



# Climate change and the energy transition

GRI 102-12; 102-25; 103-1; 103-2; 103-3; 302-1; 302-2; 302-4; 305-1; 305-2; 305-3

Climate change requires serious solutions. As a leading energy infrastructure company—with assets across the energy system—we are positioned to help society transition to a lower-emissions economy, while working to reduce our own emissions.

## Business context and our approach

The world faces a serious dual challenge – meeting growing global energy needs while addressing climate change. As the world’s population continues to grow – from 7.7 billion people today to more than 9 billion in 2040 – as more people move to cities, and as we strive to raise standards of living and lift people out of poverty, access to energy that heats and cools homes, fuels transportation and generates electricity is an essential need.

And, while there is no doubt that an energy transition is underway, most forecasts suggest that more than half of 2040 energy demand will continue to be met by oil and gas. Put simply, if we are to meet our climate goals then we must find ways to produce and transport cleaner oil and gas. At the same time, we need to concentrate on developing more renewable energy, improving energy efficiency and switching to lower-carbon sources like natural gas.

Enbridge is committed to doing our part. We’ve set a new corporate strategic priority – adapting to energy transition over time – to align our decision-making processes with the transition. This strategic priority helps to transform our decision-making processes to ensure we are adequately prepared for the risks and the opportunities presented by the energy transition.

In 2019, we published [Resilient Energy Infrastructure – Addressing Climate-Related Risks and Opportunities](#), our first climate-focused report, informed by the recommendations of the TCFD. The report provides insight into how we see the transition to a lower-emissions economy and the role for our company within the transition. It also provides analysis that tests the resilience of our strategy and existing assets against lower-emissions scenarios.

The process of drafting a climate-focused report was, and continues to be, highly valuable and a key part of our strategic thinking; it drives our actions including continued investments in renewable power generation, innovation to assess and power our systems and facilities, and pursuit of investments in other low-carbon infrastructure and assets that further diversify our business. It also includes the recognition that we must address our own carbon footprint, protect our assets from climate-related physical risk, and better understand and address emissions in our value chain. In this report, we update our disclosure on physical risks of climate change; in future reports we will continue to provide updates guided by the TCFD reporting framework.

## Our actions

Enbridge’s [Climate Policy](#) – first adopted in 2003, and refreshed in 2019 – clarifies the key principles that guide climate-related actions across our enterprise and provides the framework for our three-pronged approach:



**Diversification**



**Innovation**



**Reducing emissions**

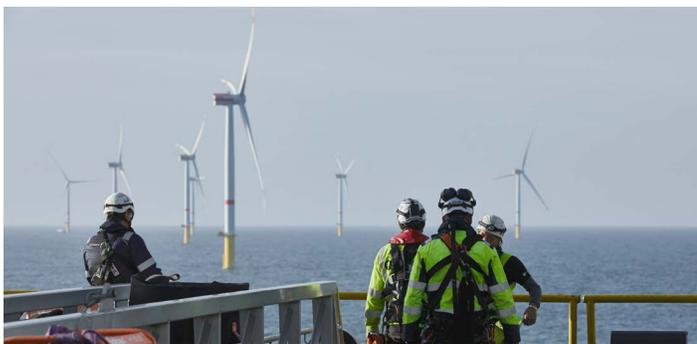
## Diversification

We believe that diversification and technological innovation by incumbent energy companies will play a significant role in the transition to a lower-carbon future. Although the transition to a lower-emissions economy poses risks, it also creates opportunities for companies to diversify and capitalize on new and emerging technologies and energy delivery options.

Over the past two decades, Enbridge has demonstrated its ability to diversify as it evolved from a transporter of crude oil to a highly diversified energy delivery company with a nearly equal balance of crude oil and natural gas delivery assets and a growing portfolio of investments in renewable energy. Our \$37 billion acquisition of Spectra Energy in 2017 was driven by our view of natural gas demand and the integral role it will play in North American and global economies in the decades to come. We were also early entrants to renewables, starting to build our power business nearly two decades ago with investments in solar and wind energy. We've deployed over \$8 billion in capital into this business and have built a solid operating and development capability that positions us well for the energy future.

Our capital allocation decisions and further diversification continue to be driven by market fundamentals and aligned to a changing energy mix, while staying ahead of customer and stakeholder needs and expectations.

