDS

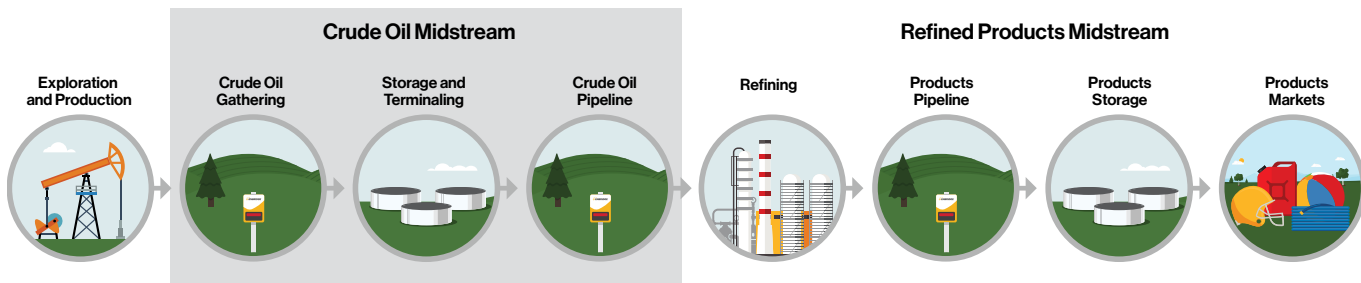


Source: WEO 2017



## Liquids Pipelines (LP)

### Value Chain

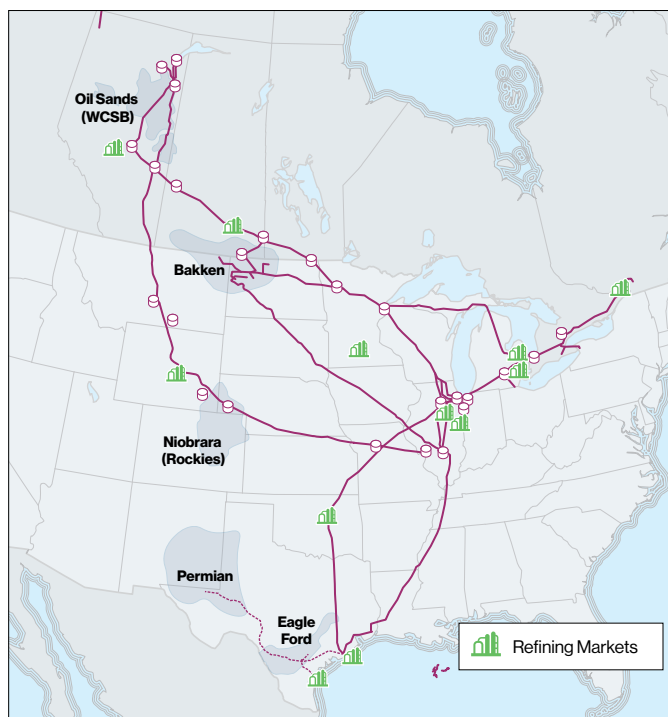


Enbridge business interests

Enbridge operates the world's longest and most complex crude oil and liquids transportation system. We move approximately 25% of North American crude oil supply. Our Mainline System alone has an operating capacity of 2.785 million barrels per day (MMb/d), including small amounts of NGL and refined product.

#### LP infrastructure: Resiliency strategies for a carbon-constrained world

- Investing in technology—by harnessing data and predictive analytics we are managing power consumption and reducing emissions.
- Continued investment in existing critical infrastructure and inspection technology, to maintain and enhance safety, reliability and efficiency while guarding against physical risks associated with climate change.
- Implementing internal emission reduction strategies and support public policies that enhance the cost and carbon competitiveness of North American oil and gas.



Enbridge liquids pipeline assets primarily transport crude oil from supply sources to oil refineries for conversion into valuable products including gasoline, diesel and aviation fuel. LP assets are connected to the Western Canadian Sedimentary Basin (WCSB), the Bakken formation (Bakken), the Permian and Eagle Ford Basins, and other producing regions. Our LP assets deliver crude oil to refineries in Western Canada, Eastern Canada, PADD IV (Rocky Mountains), PADD II (U.S. Midwest), and PADD III (U.S. Gulf Coast or USGC), and to the increasingly important export market. The following map provides a snapshot of our LP assets, and illustrates the scale and connectivity that underpin the long-term competitiveness of our asset base.

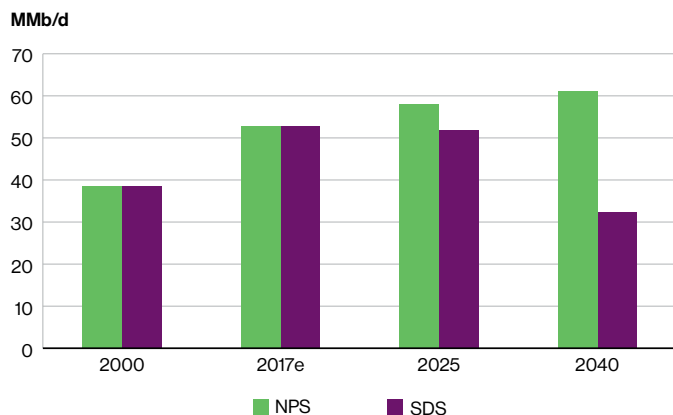
#### Scenario Analysis

The NPS and the SDS both show oil's share of global energy demand falling by 2040. The NPS shows the percentage of oil in the global energy mix falling from 32% to 28% between 2017 and 2040. Yet, the aggregate demand for oil increases under the NPS by 12% or approximately 11.5 MMb/d between 2017 and 2040. The SDS has oil's share of global energy falling from 32% to 23% over the same time period. Similarly, the NPS has oil's share of North American demand falling from 37% to 32% between 2017 and 2040, while the SDS has it falling to as low as 25%.

While global oil demand projections are relevant to set a broader context, the most important energy market projections for our LP business relate specifically to transportation fuel (gasoline, diesel and jet fuel), which represents approximately 70% of a barrel of crude oil in North America and more than 85% globally. IEA scenarios suggest that fuel efficiency, electrification of the passenger vehicle fleet, enforcement of policies restricting fossil fuel consumption and penetration of alternative fuels in long-haul trucking will determine future demand for transportation fuels.

While the NPS forecasts growth in oil-based transportation fuel demand—growing from 50 MMb/d to 60 MMb/d by 2040—the SDS forecasts that transportation fuel demand declines to just over 30 MMb/d by 2040.

## Global Oil-Based Transportation Fuel Demand



Source: WEO 2018

Given that oil-based transportation fuel demand grows under the NPS, most North American refineries are not under significant pressure under this scenario. Yet, as demand declines under the SDS, less oil supply is required and more refining capacity becomes underutilized or uncompetitive. The relevant question is whether Enbridge's assets remain resilient under the SDS.

Oil market participants are diverse and take a wide array of positions when making decisions about their assets, basin-level competitiveness and refinery competitiveness. Enbridge employs a cost curve competitiveness analysis as a proxy to assess its assets, customers' businesses and overall business model for both crude oil supply (basin level competitiveness) and refinery demand (refinery cost to manufacture products) under the SDS.

## Crude Oil Supply

The oil market is a global market. Generally speaking, in a highly competitive environment such as that described in the IEA SDS, low-cost producers are the most competitive,

profitable and sustainable. In terms of crude oil supply, Saudi Arabia and other Organization of the Petroleum Exporting Countries (OPEC) members tend to have the lowest cost to produce crude oil. Among non-OPEC producers, U.S. tight oil and Canadian oil sands have emerged as important sources of global oil supply. However, both are higher-cost, marginal sources of supply and are therefore at risk of lower production. This leaves pipelines that are connected to these basins potentially exposed to elevated volume risk in a scenario where absolute demand is falling.

Enbridge is among the largest pipeline companies serving the Canadian oil sands and is a major player serving Bakken producers. We also have a growing presence serving the Permian Basin in Texas. While lower global oil demand presents risk to supply from these basins, it is important to note that these basins have some key advantages.

Oil sands production tends to be long-lived in nature with very little decline (unlike conventional basins that naturally decline approximately 20% per year absent investment).<sup>1</sup> Oil sands projects offer security of supply. They are also very resilient once they are built, as oil prices would have to fall below the combined cost of sustaining capital and operating costs to shut in existing oil sands production. In 2017, for example, IHS Markit estimates that most oil sands (both mining and in situ) operations needed a WTI oil price of \$30 to \$40/bbl to cover the cost of operating, sustaining and marketing the bitumen produced.<sup>2</sup> The IEA's 2040 oil price is projected to be \$64/bbl for Brent crude—a price that supports the view that existing and under-construction oil sands production should continue into the future. Moreover, oil sands production is also expected to remain relevant into the future because USGC refineries—the most complex and lowest-cost refineries in the world—are configured to take heavy oil.

The carbon intensity of oil sands production has been decreasing in recent years. In September 2018, IHS Markit released a report showing that the carbon intensity of oil sands production fell 12% since 2014.

