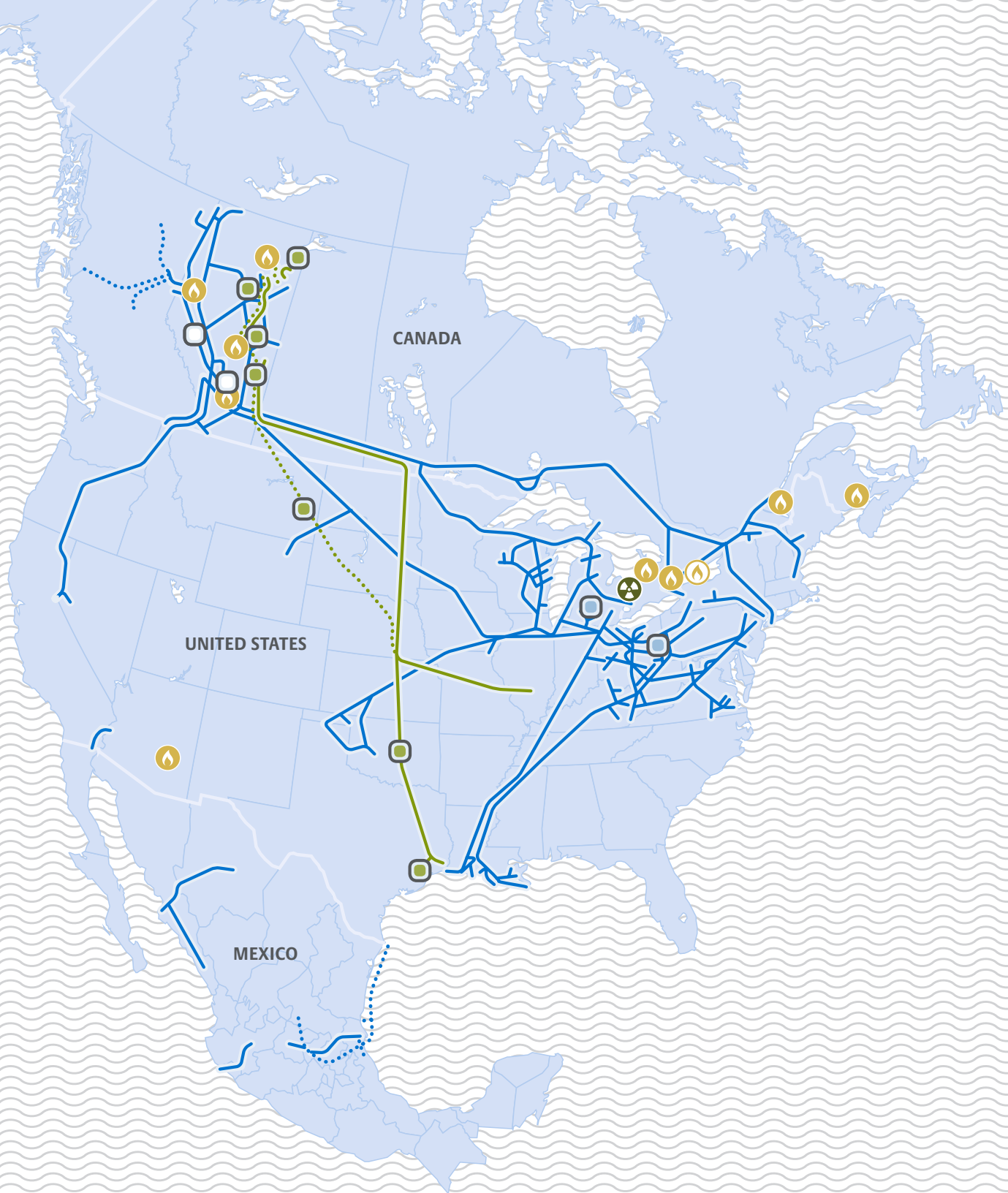
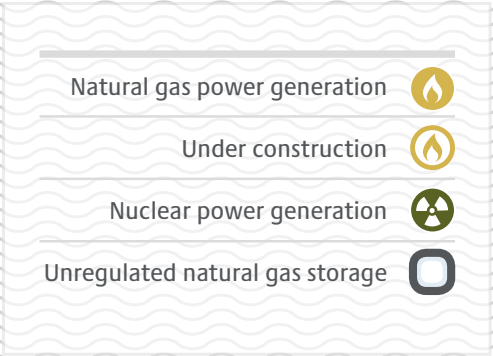
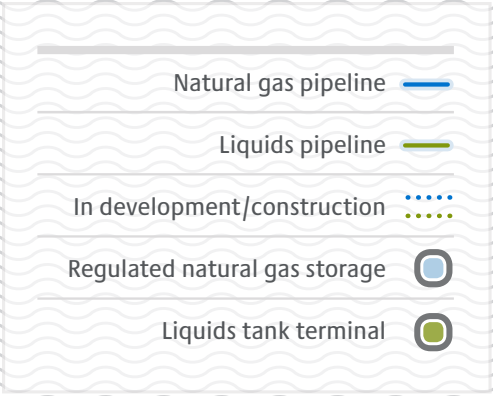


# Delivering energy responsibly.

Report on Sustainability and Climate Change







*Cover Photo: Charleston, West Virginia is home to more than 500 of our employees and our Charleston office includes the Natural Gas Control Center for the Eastern United States. Our roots in West Virginia run deep, dating back more than 100 years. Today, we safely and reliably operate more than 2,500 miles of natural gas pipeline in the Mountain State.*

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## Who we are

TC Energy proudly delivers the energy that millions of North Americans rely on to power their lives and fuel industry.

Guided by core values of safety, integrity, responsibility and collaboration, our people are deeply rooted in their communities and ensure that we develop and operate our facilities in an economically, socially and environmentally sustainable manner. We are committed to working closely with our neighbours and key stakeholders to develop better project plans and create long-term opportunities and economic benefits in the communities where we operate across Canada, the United States and Mexico.

Our success is achieved in large part by the efforts and actions of more than 7,000 employees and contract professionals who work on our behalf. From our corporate offices to our field operations, we actively seek out a wide range of candidates for all positions; recognizing that diverse backgrounds, cultures, opinions, expertise and skills drive innovation and strengthen our teams.



## Three complementary energy infrastructure businesses

### Natural gas pipelines

Our 92,600-kilometre (57,500-mile) portfolio of natural gas pipelines transports more than 25 per cent of the daily North American production of abundant, low-cost, clean-burning natural gas. This pipeline network strategically connects growing supply in the most prolific and lowest cost basins on the continent to key markets across Canada, the U.S. and Mexico. We also operate the continent's largest natural gas storage business, with more than 650 billion cubic feet (Bcf) of regulated and unregulated storage capacity.