Our renewable energy portfolio includes onshore and offshore wind, solar and geothermal projects in North America and Europe. We have nearly 2,000 MW of net renewable generation capacity, based on projects in operation or under construction; enough energy to power nearly 900,000 homes. In 2019, Maple Power Ltd., a joint venture between Enbridge and Canada Pension Plan Investment Board, was established with the objective of investing in and managing offshore wind projects in Europe. The projects are in phases ranging from early development, late development, construction or operational. The joint venture is domiciled in the United Kingdom, with staff based in London and Paris. In 2019, Enbridge allocated \$3.1 billion in capital to renewable power generation and made \$1 billion in long-term investments in renewable power generation. Additionally, two offshore wind projects that Enbridge has partial ownership of were completed in 2019: the Hohe See Offshore Wind Project, with 71 turbines and 497 MW of capacity, and the Albatros Offshore Wind Project, with 16 turbines and 112 MW of capacity. In 2019, Enbridge secured a long-term power purchase price agreement for the 600 MW Dunkirk wind project and an investment in 480 MW St. Nazaire offshore wind project in France.



> Power-to-gas plant in Markham, Ontario

### The critical role of natural gas

**Fuel-switching:** Over the past several years North America has capitalized on increased production of natural gas to enhance fuel-switching away from emissions-intensive coal-fired power generation. In 2019, fuel-switching in the U.S. power-generation sector resulted in an 18% year-over-year reduction in coal-fired generation, driving a 2.1% reduction in GHG emissions.<sup>1</sup>

**Reducing flaring:** Pipelines are playing an increasingly crucial role in the reduction of flaring in the U.S. Permian Basin. By increasing takeaway capacity, natural gas is shipped to market which improves netbacks for shippers and dramatically reduces the amount of natural gas that might otherwise be flared.

**LNG exports:** New export markets for natural gas are emerging and include the export of liquified natural gas (LNG) from the U.S. Gulf Coast (USGC) and British Columbia to southeast Asia and India. Replacing the world's existing and expected future fleet of coal-fired power plants with gas-fired generation would cut worldwide CO<sub>2</sub> emissions by approximately 5,700 megatonnes annually by 2040 — equivalent to cutting current global CO<sub>2</sub> emissions by more than 10%.

<sup>1</sup> Preliminary U.S. emissions estimates for 2019

## Innovation

As we diversify into lower-carbon businesses, we're also keenly focused on innovation as a catalyst for the transition to a lower-emissions future.

Our Technology + Innovation Lab (the Lab) is supporting the business through digital solutions that improve asset utilization and environmental performance. For example, the Lab has been working with our LP business to ensure our storage terminals work in unison by recommending the best flow paths, resolving bottlenecks. This helps to maximize throughput and make our system more efficient, reducing overall energy consumption and emissions.

Our GDS business continues to invest in innovation to reduce the carbon intensity of the energy it delivers, including 'greening' natural gas by blending renewable natural gas created from landfills and municipal organic waste. GDS is also working to pilot the blending of hydrogen, generated by its [Power-To-Gas facility](#), into our existing natural gas network to reduce GHG emissions beginning in 2021 (pending regulatory approvals). When completed, we will distribute the blended natural gas within a localized geographic area for both residential and commercial customers. This lower-carbon gas will reduce emissions across our energy value chain.

GDS is also partnering with [NRStor](#), Toronto Hydro and MPOWER Energy Solutions to pilot the first home battery rental program using the Tesla Powerwall to give eligible homeowners the opportunity to access reliable backup power during grid outages, better manage peak electricity usage and monitor real-time energy consumption. The battery will charge with lower cost off-peak electricity and use that stored energy during peak times to directly benefit the homeowner and the local electricity grid. This effort improves reliability for customers, reduces costs for everyone on peak energy days and lowers GHG emissions across our energy value chain.

Enbridge supports market mechanisms – including carbon pricing – as efficient and cost-effective means to reduce GHG emissions. We support the goals of the Paris Agreement and the use of Internationally Transferred Mitigation Outcomes as a way to reduce global GHG emissions, while incentivizing lower carbon economic activity in both the U.S. and Canada. Enbridge is an active participant on the American Petroleum Institute (API) Climate Committee which strives to ensure that the U.S. natural gas and oil sector is part of the climate solution.

## Reducing emissions

### *From our own operations*

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.

In 2019, we committed to developing next generation GHG emissions reduction targets. Since then we have established a rigorous process for the target setting process including the engagement of multiple external stakeholders and experts. Meanwhile, each of our business units has worked to establish emissions baselines and forecasts while also identifying and costing emissions reduction opportunities. To supplement the work done by our business units, we held internal and external innovation challenges to crowdsource emissions reduction ideas. We are also working to determine which internal processes will need to be updated to align with the targets we will set. At the time of publication, we continue to analyze different emissions reduction approaches as we work toward establishing new targets. We expect to announce new targets in the coming months.

### *Energy efficiency for our utility customers*

Through a wide range of Demand Side Management (DSM) programs, we encourage our natural gas customers – from homeowners to industrial facilities – to adopt energy-saving equipment and operating practices to reduce energy consumption. Between 1995 and 2019, GDS's energy efficiency programs reduced customer consumption by 30 billion cubic metres of natural gas, which is enough natural gas savings to serve nearly 12.5 million homes for one year. These gas savings have resulted in a reduction of 56.2 million tonnes of GHG emissions, roughly equal to removing 12.2 million cars from the road for one year – all lowering emissions in our value chain.