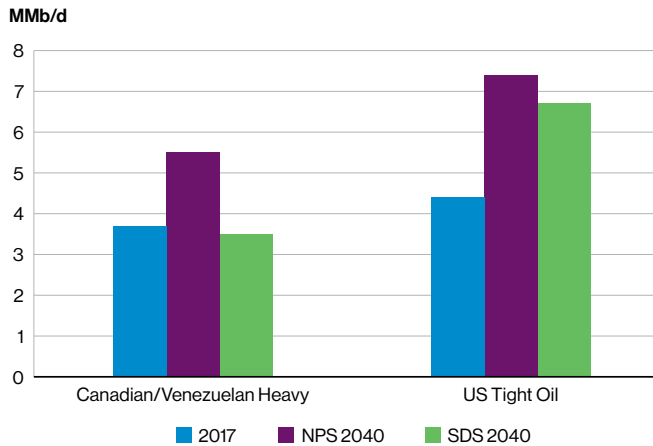
Significant future GHG emission reductions from oil sands production—as the industry adopts newer, potentially game-changing technologies—may increase market acceptance of bitumen vis-a-vis other sources, thereby reducing Enbridge's risk.

<sup>1</sup> <http://www.oilsandsmagazine.com/technical/properties>

<sup>2</sup> IHS Markit, Scenarios of Future Growth (December 2017).



## Crude Oil Supply by Type



Source: WEO 2018

U.S. tight oil will continue to play an important role in meeting global oil demand even under the SDS, as can be seen in the chart above. U.S. tight oil is expected to grow and then dip just below 7 MMb/d under the SDS scenario. Permian, Bakken and other tight oil basins will continue to attract investment given competitive economics and the short-cycle nature of production.

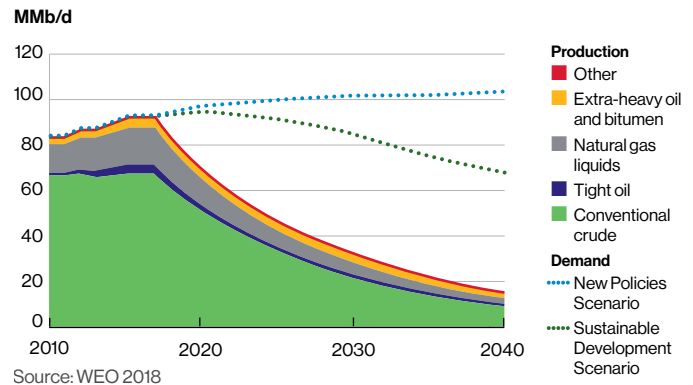
The SDS forecasts flat production of extra-heavy oil and bitumen (Canadian Oil Sands and Venezuelan Orinoco), declining conventional oil and growth in tight oil. Extra-heavy oil and bitumen and tight oil remain important sources of supply in the SDS by 2040 suggesting oil sands and tight oil basins remain productive and reserves are developed.

Geo-political risk can and will continue to impact the demand for Canadian oil—this is exemplified by the impact of political turmoil in Venezuela on oil markets in 2019. The implication is that oil sands product will meet a larger share of heavy oil demand as Venezuelan and OPEC investment in heavy oil continues to diminish. This should provide Enbridge with a fairly stable source of supply, particularly under the SDS. That said, with less oil supply needed to meet demand, it's possible that volume risk to Enbridge assets may increase and our cash flow may be impacted in the longer term. Much of this risk is mitigated through our direct connection to the most competitive refineries, our low per-barrel transportation cost and effective commercial agreements.

Even under the SDS, significant investment is required to replenish global oil supply. The chart below shows that with no new investment, global oil production would halve by 2025. In the coming years, North American producers have an opportunity to meet a larger share of global demand. Note also that extra-heavy oil and bitumen production remains steady through 2040.

Significant investment in energy infrastructure will be required to ensure that oil is moved safely, reliably and more efficiently while guarding against physical risks associated with climate change. Importantly, this investment is necessary even if oil demand slows.

## Oil Production with No New Investment from 2018



Source: WEO 2018

## Crude Oil Demand

As part of Enbridge's annual strategic planning process, we regularly examine oil market fundamentals and identify changing trends in global energy markets. Enbridge is actively pursuing growth and diversification opportunities among the most resilient demand pull markets while maintaining superior service to current customers in existing basins and markets. We believe that North American crude oil and refined products will continue to be cost competitive and exported from the USGC region to global markets over the long term and in growing quantities.

Enbridge connects low-cost Western Canadian heavy crude to some of the most complex, competitive and profitable refineries in the Midwest and USGC. In turn, these refineries make refined products that are consumed both continentally and globally. Access to low-cost inputs of both crude oil and natural gas allows these refineries to compete effectively both at home and abroad. The cost competitiveness of North American resources ensures that tight oil and oil sands continue to be produced in larger quantities. It also ensures that U.S. refineries in Enbridge's core and extended markets will continue to run and produce refined products while enjoying a feedstock cost advantage versus other global refineries.

We expect North American refineries to remain well-positioned to compete globally as long as the North American feedstock cost advantage persists. There is further advantage in the fact that many refineries in Enbridge's core markets possess coking capacity to convert heavier portions of the barrel into higher-value light products. Refineries in the PADD IV (Rocky Mountains), Eastern PADD II (Midwest) and Eastern Canada are also able to convert heavy portions of the barrel into high-value products. All of this sustains Enbridge's value proposition into the future as our LP infrastructure is expected to be both used and useful.

Given the complexity and uncertainty associated with building new pipelines, there is significant value in existing infrastructure. Our strategy includes maintaining and enhancing the safety and environmental performance of existing assets while positioning for future growth opportunities.

The export market has supported high refinery runs for USGC refineries and Enbridge expects that to continue. Depending on the decline in gasoline demand as a result of electric vehicles (EVs) and fuel efficiency gains, however, Enbridge anticipates some pressure on North American refinery capacity. The pressure would be most evident in PADD I (East Coast) and PADD V (West Coast) where crude feedstock costs are high and refinery complexity is low compared with Enbridge core market refineries (including PADD II and PADD III). If some refining capacity is eliminated, as the SDS anticipates, it would likely be capacity in PADD I and PADD V.

Some refinery capacity in Enbridge's core market may be at risk but it would be smaller-scale, light cracking refineries that would be most exposed given competition with coking refineries. Even if refinery capacity in Enbridge's core market were to close, crude oil that would have been destined for those facilities could be redirected further south to USGC refineries on the Enbridge system, resulting in a longer-haul movement on our pipelines and increased opportunities for investment in Texas and other Gulf Coast states.

Enbridge has an established and successful history as the largest transporter of crude oil to the U.S.—the world's largest crude oil market. This, along with our enhanced capability to export North American crude to global markets, significantly mitigates volume risk on our crude oil pipes. As a regulated pipeline that does not own the commodity being shipped, risk is mitigated. Moreover, most of Enbridge's customers are large, financially strong entities. Customers can help to mitigate risk—for themselves and for midstream companies—by further reducing costs, managing climate risks appropriately and effectively reducing emissions.

In 2005 nearly 54% of North American crude oil demand was satisfied by import, whereas more than 70% is now supplied by North American production.

Meanwhile, the strength of North American tight oil production increasingly results in surplus light oil supplies, which are being exported to meet global demand. While oil markets are tightening in developed economies like North America and Europe, oil demand is growing rapidly in other parts of the world. For example, oil demand in India is expected to almost double by 2040 under the NPS, while it would also grow under the SDS. Despite shifting supply and demand dynamics, it remains important to connect abundant, low-cost supply with growing global markets. Enbridge's core assets are strategically located to do so.