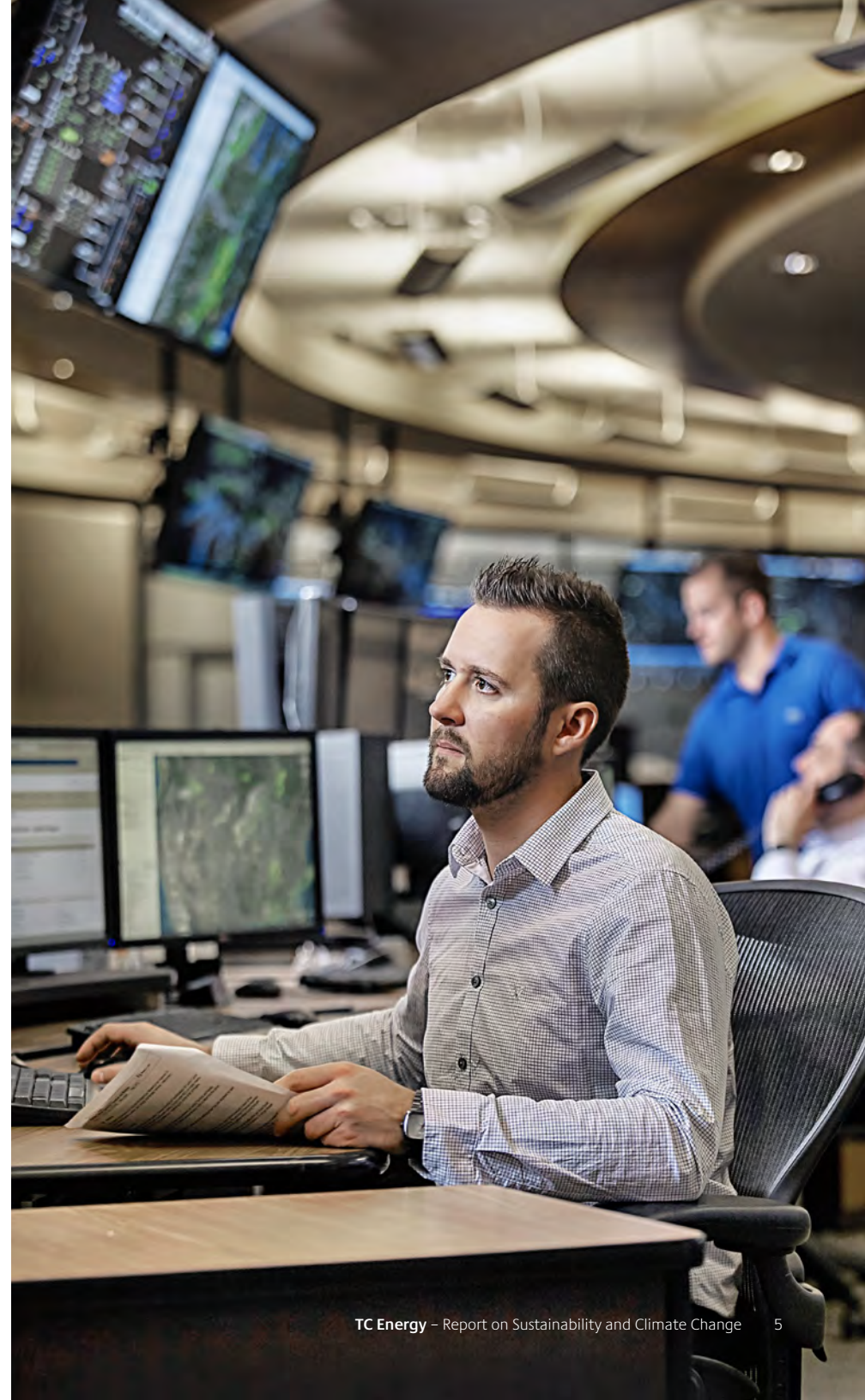
### Liquids pipelines

Our 4,900-kilometre (3,000-mile) liquids pipeline system connects growing continental oil supplies to key refinery markets in the U.S. Midwest and Gulf Coast, where it is converted into gasoline and other petroleum products we use every day. Our Keystone Pipeline System has long-term contracts to ship 555,000 barrels of crude oil per day (bbl/d) and delivers approximately 20 per cent of western Canadian production to U.S. markets.

### Power generation

TC Energy owns or has interests in 11 power generation facilities with capacity of approximately 6,600 megawatts – enough to power more than six million homes. Nearly half of the power we provide is generated from an emission-less nuclear power facility and we are leaders in the development and operation of high-efficiency natural gas-fired and cogeneration power facilities.

For further details about our business, including additional details on the scope, size and strategy of our operations, please refer to our *2018 Annual Report*. TC Energy is traded on Toronto and New York stock exchanges under the symbol TRP.





# CEO's message

## Committed to sustainability

TC Energy's purpose is to deliver the energy people need every day, guided in every decision we make by our core values – Safely. Responsibly. Collaboratively. With integrity.

Reliable and affordable energy is essential to daily life. When we drive our kids to school, flick on the office lights or cook a meal for our families, we depend on the natural gas, electricity and oil that are the foundation for the products and services that are central to our lives.

As a leading North American energy provider, we are proud of the role we have played in powering lives and fueling businesses for more than 65 years. By contributing to the energy supply that is fundamental to our quality of life while minimizing the negative impacts of our activities, we are building a truly sustainable business – one that improves our society's well-being and generates significant value for our shareholders and the communities where we operate.

I am proud to share our inaugural Report on Sustainability and Climate Change, which describes the work we are doing to ensure the resilience and long-term sustainability of our business in an ever-evolving energy landscape.

Over the last year, we have made important improvements to further embed sustainability into the governance, risk management and day-to-day operations of our organization. We added "Sustainability" to the mandate of the Health, Safety and Environment Committee of our Board of Directors in recognition of the growing intersection of governance, risk, environmental and social issues. We have created the role of Chief Sustainability Officer (CSO) to provide strategic leadership and direction on sustainability-related issues, including climate change, environmental stewardship, stakeholder engagement and Indigenous relations.

Looking to the recommendations of the Financial Stability Board's Task Force on Climate-Related Financial Disclosures (TCFD), this report provides focused, transparent and meaningful disclosure on how we assess and manage the risks and opportunities to our business in relation to climate change, as well as our ongoing actions to reduce greenhouse gas (GHG) emissions from our operations.