# Climate-related physical risk

As the potential for climate-related physical risk increases – and as a follow-up to the information provided in our [climate report](#) – we are working to further strengthen our risk-management framework to enhance our resilience to climate change. Enterprise-wide, functional groups are being asked to identify the climate-related physical risks which impact their area of responsibility and the mitigation in place to reduce or respond to these risks and where further treatment is required. While we will report on the results of these efforts in subsequent reports, this report provides an initial inventory of physical risks to our assets and outlines the steps we take to mitigate these risks.

Enbridge owns and operates assets across vast geographic areas and is therefore exposed to a wide variety of acute and chronic climate-related physical risks which include extreme precipitation, flooding, wildfires, heat stress, hurricanes, cold snaps and winter storms. Enhanced monitoring, inspection and maintenance of assets, emergency response planning and training, business continuity planning and mock exercises minimize the potential for negative impacts resulting from these events. Improved alignment with third parties on contingency planning 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 priority after a storm.

## Extreme Temperatures

Larger fluctuations in temperature are driving increased demand for energy and creating challenging physical working conditions for our employees. Some of the ways in which we are increasing the ability of our network to respond and enhance safety include:

- Reinforcement of natural gas supply (i.e. pipelines and associated transmission infrastructure) into significant growth markets
- Expansion of natural gas storage capacity enabling greater flexibility and resiliency

## Extreme Precipitation

Our energy delivery infrastructure is situated both above- and below-ground and as a result can be negatively impacted by extreme precipitation events which contribute to overland flooding, ground shifting and watercourse erosion. Some of the ways in which we are protecting our assets include:

- Instituted a Real-Time Flood Monitoring System for our liquids pipelines
- Partnered with a marine survey company to conduct unmanned autonomous bathymetric surveys of our pipelines at water crossings, including during peak flood conditions
- Partnered with Japan Aerospace Exploration Agency to analyze satellite images to identify land-based movement near our pipeline right-of-way (ROW) and terminals (including in vegetated areas)
- Enhanced protection of our buried pipelines at water crossing by adding cover such as sandbags and large rocks and/or replacement of existing pipelines at increased depths beneath water crossings
- Conducted a geotechnical assessment revealing an exposed pipeline to water forces and debris. The findings recommended the pipeline be replaced using horizontal directional drilling to prevent future exposure. The work was completed in early 2020.

## Hurricanes

Hurricane activity continues to increase in frequency and intensity particularly around the USGC where GTM owns and operates both manned and unmanned facilities. Some of the ways in which we are protecting our assets include:

- Designing our offshore pipelines to withstand increasing strength of waves, underwater currents and associated scouring
- Enhanced weather monitoring to forecast weather events, including wave heights and wind strength
- Participation in a cooperative which stores deep water repair tools used to repair or replace pipelines impacted by hurricane damage

## Performance

### Scope 1 GHG Emissions

Scope 1 GHG emissions include those that result directly from our operations such as natural gas-fired combustion from compressors used for transmission, along with fugitive and vented emissions. In 2019, our Scope 1 emissions reduced significantly mainly due to the divestment of our gas gathering and processing assets.

### Scope 2 GHG Emissions

Scope 2 GHG emissions include those that result from the off-site generation of electricity, which we buy and consume. Our LP business uses electricity to operate the pumps that push crude oil and other liquid hydrocarbon products through its pipelines. Note that as our pipelines become fuller, the amount of energy needed to push crude oil and other liquid hydrocarbon products increases proportionately due to several factors, including the type of flow and liquid viscosity. In 2019, our company-wide Scope 2 GHG emissions were about the same as 2018 levels.

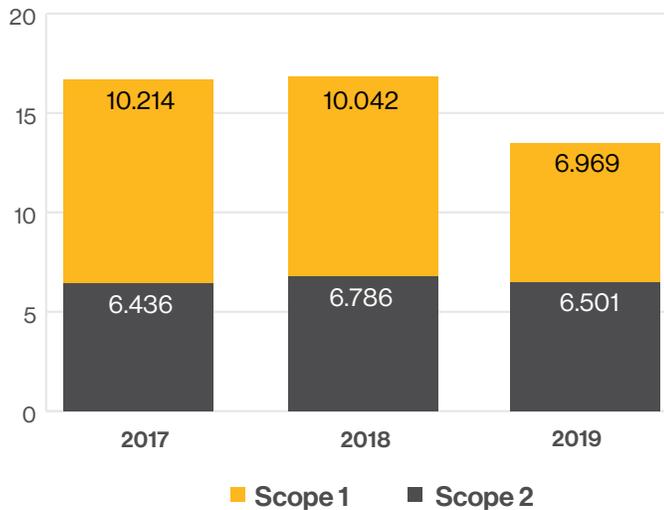
### Scope 3 GHG Emissions

We track Scope 3 GHG emissions that result from our utility customers' natural gas use, from our employee business air travel and from electricity grid transmission and distribution loss (grid loss). In 2019, Scope 3 GHG emissions were slightly less from both grid loss and employee travel relative to 2018 levels. Our Scope 3 emissions from customers' natural gas consumption increased by 7% relative to 2018. This is a direct result of an increase in customer sales at GDS.