### 3.3

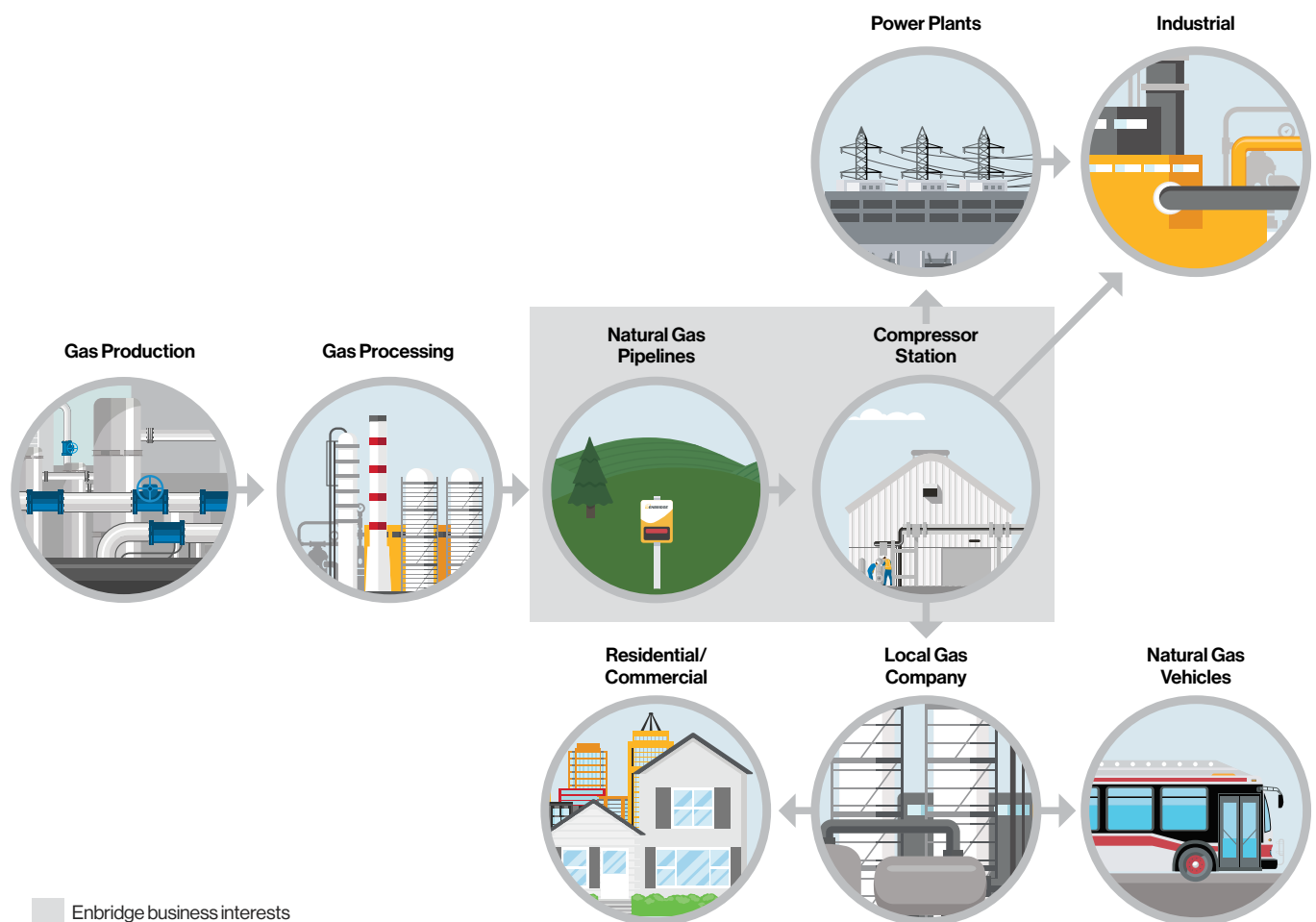
## Natural Gas Transmission and Midstream (GTM)

Enbridge transports about 20% of all natural gas consumed in the United States. Our GTM assets move approximately 19.4 billion cubic feet (Bcf) of natural gas each day and we have interests in approximately 160 Bcf of working natural gas storage. We connect North America's most prolific supply basins to major demand centers.

### GTM infrastructure: Resiliency strategies for a carbon-constrained world

- Support switching from coal to a mix of low-cost, low-emission natural gas and renewable generation by enhancing strategic connections between key supply basins, growing industrial demand centers, consumer applications and LNG export infrastructure.
- Invest to reduce methane emissions while improving the safety, reliability and efficiency of our operations.

### Value Chain





In February 2017, we repositioned our Company for a lower carbon economy with the \$37-billion acquisition of Spectra Energy. As described on Page 16, this acquisition dramatically increased the proportion of our portfolio focused on natural gas—from 27% to 54% of net assets—which reduced the liquids share of our portfolio from about 66% to 43%.

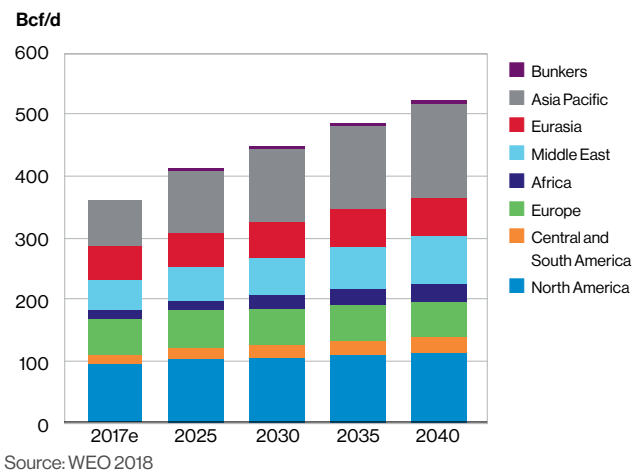
Our GTM assets cover approximately 26,000 miles (41,800 kilometers (km)) in 31 U.S. states, five Canadian provinces and offshore in the Gulf of Mexico, and provide major North American population centers with access to critical supply basins and are strategically located to meet growing demand domestically and internationally.



## Scenario Analysis

Natural gas currently meets approximately 22% of global energy demand. Both the NPS and the SDS project that global demand for natural gas will increase through 2040.

### IEA Natural Gas Demand Outlook: New Policies Scenario



The NPS predicts an increase in global gas demand of approximately 45% by 2040 as gas demand grows in most parts of the world. Two-thirds of this growth comes from developing economies in Asia (grows by 78 Bcf/d) and the Middle East (grows by 28 Bcf/d). As China seeks to combat air pollution, it alone accounts for nearly 30% of total natural gas demand growth to 2040. Demand also grows in North America—by almost 20 Bcf/d.

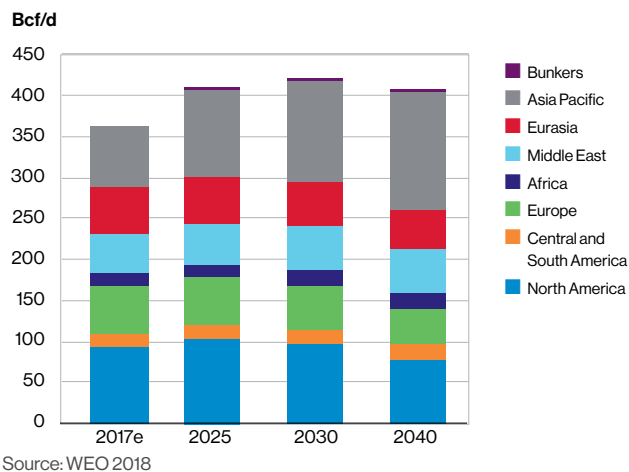
In recent years, North America has capitalized on natural gas to replace significant amounts of coal-fired power generation, while expanding petrochemical production. According to the U.S. Energy Information Agency, 30% of power in the U.S. in 2017 was generated from gas-fired power plants, a 10% increase over 2007. During the same period, the proportion of coal-fired power diminished considerably, from 50% in 2007 to 31% in 2017. As this shift occurred, U.S. carbon emissions fell to levels last seen in the 1990s. Our gas infrastructure has played a prominent role in this development.

Nearly all of our U.S. gas transmission systems were designed to transport natural gas from prolific supply basins in the Gulf Coast to under-served market demand in the U.S. Northeast. Over the past decade, natural gas supply and demand dynamics in North America have changed dramatically. Through a series of expansions and reversals on our core systems, the

execution of greenfield projects and strategic acquisitions, we have been able to meet the growing and changing needs of consumers and producers alike. Over that period, we have placed approximately \$15 billion of natural gas growth projects into service. In 2018 alone, we approved 11 new gas transmission projects. Our asset base is now strategically placed to transport diverse supply to the Northeast, Southeast, Midwest and Gulf Coast markets on a fully subscribed and highly utilized basis.

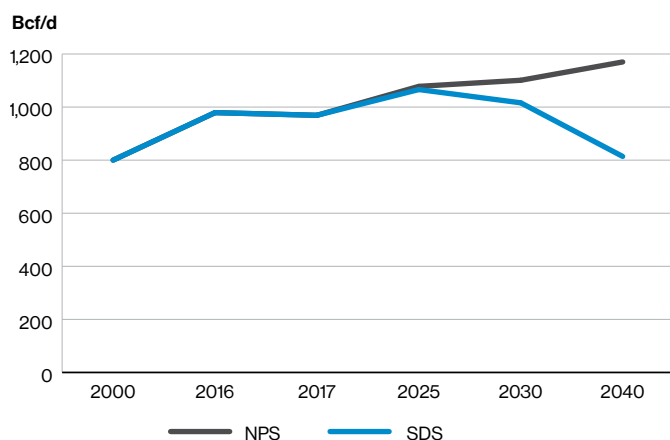
Yet, even under a North American growth scenario, North American suppliers are shifting focus to global gas markets. North American exports are expected to play a significant part in meeting global demand, underscoring the ability of our assets to remain highly utilized by shippers.