The demand for our services has never been greater, as the world's appetite for safe, reliable and affordable energy continues to grow. We recognize that it will take all forms of energy to meet this demand, which is why our current asset portfolio and our future growth plans continue to be informed by and aligned with long-term energy supply and demand fundamentals. In the decades ahead, most of the growth in energy demand will come from developing economies where more than one billion people live in poverty and access to affordable energy is essential for improving health, environmental quality and living conditions. In promoting prosperity and the improvement of living standards across the globe, we acknowledge that a truly effective strategy for reducing greenhouse gas emissions must consider that the world will require more energy to meet overall demand. We believe that North America should be the world's energy supplier of choice, as we are leaders when it comes to stringent regulatory standards, deep respect for environmental stewardship, human rights and responsible development.

Our investment in a balanced and sustainable energy system includes the safe transportation and storage of more than 25 per cent of the clean-burning natural gas consumed daily across North America. We play a key role in plans to move North America's prolific natural gas resources to global markets by connecting that supply through our infrastructure to the growing liquefied natural gas (LNG) export industry in the U.S. and



Canada. We are also the largest private-sector natural gas transporter in Mexico, providing cleaner sources of energy for power generation and other industries. Bringing affordable and reliable natural gas to global partners helps increase the world's access to cleaner energy sources, reducing global GHG emissions and enhancing global energy security and economic stability.

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### Sustainability highlights

In 2018, TC Energy undertook several key steps to embed sustainability into the governance, risk management and day-to-day operations of our organization.

- We created a new *Chief Sustainability Officer (CSO)* role to provide strategic vision and leadership of sustainability-related issues at the highest level of our organization.
  - We added “Sustainability” to the Health, Safety and Environment Committee of the Board to form the *Health, Safety, Sustainability and Environment (HSSE) Committee*. This new mandate recognizes and provides coordinated focus on the growing intersection of risk, governance, environmental and social issues.
  - We analyzed *the resilience of our energy infrastructure portfolio* under three long-term energy scenarios (Rivalry, Vertigo, Autonomy) and a fourth alternative case (2°Celsius) which formed a key part of our Board of Directors’ annual strategic planning session in 2018.
  - We approved a formalized *Enterprise Risk Management (ERM) Framework* and established a Chief Risk Officer role to provide a centralized and pragmatic approach to prioritizing risks, clarifying roles and responsibilities, and improving Board and management oversight.
  - We implemented *guiding principles* for the *environment and engagement with Indigenous groups and landowners* to ensure we have a consistent and respectful approach to managing our environmental footprint and working with those who have legal rights and distinct relationships to their land.
- 

We are one of the largest private-sector power generators in Canada. Nearly half of the 6,600 MW of electricity we generate through our 11 power generating stations is emission-less power from Bruce Power, which provides approximately one-third of Ontario's electricity supply. We continue to explore opportunities to invest in low-carbon and renewable energy projects. As North America transitions to a less carbon-intensive electricity supply, our vast network of pipelines have played an important role in the replacement of coal-fired power generation with natural gas, which has resulted in significant GHG emissions reductions across our major markets.

The transition to a lower carbon-emissions energy system has begun and will continue for decades to come. Our role is to deliver diverse forms of energy in the safest, most efficient manner possible, and we are working hard to manage our own emissions and reduce the GHG intensity of our operations. We have a robust research and development program, with a focus on improving the safety and efficiency of our facilities, and we continue to develop and implement new practices and technologies that reduce fugitive emissions and minimize methane loss during routine operations and maintenance on our pipelines.

Part of our commitment to long-term sustainability is listening to those who are involved with or affected by our business, and communicating candidly about our performance. For almost 20 years, we have provided relevant and comprehensive information about the environmental, social and corporate governance issues that matter most to our stakeholders through our annual Corporate Responsibility reports, on our websites, and in countless meetings and conversations.

Going forward, we will continue to improve the way we communicate to meet the needs of our diverse stakeholders. With that said, I encourage you to let us know how we are doing and how we can continue to improve.

Thank you for taking the time to learn more about TC Energy.

Sincerely,



Russ Girling  
President and CEO



# Enhanced public disclosure





## Our inaugural report

TC Energy is proud to continue our legacy of disclosure on topics important to our stakeholders in this inaugural Report on Sustainability and Climate Change. In this report, we have described our approach in the context of climate change to ensure the resilience of our business model during the transition towards a lower carbon economy. In consideration of the recommendations from the Task Force on Climate-Related Financial Disclosures (TCFD), we identify climate-related risks and opportunities to TC Energy's operations, as well as discuss our actions to reduce our greenhouse gas (GHG) emissions. As the first report of this nature, we have taken an important step towards transparently reporting our work on sustainability and matters related to climate change. We look forward to continuing to enhance our reporting processes to further meet the needs and expectations of our stakeholders.

## Core elements of recommended climate-related financial disclosures



*The Task Force for Climate-related Financial Disclosures (TCFD)*

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### Spotlight on: The Task Force for Climate-Related Financial Disclosures (TCFD)

In June 2017, the TCFD published a set of recommendations for developing effective climate-related financial disclosures through existing reporting processes for organizations. These recommendations provide a framework to solicit decision-useful, forward-looking information on material financial impacts of climate-related risks and opportunities, including the global transition towards a lower-carbon economy. We recognize the value of the TCFD recommendations in providing meaningful and transparent disclosure on our strategic planning and risk management processes.

While the TCFD recommendations are in an early stage, TC Energy looks forward to continued refinements to the framework. We have provided a table outlining the sections of this report that show our initial alignment to each of the four thematic areas identified by the TCFD (Appendix A). We will continue to assess how we can enhance our disclosure approach to best meet the needs of our stakeholders and the recommendations outlined by the TCFD.

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## Our principled approach to engagement and reporting

Our approach to engagement with people and groups who may have a vested interest in our activities is rooted in our core values of safety, integrity, responsibility and collaboration and our guiding principles for working with landowners, Indigenous groups and stewardship of the environment. We are committed to listening closely to the needs of all our stakeholders and responding with positive solutions that enable us to meet people's energy needs and mitigate adverse social and environmental impacts as much as possible. We also acknowledge that building trust takes time and that, in some cases, we may not be able to meet all stakeholder expectations, but we strive to present factual, clear and consistent information to ensure our stakeholders are well informed about our activities.