To see a further breakdown of our GHG emissions please refer to our [ESG Datasheet](#).

### Scope 1 and Scope 2 GHG emissions

(million tonnes CO<sub>2</sub>e)



As part of our assurance process, we have made some changes in methodology and emissions factors. Therefore, our 2018 Scope 1 and Scope 2 emissions are restated.

## Methane performance

The majority of our methane emissions are from our natural gas transmission, storage and distribution business units, namely GTM and GDS.

In 2019, the total volume of methane released from our operations was approximately 1.5 million tCO<sub>2</sub>e, which is approximately 7% less than in it was in 2018. Methane is one of the three main GHGs which are included within our Scope 1 GHG emissions inventory. As a percentage, methane comprised 22% of total Scope 1 emissions in 2019, which is a 7% increase over 2018. This is due to the divestment of our gas processing assets in 2018, which resulted in a reduction in carbon dioxide emissions while our methane emissions remained largely the same. Therefore, methane emissions from venting and fugitive sources became more pronounced (in the absence of carbon dioxide).

### Methane emissions

(million tonnes CO<sub>2</sub>e)



This chart only includes Scope 1 methane emissions at GTM and GDS. Scope 2 methane emissions are not included here. LP operations are not a major source of Scope 1 methane emissions.

As part of assurance process, we have made some changes in methodology and emissions factors. Therefore, our 2018 Scope 1 methane emissions are restated.

# Leading the way to methane reductions

Natural gas is key to a lower-carbon future—as a cleaner, more efficient source of energy, it helps meet North America's growing energy needs in a way that is economically, environmentally and socially responsible. Yet, if natural gas is to meet its full potential as a climate solution then we need to find ways to reduce methane emissions.

Methane is a colorless, odorless gas that's both the primary component in natural gas and a potent GHG if released into the atmosphere before being combusted. Methane can be released from compressor stations that move gas through pipelines, maintenance activities (including venting), small leaks and third-party damage.

Enbridge is committed to taking proactive steps to reduce methane emissions as we work to address our own operational emissions while realizing the environmental benefits of natural gas and its role in the energy transition.

## Detection

At Enbridge, we use a range of methods to detect methane emissions:

- Optical gas imaging cameras to detect small leaks of fugitive emissions
- Hand-held 'sniffer' gas detectors
- Air patrols on transmission pipelines to enable repair or replacement of faulty equipment

## Reduction

Where possible, we use multiple approaches at our facilities to reduce methane emissions:

- Using portable compressors to capture natural gas which would have otherwise been vented to the atmosphere (when safely isolating segments of pipeline infrastructure)
- Replacing and modernizing equipment to reduce fugitive emissions (e.g. replacement of high-bleed controllers with low- or no-bleed controllers)
- Using compressed air rather than natural gas to start compressors
- Replacement of wet seals with dry seals in compressors to minimize fugitive emissions

## Collaboration

We are collaborating with our peers through joint industry partnerships on initiatives aimed at innovation and promoting energy efficiency solutions across the natural gas value chain. We also support advocacy that advances smart, cost-efficient regulations that complement voluntary reduction efforts.



### Environmental Protection Agency's Natural Gas STAR Program

Provides a framework for the implementation of methane-reducing technologies and practices and documentation of voluntary emission reduction activities. Enbridge has been a member since 2004.



### Interstate Natural Gas Association of America's (INGAA) Methane Emissions Commitments

Signatories aim to continuously improve natural gas transmission and storage operations. By measuring and monitoring emissions over two decades, INGAA member companies have gained knowledge about potential sources. Enbridge made this voluntary commitment in 2018.



### American Petroleum Institute's The Environmental Partnership (TEP)

TEP for the midstream oil and gas sector is designed to further reduce emissions of methane and volatile organic compounds using cost-effective technology, while providing a forum for participants to share information and analyze best practices and technological breakthroughs in order to improve our understanding of emissions and how best to reduce them. We joined TEP in 2020.



### ONE Future

An industry-led partnership that is driving toward a collective goal of reducing the industry's methane emissions rate or intensity to less than 1% by 2025 across the value chain. Enbridge joined ONE Future in 2020.