### IEA Natural Gas Demand Outlook: Sustainable Development Scenario



The SDS underscores the importance of shifting focus to global natural gas markets; it forecasts global gas demand growth of approximately 10% by 2025 and then is essentially flat to 2040 (with strong regional variations). Asia remains a strong source of demand growth through 2040 as natural gas and renewables combine to displace more carbon intensive fuels. In fact, the SDS foresees a larger role for natural gas in some markets than is envisioned under the NPS: The share of the natural gas mix rises to almost 20% in China and 16% in India by 2040 under the SDS, compared with 14% and 8% under the NPS. Under this scenario, many advanced economies—like North America and Europe—see gas demand falling due to energy efficiency policies and the expansion of renewable energy. In North America, natural gas demand increases through 2025 and then drops 15% by 2040.

## North American Natural Gas Demand



Source: WEO 2018

North America is expected to be a major player in supplying global gas markets. New U.S. LNG export plants have already started to change global gas dynamics. Enbridge's system is very well positioned for both supply push from areas like the Permian, Marcellus and Western Canada, and demand pull from growing markets in the U.S. Northeast, Southeast and Gulf Coast.

The North American center of growth is in the USGC, where petrochemical facilities, power generation, LNG and exports to Mexico are driving demand. Enbridge is well-positioned to benefit with our Valley Crossing Pipeline and our Texas Eastern Transmission system, which follows the coast from South Texas to Louisiana. These pipelines draw from multiple basins including the Permian, East Texas, and the Marcellus—through our bidirectional Texas Eastern system. We supply gas to Sabine LNG today and we are interconnected to Cameron LNG and Freeport LNG, which are expected to start up this year. Additionally, our network is well situated to serve multiple new projects currently under development in the USGC.

We also see opportunity on Canada's West Coast. The October 2018 decision to move forward with LNG Canada, Royal Dutch Shell's large-scale project on Canada's West Coast, means Canada will become a large-scale exporter in what could be the first of several new LNG projects in British Columbia (BC).

LNG export from BC is anticipated to create uplift in natural gas supply prices within the WCSB. In recent years, WCSB prices have been very low—or even negative—due to local supply exceeding local demand, and competitive supply alternatives available to other demand centers in North America. Enbridge is well-positioned to deliver growing WCSB supply for new LNG projects on Canada's West Coast.

BC LNG also has the potential to have the lowest carbon intensity globally. BC is the only jurisdiction in the world to mandate a LNG emissions benchmark. This means all BC facilities must meet or beat a standard of 0.16 tonnes of carbon dioxide equivalent (tCO<sub>2</sub>e) per tonne of LNG—a mark that is lower than recent plants coming online in other jurisdictions. Canada's commitment to reduce methane emissions from gas production (40 to 45% below 2012 levels by 2025) puts Canada in a strong leadership position on LNG emissions.

Mexican energy reforms have opened new opportunities to supply natural gas via newly built pipelines from the U.S. to Mexico. Enbridge's Valley Crossing Pipeline—a 168-mile pipeline delivering 2.6 Bcf/day—provides market access for Haynesville, Permian and other supply sources to Mexican utilities which serve approximately 37 million customers. Valley Crossing will have a meaningful impact on GHG emissions in Mexico, largely due to the displacement of fuel oil in Mexico's electricity generation.

Japan is expected to be the largest LNG importer, but it is China and other developing Asian markets that are expected to be the primary drivers of LNG demand growth—Asian markets reach 80% of global LNG imports by 2040. The IEA makes it clear that without new investment, growing offshore demand for LNG could result in a tight market as early as 2023. Because projects have long lead times, investment decisions need to be made soon to ensure adequate supply through the 2020s. Enbridge is well-positioned in multiple regions to support this incremental growth.

Given Enbridge's strategic location between highly competitive supply basins and demand-pull markets—both domestic and offshore—we are confident that our assets will remain used and useful under both the NPS and the SDS.



## Mitigating Risk from Methane Emissions

Both IEA scenarios rely heavily on replacing coal with natural gas and renewables. But the IEA has warned that the climate benefits of natural gas will not be fully realized unless methane emissions are tackled.

Methane emissions are regulated in Canada and the U.S. The Canadian federal government has set a target of reducing methane emissions by 40 to 45% below 2012 levels by 2025 and some provinces are establishing their own plans to align with the federal approach. In the U.S., some states are establishing their own frameworks for methane reduction. All of our natural gas transmission assets in the U.S. participate in voluntary programs to promote best management practices on methane reduction. These include the Interstate Natural Gas Association of America's Methane Emissions Commitments and the Environmental Protection Agency's Natural Gas STAR Program. In 2018, Enbridge's U.S.-based GTM business reported methane savings of 3.1 million cubic feet as a result of operational and maintenance measures that improved efficiency.

## Methane Reduction Strategies and Protocols

We are reducing methane emissions and conserving marketable methane while improving the safety, reliability and efficiency of our operations. Our programs, protocols and initiatives for integrity management, damage avoidance, maintenance of system fitness and leak detection are central to methane reduction. Processes to detect methane leaks include the use of Optical Gas Imaging (OGI) cameras, handheld "sniffer" gas detectors, infrared cameras, Audio Visual and Olfactory (AVO) inspections, right-of-way surveillance and air patrols on transmission pipelines. We conduct frequent leak detection surveys in accordance with leading industry best practices. Our GDS business has developed a leak management program that uses new technology for optical imaging, and portable flow sampling and data collection, for improved tracking and management.

Our GTM business has a comprehensive set of standard operating procedures that address methane leakage and venting within its transmission pipeline systems. Specific to GTM's compressor stations and metering and regulator stations, these protocols are designed to locate and prioritize repairs of methane leaks. Facility methane leakage surveys are conducted inside and outside buildings on all piping and components within the station fence lines that contain natural gas. Inspections are routinely performed as part of operator rounds and technician inspections to identify any leaks or other issues. This operating practice provides timely detection of fugitive emissions and ensures appropriate action is taken.

## 3.4

### Gas Distribution and Storage (GDS)

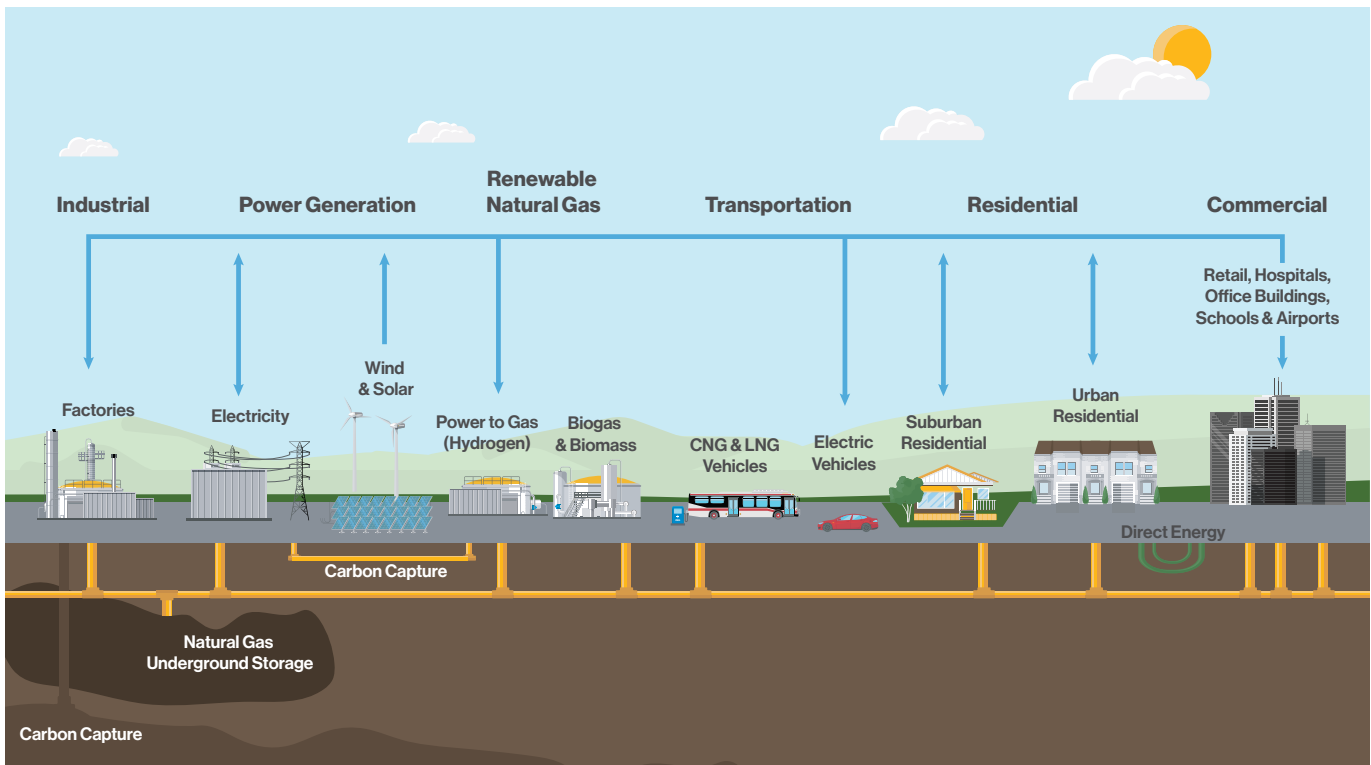
Enbridge also has a significant presence in natural gas distribution and storage in North America. We operate the largest natural gas distribution franchise in Canada, serving 3.7 million customers. Our Dawn Storage Hub assets in southern Ontario connect multiple supply basins with strategic markets and are positioned to serve both growing supply basins and growing end use markets.