Our past Corporate Responsibility (CR) reports – produced since 2001 – demonstrated our ongoing commitment to providing comprehensive information on our economic, social and environmental performance consistent with recognized global standards. Building on this work, this inaugural Report on Sustainability and Climate Change continues our efforts to provide clear, strategic, and transparent information on sustainability and climate-related issues that are material to our stakeholders. While we have chosen to focus on disclosure of climate-related information in this year's inaugural report, we will continue to explore a variety of formats (e.g. regular web content, reports, etc.) that are tailored to the needs of different stakeholder groups. We encourage you to learn more about our approach to engagement, and topics such as community investment, environmental stewardship, pipeline safety and integrity and our financial performance at [www.TCEnergy.com](http://www.TCEnergy.com).

### **An enhanced digital experience**

We are committed to providing transparent and meaningful communication on our progress towards sustainability and our actions related to climate change. In an ever-evolving energy landscape, we also recognize that our stakeholders are interested in having easy access to accurate and timely data. Over the next year, we will launch improvements to our website to enhance disclosure of our performance on sustainability and climate-related issues. The website will provide more data and information measured against key performance indicators and industry standards while serving as a platform to engage in productive dialogue with our stakeholders as we continue to deliver safe and reliable energy across North America.

To help us continually improve, we invite all stakeholders and interested parties to provide feedback on this report or any other facet of our performance. Please visit the Contact page on our website for additional ways to reach out to us.



# Energy fundamentals and TC Energy's strategy



## A leader within an ever-evolving energy landscape

Global demand for energy is forecast to increase approximately 36 per cent from 2017 to 2050 driven by population expansion and economic growth.<sup>1</sup> Oil and natural gas are expected to retain the largest share of primary energy supply, while renewables are predicted to be the fastest-growing energy supply source in terms of market share.<sup>2</sup> In this environment, we are well-positioned to be a preferred provider of safe, reliable, affordable and sustainable energy delivery for decades to come.

TC Energy's purpose is safely and reliably delivering the energy people need, every day. In turn, our vision is to be the leading energy infrastructure company in North America, focusing on pipeline and power generation opportunities in regions where we have or can develop a significant competitive advantage. To be competitive, we must offer energy infrastructure services in our core markets that are attractive to customers. We have a multi-year strategic plan that identifies the key priorities to achieve our purpose, including the following<sup>3</sup>:

- Maximizing the full-life value of our infrastructure assets and commercial positions
- Commercially developing and building new asset investment programs
- Cultivating a focused portfolio of high quality development and investment options
- Maximizing our competitive strengths

The Board of Directors provides oversight and direction to ensure that we have a robust strategy that supports our vision. To facilitate this, we have a strategic plan that is updated annually, in addition to holding strategic planning sessions with the Board throughout the year to consider specific and emerging issues.

## A balanced portfolio approach

Our three major lines of business that serve core supply and demand centers across three countries provide diversification as the energy future unfolds, allowing us to position ourselves in the right asset classes reflecting long-term energy fundamentals.

Long-life infrastructure assets and long-term commercial arrangements are the cornerstones of our low-risk business model. Our natural gas and liquids pipeline assets connect low cost supply sources to growing markets – generating predictable and sustainable cash flow and earnings. Long-term power sale agreements are used to manage and optimize our portfolio and to manage price volatility in our power generation business.

We apply the principles of portfolio management to continuously optimize our asset base. Our divestitures of power generation assets in 2017 and 2018 were strategic decisions that supported our ability to prudently finance our \$36 billion secured capital growth program while reducing our exposure to power market volatility. Selling these assets at attractive market prices was a sound economic decision and does not reflect the role that power generation and renewable energy will play in our strategy going forward

## Our growth plans

Global demand for natural gas is expected to increase 45 per cent by 2040 as the world seeks ways to meet emissions-reduction targets through cleaner forms of energy.<sup>4</sup> Transporting natural gas – the cleanest-burning fossil fuel – in our pipelines continues to support the significant shift away from coal-fired power generation occurring in North America and beyond. We transport more than 25 per cent of North America's daily natural gas production and are expanding across our extensive network, including the NGTL, Columbia and other pipeline systems serving premium markets.

We are playing a role in developing North America's liquefied natural gas (LNG) export industry with several pipeline projects in the United States and Canada. Our \$6.2-billion Coastal GasLink project in British Columbia will initially move 2.1 Bcf/d of Canadian natural gas to international markets via the LNG Canada liquefaction and export facility. LNG Canada's exports could reduce annual global carbon dioxide (CO<sub>2</sub>) emissions by 60 to 90 million tonnes by displacing coal-fired electricity in importing countries, which equates to more than the total annual emissions of British Columbia and roughly 10 per cent of Canada's total annual emissions.<sup>5</sup>

<sup>1</sup> IHS Markit, *Global Scenarios Dataset – Energy Outlook to 2050: Rivalry Scenario, Version 1.0* (July 2018).

<sup>2</sup> *Ibid.*

<sup>3</sup> TC Energy, 2018 Annual Report, page 12. <https://www.transcanada.com/globalassets/pdfs/investors/transcanada-annual-report.pdf>

<sup>4</sup> International Energy Agency (IEA), "World Energy Outlook 2018." <https://www.iea.org/weo2018/>

<sup>5</sup> LNG Canada, "Safety and environment", Accessed February 7, 2019. <https://www.lngcanada.ca/safety-and-environment/>



In the U.S., our Columbia Gulf pipeline system supplies the Cameron LNG export terminal in Louisiana with approximately 0.8 Bcf/d. When combined with our US\$0.4-billion Louisiana Xpress and US\$0.2-billion Grand Chenier Xpress projects that are under development, we will supply approximately 3 Bcf/d, of supply from the Appalachian Basin directly to Gulf Coast LNG export markets within the next five years. On the East Coast, our recently completed WB Xpress project supplies gas to the Cove Point LNG facility in Maryland, while a planned expansion to our North Baja pipeline in California will transport U.S.-produced gas to the Costa Azul LNG facility on the West Coast of Mexico.

Our liquids pipelines business transports growing crude oil production to key markets. The proposed Keystone XL pipeline project would more than double the capacity of our Keystone Pipeline System with enhanced access to over 4.3 million Bbl/d of refining capacity in Houston and Port Arthur, Texas. Keystone XL would safely deliver Canadian and U.S. crude oil produced under stringent regulatory requirements by companies with strong histories of innovation and responsible development, supplanting primarily internationally-sourced heavy crudes used by Gulf Coast refineries.