#### GDS infrastructure: Resiliency strategies for a carbon-constrained world

- Continued development of new energy efficiency products, services and programs for our customers (homeowners and businesses).
- Application of new technologies for producing pipeline-quality natural gas with a lower carbon footprint, such as renewable natural gas (RNG) collected from decomposing organic waste, and power-to-gas (P2G) technology which uses renewable electricity to produce hydrogen or natural gas.

As discussed previously, the NPS shows North American natural gas consumption growing by nearly 20% through 2040. By contrast, the SDS shows North American gas demand increasing through 2025 before dropping by approximately 15% by 2040. What really matters for our GDS business is where demand growth is expected to occur.

## Enbridge GDS Profile



Under the NPS, North American natural gas demand growth is expected to continue to see low annual growth over the long term with continued growth in peak day demand. In Ontario, natural gas enjoys a price advantage over electricity. This will continue to drive significant growth with specific interest coming from communities that are not currently served by natural gas.

In Eastern Canada, we are adding 50,000 customers each year and deploying capital in excess of \$1 billion annually to maintain and grow our GDS assets and services. We see continued growth over the medium term given the growing energy needs of Ontario, the cost competitiveness of natural gas and growing supply partially enabled by our Dawn Storage Hub and Parkway transmission assets. Yet, due to the current grid makeup in Ontario (which has already transitioned from coal-fired power), this rapid pace of natural gas generation growth is not expected to be sustained over the long term.

Under the SDS, Enbridge's GDS business may see a slowing rate of natural gas growth. This is driven by changes to building codes requiring new homes to be net-zero emissions, increased fuel switching to geothermal and heat pumps, and increased energy conservation that will offset the increases in population growth.

Enbridge recognizes that consumers want more affordable, reliable and lower emissions energy and we are working to mitigate risk associated with certain scenarios that have natural gas demand diminishing in some regions. We also see significant opportunity in diversifying the products and services offered by our GDS business to respond to evolving customer preferences.

Enbridge's natural gas utility is a recognized leader with significant experience in Demand Side Management in North America. Since 1995, our DSM programs have reduced energy consumption by 30%—this is the equivalent of removing 7 million cars from the road. Customers trust Enbridge to provide them with information and programs to help better manage their energy consumption. For our residential customers, that includes incentives to weatherize homes. For commercial and industrial customers, it may include advice on how their business optimizes use of natural gas in heating and process loads, coupled with rebates for doing so.

In addition to investing in the businesses and infrastructure that are key to a low-carbon economy, Enbridge's natural gas distribution business is investing in specific technologies that can help accelerate that economy. Examples of these investments include technology that could see existing pipeline infrastructure used to store renewable energy to help address intermittency issues; technology for storage of CO<sub>2</sub> in a deep saline aquifer; and next-generation solar power technology that is less costly and has a lower environmental footprint.

Similarly, while increased electrification of energy systems and building new renewable power generation is expected to advance the transition to lower-emission energy, improved management of traditional energy sources and optimization of existing infrastructure will provide significant carbon reductions while also supporting energy affordability. Enbridge's natural gas distribution business is transitioning customers from higher-emission fuels onto natural gas and pursuing opportunities to reduce emissions through “greening” natural gas supply.

Enbridge is acting on the following opportunities:

- Delivering natural gas to customers who previously didn't have access, allowing them to switch from higher-emission fuels, while saving money on their energy costs.
- Renewable natural gas is methane produced from the decomposition of organic waste, which can be used in place of traditional natural gas for heat and transportation; it costs less than electricity and reduces the overall carbon intensity of natural gas. RNG can also become a clean source of energy that complements wind and solar. We've successfully secured RNG development projects, including the Dufferin project with the City of Toronto, and there are approximately 20 potential projects currently under review.
- Hydrogen, a carbon-free form of energy, has the potential to make a meaningful contribution toward achieving climate goals. Enbridge successfully commissioned the first large-scale power-to-gas fuel cell in North America in 2018, a 2.5-MW unit in Markham, Ontario which uses surplus renewable electricity and stores it by converting it to hydrogen. In the future, hydrogen could be used to store energy, refuel vehicles and be injected into the natural gas grid. This would further offset the carbon content of fuel that heats and powers homes and businesses.
- Converting transportation fleets to compressed natural gas (CNG), which has immediate environmental and affordability benefits in the near term, while setting the stage for the transition to carbon-neutral renewable natural gas as a fuel source for fleets such as buses and waste removal trucks as well as heavy haul transportation.
- Investigating solutions and implementing pilot initiatives to assist customers in using less energy. Examples include combined heat and power generation, heat pumps and geothermal systems.



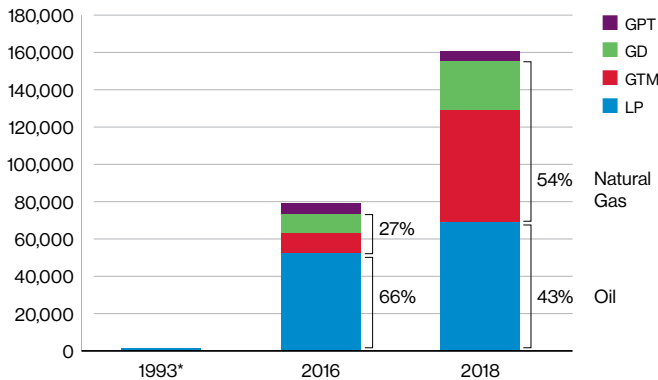
# 3.5

## Diversification Toward Lower-Carbon Energy

Enbridge's strategic planning process has consistently revealed opportunity in energy systems change. Over the past two decades, we have diversified our business to reflect shifting market fundamentals while staying ahead of the changing needs and expectations of our customers and stakeholders. Twenty-five years ago, at a time of major oil supply growth, we were a pure oil pipeline business. As we saw the future energy mix changing, we began to successfully diversify our business to natural gas and renewables.

In 2017, we accelerated growth of our gas transmission and gas distribution and storage businesses with the \$37-billion acquisition of Spectra Energy. This acquisition grew our asset base significantly and brought relative balance to our portfolio of oil and natural gas assets.

**Total Net Assets, Segmented**  
(Millions of Dollars at Year-End)



## Power and Renewables

Enbridge has invested more than \$7.8 billion in renewable energy projects. Our Green Power and Transmission (GPT) business unit includes renewable power generation assets consisting of wind, solar, geothermal and waste heat recovery facilities. Our net interests in renewable power facilities—either operating or under construction—have the capacity to generate more than 1,700 MW of zero-emission energy in North America and Europe. Of this amount, approximately 477 MW are generated by wind facilities in Canada, approximately 912 MW are generated by wind facilities in the U.S. and approximately 100 MW are derived from a 24.9% interest in the 400-MW Rampion Offshore Wind Project in the U.K. Additionally, 155 MW are derived from a 25.5% interest in the Hohe See Offshore wind power project in Germany. Enbridge is also a 50% owner of Éolien Maritime France (EMF) SAS. EMF is in the late stages of developing 1,428 MW of offshore wind farms in France. Power produced from these facilities is sold under long-term power purchase agreements. GPT also includes three solar facilities located in Ontario and a solar facility in Nevada with 51 MW and 27 MW (our net interest) of power generating capacity respectively.

We also have interests in electricity transmission assets—including the Montana-Alberta Tie-Line (a 300-MW transmission line from Great Falls, Montana to Lethbridge, Alberta) and the East-West Tie Transmission Project (a 230-kilovolt transmission line in Ontario currently under development).

Both the NPS and the SDS have global demand for both electricity and renewable energy growing rapidly between now and 2040. The NPS projects global power demand nearly doubling between 2017 (6,961 GW) and 2040 (12,466 GW), while the SDS has global power demand reaching 14,655 GW by 2040. The NPS predicts that the percentage of global energy supply derived from renewables will more than double between 2017 and 2040, while the SDS suggests renewables will need to triple if we are to meet the UN's SDGs.



After one year in service, Enbridge's Rampion Offshore Wind Project's 116 wind turbines have generated about 1,130 gigawatt hours of electricity. The 400-MW site, 13 km off the Sussex coast in the U.K., has the capacity to power 350,000 homes or around half the homes in Sussex, reducing carbon emissions by around 600,000 tCO<sub>2</sub>e a year.

Enbridge believes that diversification and innovation by incumbent energy companies have a significant role to play in the transition to a lower carbon future. Our investments in power and renewables provide Enbridge with experience in the development, construction and operation of onshore and offshore wind farms, solar generation, geothermal and electricity transmission projects.