We pursue North American power generation opportunities that fit our business strategy and risk preferences.<sup>6</sup> Billions of dollars of new investment will be required in the shift to lower GHG emission intensity electricity, including renewables, nuclear and natural gas.<sup>7</sup> We have experience building and operating renewable, nuclear and natural gas electricity generation facilities and capitalize on that expertise to capture investment opportunities. For example, TC Energy played a significant role in Ontario's transition away from coal-fired power generation through multibillion dollar investments in nuclear refurbishment, natural gas-fired generation and solar power installations.

Electrification investment also complements our natural gas pipeline business, as seen in Mexico. For over a decade, Mexico has significantly transitioned to natural gas from fuel oil and diesel as its primary electricity generation source. The subsequent natural gas demand growth required new pipeline infrastructure. TC Energy has met that need with approximately \$7 billion invested in natural gas pipelines in Mexico.

<sup>6</sup> TC Energy, 2018 Annual Report, page 13. <https://www.transcanada.com/globalassets/pdfs/investors/transcanada-annual-report.pdf>

<sup>7</sup> IEA, "World Energy Outlook 2018."



## Scenario analysis

We track energy supply and demand fundamentals on an ongoing basis. The transition to a lower-carbon energy mix is both a risk and opportunity for our business. Should alternative lower-carbon forms of energy result in decreased demand for our current services, the value of some of our long-lived energy infrastructure assets could be negatively impacted. We are cognizant of such consequences and monitor the development of innovative technologies that have longer-term implications for our strategy. In 2017, TC Energy committed to invest up to US\$25 million in Energy Impact Partners, a venture capital fund that invests in innovative technologies, services and products throughout the electricity supply chain from generation to consumption.

We recognize that the future energy system will evolve. As part of our 2018 strategic planning cycle, we analyzed the resilience of our portfolio under three long-term

energy scenarios and a fourth alternative case. This scenario analysis formed a key part of our Board of Directors' annual strategic planning session in 2018.

Scenarios offer alternative outlooks for the energy future but do not describe what will or should happen, and therefore investors should not rely on them to make investment decisions. We did not assign probabilities to the scenarios. Our objective was to better understand the resilience of our asset portfolio over a large range of potential energy supply and demand outcomes.

In this context, resilience refers to our ability to tolerate disruptions and adapt to external changes or uncertainties that may affect our ability to meet our long-term goals and remain effective under most situations and conditions.<sup>8</sup>

We compared our resilience under the following four scenarios, all of which were developed by IHS Markit and are described in Table 1.

Long-term planning and energy scenarios			Alternate case
Rivalry	Vertigo	Autonomy	2°Celsius
A world of increasing competition for political and economic power as the world transitions to a more multipolar world with broader distribution of wealth and influence. This increased competition plays out in the energy industry in important ways as growing rivalry among energy sources drives fundamental shifts in the fuels and technologies used in transportation and electric power generation.	A volatile future in which frequent economic and financial tremors cause political and social dislocations and instability. These undermine confidence and perpetuate a perennially risk-averse market environment that is focused on short-term profit maximization and cost containment, leading to time lags in large capital investment that leads to constant mismatches between demand and supply. While technology innovation is able to continue to move forward, the world is even less able to adjust to its impacts on labor markets and the broader economic landscape, adding further to an atmosphere of instability and imbalance.	A world in which a powerful combination of market and social forces helps to push technology and consumer behavior in ways that transform the global energy system. The world moves from one defined by centralized, traditional sources of energy, to one in which new sources of indigenous energy production are able to meet local energy needs that are changing in fundamental ways.	Designed to complement IHS's long-term global scenarios, however, underlying data is less detailed than the full scenarios. Describes a potential pathway to meet the Paris Agreement goal of limiting average global temperature increase to well below 2°Celsius above preindustrial levels by 2100.

Table 1 : IHS Markit descriptions of long-term planning and energy scenarios (Rivalry, Vertigo, Autonomy) and complementary alternate case (2°Celsius).<sup>9-10</sup>



## Results

Analysis of the Rivalry, Vertigo and Autonomy scenarios indicated that our base business and foreseeable growth prospects are resilient, largely because North American oil and gas production is expected to remain competitive across all three outlooks. In addition, the long-term contracted nature of our assets limits exposure. Energy fundamentals in the IHS Markit scenario, Rivalry, support growth in our core business segments.

The Vertigo scenario foresees a more volatile political and economic future with constrained clean energy policy and technology development. However, TC Energy's portfolio is resilient due to sustained energy demand and continued fossil fuel dominance of the energy mix. Investment opportunities exist in our core businesses and our ability and preference to fund growth from internally-generated cash flow insulates us from economic volatility.

TC Energy's portfolio withstands threats posed by the accelerated transition to less carbon intensive energy sources and increased country-level energy independence that defines the Autonomy scenario. Abundant low-cost energy coupled with efficiency gains leads to intense competition amongst energy sources and fossil fuel supplies. TC Energy's resilience requires being competitively positioned in North America's lowest-cost basins.

In the 2°Celsius scenario, decreases in long-term fossil fuel demand due to energy efficiency gains and technological breakthroughs in electrification and energy storage introduces uncertainty about the long-term resilience of traditional energy markets and the subsequent implications for energy infrastructure companies. TC Energy's assets in the 2°Celsius scenario are largely insulated from fossil fuel demand destruction to 2030, with only modest exposure for our liquids and natural gas pipeline assets. Post-2030 is an inflection point for hydrocarbons as policy aspirations materially reduce demand for fossil fuels. In such a situation we can adopt measures to preserve value such as accelerating depreciation or abandonment surcharges in order to ensure a return of capital.

We will continue to adapt to changes in the global and continental energy mix, mitigating risk and capitalizing on opportunities. We have a demonstrated ability to leverage core competencies to respond to a constantly evolving system. Taking advantage of opportunities to diversify, we expanded beyond our traditional natural gas pipeline business into electrification and liquids pipelines. As displacement of coal-fired generation has accelerated, we terminated our power purchase agreements in Alberta that became unprofitable due to new legislation, and we have captured natural gas-fired electricity opportunities. In addition, as demand for capacity on the Canadian Mainline declined, we converted part of the system from natural gas to liquids transportation, creating a platform for the Keystone Pipeline. More recently, we adapted to changes in natural gas fundamentals when we shifted our natural gas pipeline strategy, reversing the flow of natural gas on our ANR pipeline and acquiring Columbia Pipeline Group, mitigating threats presented by emerging shale gas production in the Utica and Marcellus formations in the northeast U.S. while creating new opportunities to grow our business. These are only a few of many examples of how TC Energy has thrived in the face of challenges to our business.

Looking forward, we will continue to utilize scenario analysis in our strategic planning cycle to enhance the rigour of our assessment of our long-term resilience. We continually develop mitigation strategies to enhance the resiliency of our business as the energy future evolves. We continue to monitor key indicators or "signposts" to gauge the direction of the energy sector, informing our capital allocation decisions, such as investments and divestitures.

<sup>8</sup> Task Force on Climate-Related Financial Disclosure (TCFD), *Technical Supplement: The Use of Scenario Analysis in Disclosure of Climate-Related Risks and Opportunities*, page 2. <https://www.fsb-tcfd.org/publications/final-technical-supplement/>

<sup>9</sup> IHS Markit, "Global Scenarios." <https://cdn.ihs.com/www/pdf/0119/IHS-Markit-Global-Scenarios-Brochure.pdf>

<sup>10</sup> IHS Markit, "Climate and Carbon." <https://cdn.ihs.com/www/pdf/1018/IHSMarkit-Climate-Carbon.pdf>

# Actions to reduce emissions





## TC Energy's role in the energy value chain

The energy industry is complex and multi-faceted. TC Energy works as an intermediary in the oil and gas value chain, moving natural gas and crude oil from supply sources through our pipelines to markets and/or storage facilities. In addition, we are a provider of power, generating electricity for companies that distribute energy to homes and businesses.

We seek to expand access to energy while minimizing any negative impacts. We recognize our role in the larger energy system, including the ongoing management of our own GHGs and the emissions. We believe in a global response to address climate change, where every individual, industry and government must be involved in managing the GHG footprint.

[Figure 1](#) (see page 18) illustrates the major stages of the energy value chain and how we provide safe, reliable and affordable fuel transportation and power generation every day.

## Our carbon performance

### How our emissions are generated

GHG emissions generated by our facilities and assets are primarily produced through our consumption of natural gas as a fuel source to power operations, planned releases of natural gas for maintenance activities, and the infrequent and unintentional releases of natural gas. We also have associated indirect emissions from the electricity purchased to power some of our facilities.

In 2017, we reduced our direct GHG emissions by 24 per cent overall compared to 2016 and saw a 22 per cent decrease in our company's total direct and indirect GHG emissions. These decreases were primarily attributed to the sale of our U.S. Northeast power assets in April 2017. We also experienced a consistent decrease in GHG emissions intensity across our Canadian and U.S. natural gas pipelines and power generation operations. This decrease is largely due to the sale of our U.S. Northeast

power assets and reduction in power usage on our Foothills, ANR and U.S. Natural Gas Operations natural gas pipeline systems.

For a more detailed breakdown on our 2017 emissions data, please refer to Appendix B. In accordance with our compliance requirements, 2018 emissions data is undergoing verification and will not be available until later in 2019. The most updated versions on our emissions data can be found on [www.TCEnergy.com](http://www.TCEnergy.com).

### Compliance reporting

We own assets and have business interests in several regions where there are regulations to address industrial GHG emissions, including GHG pricing policies which include emissions trading schemes.<sup>11</sup> In all the jurisdictions where we operate—Canada, the U.S. and Mexico – we employ TC Energy's operating procedures to inspect and maintain our facilities and we comply with regulatory requirements to track and report our emissions.<sup>12</sup>

We have been reporting GHG emissions in public forums since 1995, have consistently reported under the Canadian federal government's mandatory reporting system since 2004, and are currently reporting our facility GHG emissions annually to more than half a dozen regulatory systems in Canada, the U.S. and Mexico.

TC Energy facilities operate in jurisdictions where there are regulations to address industrial GHG emissions, including GHG pricing policies with emissions trading schemes.<sup>13</sup> We own assets subject to carbon pricing programs in California (cap and trade), the Northeast U.S. Regional Greenhouse Gas Initiative, British Columbia (carbon tax), Alberta (emissions trading scheme) and Québec (cap and trade).<sup>14</sup>

We actively monitor and submit comments to regulators as new and evolving initiatives are undertaken, and expect that, over time, most of our facilities will be subject to some form of regulation to manage GHG emissions.<sup>15</sup> We believe environmental considerations and competitive economics must coexist to help drive emission reductions. We continue to advocate for the use of carbon markets to create immediate and measurable reductions in GHGs at the lowest possible cost.

<sup>11</sup> TC Energy, CDP Climate Change Questionnaire 2018. <https://www.transcanada.com/en/commitment/environment/climate-change/>

<sup>12</sup> Kristine Delkus (Executive Vice President, Stakeholder Relations and General Counsel, TC Energy), Letter: TC Energy to Expert Panel on Sustainable Finance, February 7, 2019.

<sup>13</sup> TC Energy, CDP Climate Change Questionnaire 2018.

<sup>14</sup> Ibid.

<sup>15</sup> Ibid.