In early 2018, we formed a joint venture with the CPPIB. By bringing them in as a minority interest partner in a sub-set of our renewable power projects in North America and as a development partner in the European offshore, we gained a very strong financial partner with whom we continue to pursue strategic renewable power investments. We are taking a deliberate, prudent approach to prepare for a world in which electricity, and renewable power generation in particular, become an even more important part of the global energy mix.

Our primary renewable development effort in the near term is directed at offshore wind projects in Europe, where we are able to obtain low risk commercial structures to support growth. This preference is based on a few key factors including: a firm

belief that offshore wind can play a disproportionately strong role in the transition to a low carbon economy; decreasing levelized cost of offshore wind power; higher capacity factors relative to other renewable technologies; the reduction of overlapping and potentially conflicting land use objectives, both with respect to the physical footprint required for generation and high-voltage transmission to customers; and the increased power system efficiency that results from locating generation close to consumption centers, many of which are located along coastlines.

Enbridge will continue to develop our power and renewables business where we have a competitive advantage and where we find opportunities with strong commercial underpinnings. As opportunities emerge, we will be looking to manage financial, regulatory and construction risk while securing long-term power purchase agreements (PPAs). Our asset mix will continue to be informed by the global energy mix—as renewable demand increases, our investments in renewable energy are also likely to increase.

# Governance

This section discusses how climate-related risks and opportunities are part of our governance process.

Our core values of Safety, Integrity and Respect and Statement on Business Conduct govern how we do business. The Enbridge Board of Directors is ultimately responsible for governance and stewardship of the Company. It has power to oversee the management of our business in support of the health and resilience of our Company in the short, medium and long term. Our approach to corporate governance is designed to align closely with best practice, which includes the highest degree of director independence. Our corporate governance structure is comprised of our Board of Directors, five Board Committees, our Executive Leadership Team (ELT) and other management committees and functional areas.

## Board Committee Accountabilities

Our Board carries out many of its responsibilities through five standing committees that are made up entirely of independent directors. Their responsibilities are summarized in the graphic below.

In particular, the following two committees have oversight on the effectiveness of Enbridge's strategies and performance on climate-related risks and opportunities:

- **CSR Committee:** Oversight responsibilities include government policy and regulation on climate issues; implementation of Enbridge's corporate climate policy; and stakeholder engagement on climate issues.
- **Safety and Reliability Committee:** Oversight responsibilities include the physical impacts of climate change.

### Safety and Reliability Committee

Oversight of safety and operational risk including pipeline and facility integrity management, security, emergency response, enterprise-wide safety culture and environment, health and safety.

### Corporate Social Responsibility Committee

Oversight of corporate social responsibility and sustainability matters including climate and energy, Indigenous rights and relationships, stakeholder engagement, government relations and environmental, social and governance matters, as well as our reporting in this area.

### Human Resources and Compensation Committee

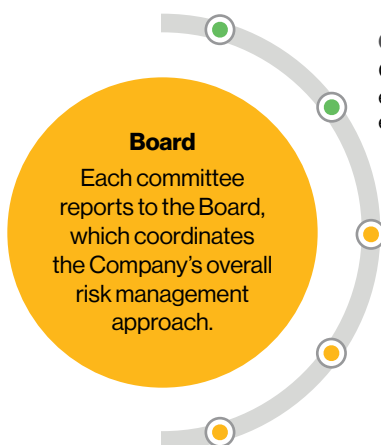
Oversight of people and compensation risk, ensuring our compensation program and practices do not encourage inappropriate or excessive risks that could have a material adverse impact on the Company; succession planning; and pension, retirement and savings plans.

### Audit, Finance and Risk Committee

Oversight of the Company's strategies, policies and practices relating to assessing, managing, preventing and mitigating risk and the integrity of our financial statements and financial reporting process, including the annual review of the Company's principal and financial risks and insurance program.

### Governance Committee

Oversight of corporate governance framework, including director appointment, education and evaluation processes, Enbridge's corporate governance practices and Statement on Business Conduct.



## Board Composition and Selection

We are committed to strong and sustainable corporate governance, which promotes the long-term interests of our shareholders, strengthens our Board and Management accountability and helps build public trust in Enbridge. We have a comprehensive system of stewardship and accountability that meets the requirements of all applicable rules, regulations, standards and internal and external policies.

Our diverse and highly engaged Board of Directors brings a range of viewpoints, deep expertise and strong energy-sector knowledge that helps ensure effective oversight of our strategic priorities and operations. Our Board has adopted a diversity policy which highlights the importance and value we place on differences in skills, experience, gender, ethnicity and geographic background. Five of our 11 directors (and five of our eight independent directors) are women.

For more information about our Board of Directors and our governance practices, please see Enbridge's Notice of 2019 Annual Meeting and Proxy Statement available in the Reports and SEC Filings section of the Investment Center at [enbridge.com](http://enbridge.com)

### Board of Directors

The Enbridge Board of Directors is responsible for the overall stewardship of the Company.

*As of August 2019*

Pamela L. Carter	V. Maureen Kempston
Marcel R. Coutu	Darkes
Susan M. Cunningham	Teresa S. Madden
Gregory L. Ebel, Chair	Al Monaco
J. Herb England	Dan C. Tutcher
Charles W. Fischer	Catherine L. Williams

### Director Education

All of our Board members participate in education sessions on key topics and developments. Our continuing education program for directors has provided our Board with presentations and discussions on climate and energy issues with leading external experts on environmental economics and on technological innovation and disruption.

### Management Responsibilities

Our senior managers and corporate subject-matter experts provide regular briefings to the CSR Committee of our Board on climate-related issues and developments. These briefings are also informed by targeted outreach to key external stakeholders and decision makers on climate issues, including

government policy makers, financial institutions, independent think tanks, customers, innovators and social and environmental non-government organizations.

Management is also accountable for oversight and execution of our reporting and disclosure on climate issues. This includes setting performance metrics and goals and engaging in special initiatives, such as development of this report, for advancing our practices and transparency on how we are preserving and building the value of our business during the shift to a lower emission economy.

In addition to ensuring that our Board is knowledgeable and briefed on climate issues material to our business, our ELT is responsible for ensuring adherence to a robust suite of corporate policies. Climate-related risks and opportunities are addressed in our policies, programs and management systems for governing pipeline safety and integrity, environmental management, emergency response and risk management. We also maintain a separate enterprise-wide [policy on climate change](#).

### Board Interface with Climate Scenario Planning

Enbridge has a robust, year-round strategic planning process which combines business unit perspectives with enterprise-wide perspectives—including finance, corporate development, human resources and sustainability. We analyze energy fundamentals (using supply and demand scenarios) and existing and emerging trends to assess potential for disruptive change to our business. This process includes strategy sessions and continual updates between Management and the Board where proposed strategy is tested and debated. This culminates in an annual strategic plan and financial outlook that incorporates key scenarios, sensitivity analysis and climate-related developments. As these scenarios incorporate climate-related risks and opportunities, so too do our processes for governance, risk management and strategic planning.

Similarly, capital allocation decisions consider global and regional energy supply and demand fundamentals as well as competitive advantage opportunities based in costs, skills, technology, infrastructure and proximity to markets. Environmental and social factors are also considered in determining the cost of capital and form part of each capital investment decision. Key factors assessed as part of any investment decision include safety, carbon pricing trends, stakeholder engagement, Indigenous consultation and economic opportunity, and air, water and land protection.



# Risk Management

This section discusses the processes used by our Management and Board to identify risks affecting our business, including climate-related risks, and to assess the effectiveness of measures being used to manage and mitigate these risks.

## Risk Management Practices at Enbridge

Risk oversight and management is a critical role for our Board and all of the members of our Executive and Senior Management Teams. The Audit, Finance and Risk Committee of our Board has oversight and accountability for the Enterprise Risk Management Framework which ensures that appropriate systems are in place to monitor, manage and mitigate potential risks to the different segments of our business.

Based on that framework, Management provides an annual comprehensive Corporate Risk Assessment (CRA) report to the Board and regularly updates the Board and the Board Committees on the status of material risks. Our CRA analyzes and prioritizes enterprise-wide risks and treatments, highlighting top risks and trends in Enbridge's risk profile. It identifies mitigation measures and demonstrates that treatments are appropriately prioritized, effective and resourced.

Strategic planning and forecasting functions leverage the CRA results to identify material risks to the priorities identified in our Strategic Plan. To better identify, manage and mitigate risk, the CRA is reviewed by the Board committee with responsibility for the risk category relevant to their mandate. The Board Committees are empowered to make recommendations and authorize implementation and monitoring of systems to address risk.

Risk owners and specialists throughout our Company are responsible for continuously managing risks within their respective areas. The two most senior management groups within our Company—our ELT and our Operations and Integrity Committee—are directly responsible for overseeing the management of our most significant operational risks.