## TC Energy's value chain

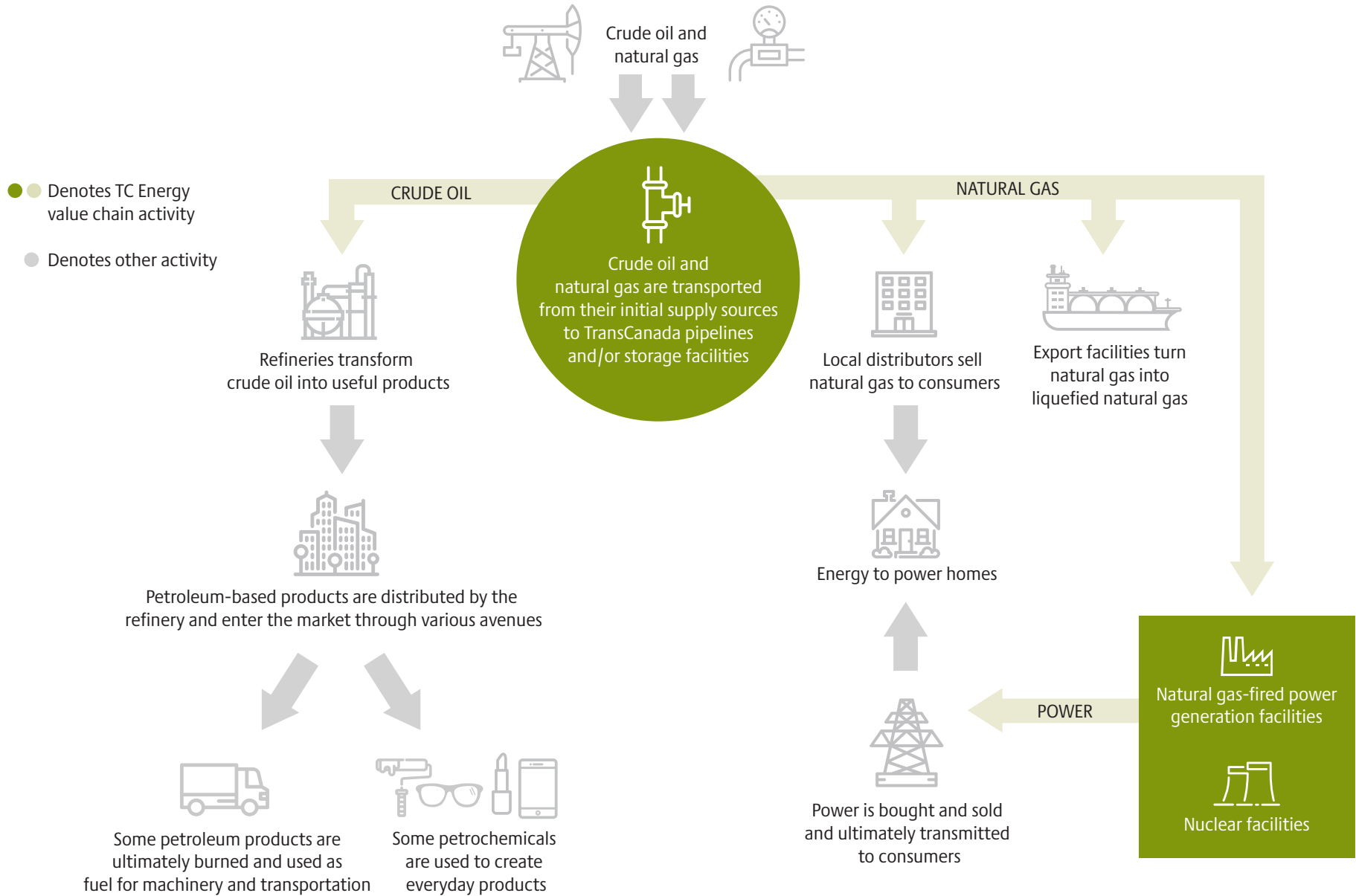


Figure 1. TC Energy's value chain

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### **Spotlight on: Emissions trading in Alberta**

For more than 15 years, TC Energy has proactively managed the emissions associated with its core businesses through asset-level efficiency improvements and installations, as well as by taking an industry-leading role in carbon markets across North America. In 2008, TC Energy voluntarily entered a forest carbon management project that is expected to sequester 14,000 tCO<sub>2</sub>e on non-farmable land in Saskatchewan between 2009 and 2029. The project served as a capacity building opportunity to help prepare TC Energy to take larger and more pronounced steps to offset its emissions in the future.

From 2007 through 2017, we were a regulated entity under Alberta's Specified Gas Emitters Regulation, and now the Carbon Competitiveness Incentive Regulation (CCIR). Throughout this period, TC Energy transacted on more than 11 million tonnes of carbon credits in Alberta, with an approximate 4 million tonnes since 2017.

TC Energy has primarily used the purchased credits to meet our emission reduction obligations in Alberta. We have also sold credits to our existing power and gas customers, as well as to other compliance buyers in the Alberta market.

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### **Our perspective on effective carbon policy**

TC Energy recognizes interest from governing bodies to reduce GHG emissions through the implementation of various carbon policy and regulatory mechanisms. We support policies that recognize the global nature of climate change and promote the reduction of both GHG intensity and absolute volume in a way that enhances human well-being now and in the future, considering the need for affordable, reliable energy and economic growth.

Across North America, there are a variety of new and evolving initiatives at the federal, regional, state and provincial level aimed at reducing GHG emissions. The result is a patchwork of requirements that impose a heavy burden on companies that operate in multiple domestic and international jurisdictions. Harmonizing program rules, tools, standards, and quantification methodologies across states, provinces, territories, regional and international partners would be foundational for building climate policy cooperation, improving efficiencies, and de-fragmenting regulatory approaches. Such actions can also allow businesses to more easily and cost-effectively plan, comply, and invest.

We support the need for sensible and cohesive public policy frameworks by engaging in dialogue with policy-makers and industry peers to help our industry fully participate in the North American discussion on climate change. Further, we contribute to a unified North American response through memberships in industry organizations, engagement with government and stakeholder representatives on climate change policy developments, and funding research into GHG emissions reduction opportunities.

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### **Spotlight on: the Paris Agreement and Canada's Methane Reduction Regulation**

On November 4, 2016, the Paris Agreement came into force as a global commitment to undertake ambitious efforts to combat climate change and adapt to its effects. Its primary aim is to strengthen the global response to limit the impact of climate change by keeping the global average increase in temperature below 2°Celsius relative to pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5°Celsius.

In support of this global commitment, Environment and Climate Change Canada issued the final Methane Reduction Regulation on April 26, 2018. The regulations detail requirements to reduce methane emissions through operational and capital modifications. There are multiple timeframes for compliance, beginning in 2020. For most of TC Energy's Canadian pipeline assets, it is likely that the federal regulation will apply. Compliance will involve equipment retrofits, frequent leak detection, repair surveys and measurements to quantify emission reductions and associated annual reporting.

As climate change is a global issue, we support collective actions towards a balanced energy future including investments in new energy infrastructure and advancing innovative and economically effective solutions to reduce our GHG emissions. TC Energy supports national and industry commitments leading to global emissions reduction in line with the objective set out by the Paris Agreement.

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## Our approach to carbon management

We are committed to managing our GHG emissions, focusing on our GHG intensity and continuing to integrate climate considerations into our overall business strategy, risk management and business development.

We look for innovative and economically effective solutions to improve system and process efficiencies that help manage emissions. Through the development of world-class technologies, we are working hard to reduce the GHG intensity of our operations and reduce energy use on our pipelines and other facilities.

We comply with absolute and intensity-based GHG emissions targets based on regulatory requirements in Alberta, Québec, California and certain states in the U.S. Northeast. In California and Québec where cap-and-trade programs are in place, we employ a variety of operational and market mechanisms to obtain emission units and offset credits.

### A reputation for innovative system design and operations

We believe technological innovation is critical to managing the complex and inter-related issues surrounding GHG emissions. With demand for low-emissions natural gas and electricity steadily climbing, the industry must continuously seek out new technologies to improve system and process efficiencies and limit the release of emissions. For over half a century, we have pioneered innovative technology and practices to enhance efficiency and reduce emissions at our facilities. For example, in the mid-2000s, TC Energy was the first Canadian company to test prototypes of hand-held, high-flow, leak-detection samplers that were 20 times faster and significantly more accurate than traditional methods. We have been instrumental in distributing this breakthrough technology across industry.