At the governance level, our CRA report is reviewed annually by our four Board committees with enterprise-wide risk management responsibility: the Audit, Finance and Risk Committee; the Safety and Reliability Committee; the Corporate Social Responsibility Committee; and the Human Resources and Compensation Committee. As a result of this review, each committee makes recommendations to the Board in respect of Company practices. In addition, the Board Committees can authorize the implementation of systems that address risks within the scope of their responsibility and monitor them to ensure they remain effective.

Our annual report on Form 10-K contains information on the risks applicable to Enbridge and is publicly available in the Reports and SEC Filings section of the Investment Center at [enbridge.com](https://www.enbridge.com).

## **An Integrated Approach to Climate-Related Risks**

Climate-related risks are integrated into multiple larger Enbridge risk categories that encompass operational, financial and stakeholder consequences. This is done because the interconnected nature of climate impacts (economically, socially and environmentally) requires a comprehensive review within the context of other risks impacting Enbridge.

## **Mitigation Measures: Physical Impacts**

We limit exposure to the physical risks and impacts of extreme weather and other natural disasters through enhanced inspection and maintenance of assets, emergency response planning, business continuity planning and emergency response training and exercises. Improved alignment on contingency planning with other parties in broadly-based logistics networks enables us to coordinate on shutdowns in advance of severe weather events and on resumption of energy supply as a first priority following a storm. We include planning for extreme weather events in our operational response plans, and have installed on-site emergency generators at many of our operational facilities to provide power in the event of extended outages (during ice storms, for example).

We operate significant infrastructure both onshore and offshore in the Gulf of Mexico region. As there is a risk that these assets could be impacted by hurricanes, where possible, we have relocated our onshore assets to higher ground.

## **Mitigation Measures: Transition Impacts**

Policies and regulations addressing climate change vary at the federal, state, and provincial levels in which Enbridge operates. While international agreements on emissions reduction are influential in a directional context, our assets and growth opportunities are much more directly affected by local policies, legislation and actions which can be highly variable and subject to change. Many of the jurisdictions in which we operate have some form of regulation in place aimed at accelerating reduction in greenhouse gas emissions through public policies that can range from carbon pricing to renewable energy portfolio standards. Other jurisdictions are actively debating the merits of different climate change policies.

At Enbridge, we seek to engage governments to ensure that proposed climate policies are both effective and efficient. It is important that climate policies do not lead to carbon leakage or other unnecessary competitiveness impacts. We have equally important rigorous management systems and accountabilities in place to ensure ongoing engagement with local communities and stakeholders, particularly on issues involving safety, environmental protection and energy efficiency.

We are taking proactive steps to understand potential liabilities as different explicit and implicit regimes for carbon regulation and pricing emerge in the jurisdictions in which we operate. While we consider existing carbon pricing regimes as part of determining the levelized cost of energy, we are also developing a regionally specific internal carbon price for our Capital Allocation Process. An internal price on carbon will enable us to better identify the potential impact of a carbon-related compliance liability to a project and/or the economics of an ongoing operation.

# Metrics and Targets

## Previous Targets

Enbridge has previously set and met enterprise-wide and business unit specific GHG emissions reduction targets. Between 2005 and 2010 we achieved an initial target to reduce direct emissions from our Canadian operations to 15% below 1990 levels. Between 2010 and 2011 we achieved an additional 6% reduction below 1990 levels, for total reductions of 21% below 1990 levels. In 2012, our GDS business set a new target to reduce the emissions intensity of its operations relative to total number of customers. The goal was to reduce emissions intensity by 5% between 2011 and 2015. The target was achieved ahead of schedule, largely on the strength of the accelerated cast iron replacement program (see below).

### Spotlight on GDS

Since the early 1990s, Enbridge's natural gas distribution business has realized significant emissions reduction. The largest GDS initiative was a multi-year, multi-million dollar cast iron pipe replacement program, which started in the early 1990s and was completed in 2012. In total, GDS replaced approximately 1,800 km of aging cast iron and bare steel pipe with coated steel and plastic pipe. As a result, GDS reduced its annual fugitive GHG emissions (mostly methane) by approximately 145,000 tCO<sub>2</sub>e.

GDS also reduced methane emissions by 95% through retrofitting of our pneumatic equipment.

**Scope 1:** Direct GHG Emissions—Occur from sources that are owned or controlled by the Company, for example, emissions from combustion in owned or controlled compressors, boilers or vehicles, also including emissions from owned or controlled processing equipment (i.e. fugitive and venting emissions).

**Scope 2:** Indirect GHG Emissions (Electricity)—GHG emissions from the generation of purchased electricity consumed by the Company. Scope 2 emissions physically occur at the facility where electricity is generated.

**Scope 3:** Other Indirect GHG Emissions—GHG emissions emitted as a consequence of the activities of the Company, but occur from sources not owned or controlled by the Company. Some examples include extraction and production of purchased materials, transportation of purchased fuels, and use of sold products and services.

Our LP business unit has primarily Scope 2 emissions because electric pump stations are used to push crude oil through the pipelines. By contrast, our GTM and GDS business units have higher Scope 1 emissions because they use primarily natural gas-powered compressors to deliver gas into and through pipelines.

## Development of New Targets and Metrics

We set out to establish new targets in 2015 but our acquisition of Spectra Energy delayed that effort so that we could implement targets reflective of a larger and more diverse asset base and strategy. From now through 2020, Enbridge business units will each work to develop next-generation targets for reducing the emissions intensity of our operations (Scope 1 and Scope 2).

## Current Metrics

It is widely recognized that there is a need to develop consistent approaches for measuring and reporting corporate GHG emissions. In the absence of both consistent methodologies for measuring emissions and third party assurance for reporting emissions, it is very difficult to compare the performance of one company against that of another.

We provide GHG data on an absolute basis in our [sustainability report](#). In this report, we have chosen to provide emissions intensity data. We have done this for two primary reasons. First, as this report contends, reducing global GHG emissions will require concerted action across the entire energy system. More specifically, emissions reduction progress needs to be made in each part of the energy system—this includes more efficient transportation of oil and gas. An intensity metric allows for meaningful comparison of corporate performance within each part of the value chain and across our different businesses. Second, an intensity metric provides the only meaningful way to measure emissions reduction progress year over year when a corporation's asset base and/or its level of business activity is growing. It allows for meaningful analysis of corporate progress as our business grows organically and through acquisition.

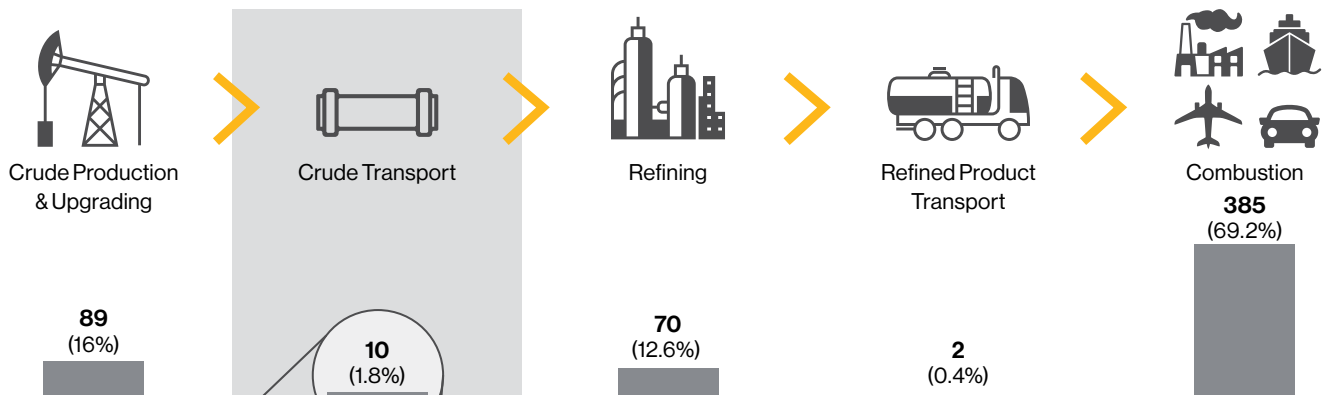
We will continue to account for industry trends relating to metrics and we anticipate modifying our metrics as industry standards evolve.

The metric we report in the chart on Page 25 shows the emissions intensity of each of our core businesses on a volumetric basis. Our LP business has no significant Scope 1 emissions as crude oil is pushed through the pipes using electric pumps. The numbers provided show that the emissions intensity of our LP assets has gone up slightly, due in large part to throughput increases. As throughput increases, so do Scope 2 emissions because electric pump stations must work harder to push oil through the pipeline.

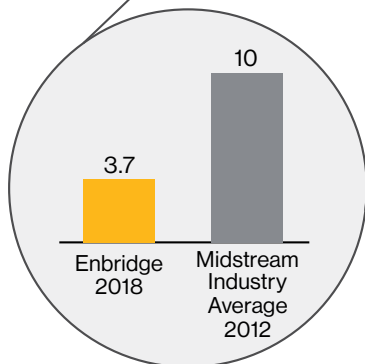
The following graphic shows where emissions come from within the oil value chain. It demonstrates that our crude oil transportation business makes up a very small portion of total GHG emissions on a lifecycle basis. It also shows that Enbridge's emissions are well below the industry average within the midstream sector.

### Lifecycle Emission Intensity (Scope 1 and Scope 2)

(Canadian Oil Sands, Average Produced), kg CO<sub>2</sub>e/bbl



Source: IHS Markit Canadian Oil Sands Dialogue



Enbridge business interests



Enbridge has a larger role in the natural gas value chain with both a gas transportation business (GTM) and a distribution and storage business (GDS), whose emission intensity for Canada and U.S. is shown on the chart on Page 25. In order to move natural gas through a pipeline, the gas needs to be pressurized at compressor stations located along the route. Compressor stations can be fueled by natural gas or electricity. The chart on Page 25 shows higher Scope 1 emissions for GTM Canada than GTM U.S. Similarly, GTM U.S. has higher Scope 2 emissions than GTM Canada. While there are many factors that determine the GHG intensity of different systems, the differences that appear in our metric are explained primarily by the fact that GTM U.S. uses more electric compressor stations than GTM Canada.

Moreover, since our metric, as we define it, captures all emissions from Enbridge-operated pipelines—irrespective of our level of ownership and in accordance with Greenhouse Gas Protocol guidelines—the increase in GTM’s emission intensity is a direct result of converting the Alliance Pipeline into an Enbridge-operated pipeline. Alliance has higher emission intensity because it is a long-haul pipeline and travels through jurisdictions with high-emission electricity grids. Enbridge’s Scope 2 emissions intensity is expected to improve significantly as provincial electricity grids lower their emissions.

GDS has primarily Scope 1 GHG emissions from natural gas combustion used to power line heaters, compressors and turbines used in the distribution and storage of natural gas. GDS has limited Scope 2 emissions as electricity is used primarily for office buildings. As the chart on Page 25 shows,

## Enbridge Green Power Production

**5,026 GWh**

Net Production in 2018



**487,154**  
**homes**  
**powered**

**4,728,963**

tonnes of CO<sub>2</sub> avoidance  
from coal power plants



GDS emissions intensity decreased slightly from 2017 to 2018.

The impact of our renewable energy production does not appear in the chart on the following page. Enbridge has the capacity—either operating or under construction—to generate more than 1,700 MW (net) of zero-emission energy in North America and Europe. The graphics above illustrate the impact of our production on GHG emissions. The graphic above shows that Enbridge produced enough zero-emission power in 2018 to supply more than 485,000 homes for one year. It also shows how many tonnes of CO<sub>2</sub>e would be avoided if our renewable energy projects were used to replace coal-fired generation.

While the data depicted on the following page is helpful as we monitor and look to continuously improve our performance, we will look for meaningful ways to incorporate our renewable energy assets into the metrics we use below.

## Metrics

Environmental Performance	2017	2018
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### GREENHOUSE GAS EMISSIONS INTENSITY<sup>1,2</sup>

#### LP (Canada and U.S.)

Greenhouse gas emissions intensity by scope  
*tCO<sub>2</sub>e/kbbl*

Scope 1: Direct	0.0	0.0
Scope 2: Indirect	3.6	3.7

#### GTM (Canada)<sup>3,4</sup>

Greenhouse gas emissions intensity by scope  
*tCO<sub>2</sub>e/Bcf*

Scope 1: Direct	1,505	1,445
Scope 2: Indirect	0.2	19.7

#### GTM (U.S.)<sup>3,5</sup>

Greenhouse gas emissions intensity by scope  
*tCO<sub>2</sub>e/Bcf*

Scope 1: Direct	599	725
Scope 2: Indirect	143	134

#### GDS (Canada and U.S.)<sup>6</sup>

Greenhouse gas emissions intensity  
*tCO<sub>2</sub>e/Bcf*

Scope 1: Direct	483	478
Scope 2: Indirect	1.5	1.3

#### Note:

1. The relationship between emission intensity and pipeline throughput is complicated and each pipeline is different. Factors to consider when calculating emission intensity include the pipeline network, age of the pipeline system, operational parameters and weather conditions (particularly for GDS).
2. Intensity metric excludes Scope 3 emissions.
3. Scope 1 and Scope 2 emissions exclude gas gathering and processing facilities in both Canada and the U.S. because these assets were or will be substantially divested in transactions authorized in 2018.
4. Maritimes and Northeast Pipeline (Canada) Scope 1 and Scope 2 emissions are not included in the 2017 results and Scope 2 emissions are not included in the 2018 result because comparable data are not available year over year.
5. The following U.S. offshore operations are excluded from the intensity metric: Garden Banks, Mississippi Canyon and Nautilus.
6. GDS results for 2017 and 2018 include transmission, distribution and storage assets of Enbridge Gas Inc.

## Task Force on Climate-related Disclosure Index

These recommendations were released in June 2017. This index references where information that addressed the recommendations can be found.

### TCFD Recommendations

#### Strategy

*Describe the climate-related risks and opportunities the organization has identified over the short, medium and long-term.*

pp. 4-17

*Describe the impact of climate-related risks and opportunities on the organization's business, strategy and financial planning.*

pp. 4-17

*Describe the resilience of the organization's strategy, taking into consideration different climate-related scenarios, including a 2 degree Celsius or lower scenario.*

pp. 4-17

#### Governance

*Describe the board's oversight of climate-related risks and opportunities.*

pp. 18-19

*Describe management's role in assessing and managing climate-related risks and opportunities.*

pp. 19

#### Risk Management

*Describe the organization's processes for identifying and assessing climate-related risks.*

pp. 20-21

*Describe the organization's processes for managing climate-related risks.*

pp. 21

*Describe how processes for identifying, assessing and managing climate-related risks are integrated into the organization's overall risk management.*

pp. 21

#### Metrics and Targets

*Describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets.*

pp. 22

*Disclose the metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management process.*

pp. 22-25

*Disclose Scope 1, Scope 2 and, if appropriate, Scope 3 GHG emissions, and the related risks.*

pp. 22-25

# Glossary

**AVO**

Audio Visual and Olfactory

**BC**

British Columbia

**Board or Board of Directors**

Enbridge Board of Directors

**Carbon Dioxide (CO<sub>2</sub>)**

A naturally occurring gas, also a byproduct of burning fossil fuels from fossil carbon deposits, such as oil, gas and coal, of burning biomass and of land use changes and other industrial processes and principal anthropogenic greenhouse gas. It is the reference gas against which other greenhouse gases are measured and therefore has a Global Warming Potential of 1 CO<sub>2</sub> equivalent.

**Carbon Dioxide Equivalent (CO<sub>2</sub>e)**

A unit of measurement that converts various greenhouse gas emissions on an equivalent basis to carbon dioxide.

**CCUS**

Carbon Capture, Utilization and Sequestration

**CPPIB**

Canada Pension Plan Investment Board

**CNG**

Compressed Natural Gas

**CRA**

Corporate Risk Assessment

**CSR**

Corporate Social Responsibility

**DSM**

Demand Side Management, which refers to mechanisms such as incentives and education programs designed to modify consumer demand and incent the more efficient use of energy.

**EHOB**

Extra Heavy Oil Barrels

**ELT**

Executive Leadership Team

**EV**

Electric Vehicle

**GDS**

Gas Distribution and Storage

**GJ**

Gigajoule

**GPT**

Green Power and Transmission

**GTM**

Gas Transmission and Midstream

**GW**

Gigawatts

**IEA**

International Energy Agency

**LNG**

Liquefied Natural Gas

**LP**

Liquids Pipelines

**MW**

Megawatts

**NGL**

Natural Gas Liquids

**NPS**

New Policies Scenario

**OGI**

Optical Gas Imaging

**OPEC**

Organization of Petroleum Exporting Countries

**Paris Agreement**

An agreement within the United Nations Framework Convention on Climate Change, dealing with GHG emissions mitigation, adaptation and finance, signed in 2016.

**PADD**

Petroleum Administration for Defense District

**PPA**

Power Purchase Agreement

**P2G**

Power-to-gas

**RNG**

Renewable Natural Gas

**Scope 1**

Accounts for direct GHG emissions which occur from sources that are owned or controlled by the Company.

**Scope 2**

Accounts for GHG emissions from the generation of purchased electricity consumed by the Company.

**Scope 3**

Accounts for other indirect GHG emissions from sources that are not owned or controlled by the Company.

**SDG**

Sustainable Development Goals

**SDS**

Sustainable Development Scenario

**Sustainability Report**

Annual Enbridge Sustainability Report

**TCFD**

Task Force on Climate-related Financial Disclosures

**Tight Oil**

Light crude oil contained in petroleum-bearing formations of low permeability, often shale or tight sandstone.

**USGC**

United States Gulf Coast

**WCSB**

Western Canadian Sedimentary Basin

**WEO**

IEA's World Energy Outlook

**WTI**

West Texas Intermediate





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