We maintain a robust corporate research and development program, with a focus on improving the safety and efficiency of our operations. For example, we recently implemented new technology in Canada to improve the tracking of our fugitive emissions data at valve sites, meter stations and compressor stations, allowing us to improve operations and regulatory reporting activities to improve our ability to plan maintenance and analyze pipeline data.<sup>16</sup>

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### Spotlight on: Methane emissions reductions

We have been a driving force in the pipeline industry in developing and implementing new practices and technologies to reduce fugitive emissions and the loss of natural gas and associated methane during routine operations and maintenance.

TC Energy is a signatory to the United Nations (UN) Methane Guiding Principles. These principles focus on priority areas for action towards the reduction of methane emissions across the natural gas value chain. As a signatory to the UN Methane Guiding Principles, we strive to:

- Continually reduce methane emissions
- Advance strong performance on methane emissions reductions across the natural gas value chain
- Improve the accuracy of methane emissions data collection
- Advocate sound policy and regulations on methane emissions
- Increase transparency in relevant reporting on methane emissions

In alignment with these principles, we continue to implement practices to enhance our management of fugitive methane emissions. During maintenance, the use of pull-down compressors and hot tap procedures help us to capture and recycle methane emissions. During operation, our Fugitive Emissions Inspection and Leak Repair Program enables us to identify leaks on pipeline and compressor station valves and other components, helping reduce releases of natural gas. We are investing in new technology in our operations to improve tracking of our natural gas pipeline fugitive emissions data at valve sites, meter stations and compressor stations. The technology will improve operations and regulatory reporting activities resulting in improved ability to plan maintenance activities.

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<sup>16</sup> TC Energy, *Delivering Energy Responsibly: TC Energy Corporate Responsibility Report 2017*, Page 43-44. <https://www.transcanada.com/globalassets/pdfs/commitment/transcanada-cr-report.pdf>



## Working with others on climate change

Our track record on implementing innovative solutions to meet customer needs spans over 65 years. We collaborate with industry and government partners to enhance the safety, efficiency and reliability of our construction and operations, and have played a key role in advancing environmental stewardship across the energy industry. We also contribute to a unified North American response to climate change through memberships in industry organizations, engagement with government and stakeholder representatives on climate change policy developments, and funding research into GHG emissions reduction opportunities.

Our partnerships and collaborations with industry and policy-makers include the following:

- We are part of a cross-sectoral working group of academics, industry peers and regulatory groups in North America to facilitate regulatory acceptance and industry deployment of new Leak Detection and Quantification (LDAQ) methods and encourage their deployment in more effective Leak Detection and Repair (LDAR) programs. The group includes representatives from 16 oil and natural gas operators, two industry associations, 10 regulatory jurisdictions, two major environmental NGOs, five universities and several other organizations.
- We sponsored an independent study conducted by the Conference Board of Canada entitled *Canadian Economic and Social Implications of Deep GHG Reductions* that provided input to the Government of Canada on its commitment to reduce methane emissions in the oil and gas sector.
- We are collaborating with several industry peers towards the detection and reduction of methane emissions. For example, we are collaborating with ATCO and Southern Alberta Institute of Technology to develop drone technology for use in detection and quantification of methane emissions. We are also designing a methane capture and destruction/reinjection system for our compressors and methane venting assets in collaboration with Solar Turbines.
- We are participating in the U.S. Environmental Protection Agency (EPA) Natural Gas STAR program, a voluntary partnership between EPA and industry to encourage adoption of cost effective technologies and practices to improve operational efficiency and reduce methane emissions, with a goal of showing methane emissions reductions in existing units with improved efficiency.
- We are a participating member company in the Interstate Natural Gas Association

of America Methane Emission Commitment, which was established in 2018 and is a commitment to continuously improve seven specific practices to minimize methane emissions from interstate natural gas transmission and storage operations in a prudent and environmentally responsible manner in three areas of operation: pipelines and pneumatic controllers; storage and compressor stations; and, R&D and information.

- We are one of 16 members in the ONE Future Coalition, a group of natural gas companies working together to voluntarily reduce methane emissions across the natural gas supply chain. Using uniform, EPA-approved reporting protocols, the coalition registered a 2017 methane intensity number of 0.552%, well ahead of its goal to reach 1% by 2025.

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### Spotlight on: Innovative power projects in Alberta

In early 2019, we launched two first-of-their-kind power generation projects with support from Emissions Reductions Alberta. These projects illustrate how we are realizing new business opportunities that yield economic and environmental benefits:

Working in partnership with Siemens, we are developing the world's first waste heat recovery power generation facility that will use super critical carbon dioxide to capture waste heat from one of our natural gas pipeline compressor stations, which will be used to generate electricity for Alberta's power grid. The facility has the potential to generate enough electricity to power more than 10,000 homes, reducing GHG emissions by 44,000 tonnes per year, the equivalent of taking 9,000 vehicles off the road.

We are also pursuing a novel, utility-scale solar-plus-storage electricity generation facility near Aldersyde, Alberta. This project will utilize innovative bifacial panel solar technology combined with the deployment of flow battery energy storage technology to demonstrate the practicality of renewable generation and viability of long duration battery storage in Alberta. This innovative project will provide direct GHG benefits through the generation of emission-free renewable power to meet the needs of 3,000 homes. The project will also help prove the technical and commercial viability of these technologies for wider scale adoption.

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# Management of climate change risks and opportunities



## Effectively managing risks and opportunities across our business

TC Energy carefully assesses the risks and opportunities associated with climate change. To better understand and manage these risks, we incorporate risk assessments into our decision-making process at all levels, listen to our stakeholders' concerns and collaborate with our industry peers. Through this iterative process, we make informed decisions that integrate climate considerations into our overall business strategy.

For more details on our governance and approach to risk management, please refer to page 85 of our *2018 Annual Report* and pages 39-42 of our *2019 Management Information Circular*.

## Governance

We recognize that everyone – from the Board of Directors to management to employees – has a role to play in risk management. The Board and its committees are responsible for risk oversight and the Governance Committee of the Board is responsible for overseeing TC Energy's Enterprise Risk Management (ERM) Framework which provides for management systems and processes for identification, evaluation, prioritization, mitigation and monitoring of risk. Other Board committees oversee TC Energy's management of specific types of risk. For instance, the HSSE Committee monitor's risk management for health, safety, sustainability and environmental risks, including climate-change related risks.

[Figure 2](#) (see page 24) describes the segregation of duties between the Board of Directors, Board Committees and Management as it relates to TC Energy's management of climate-related risks and opportunities.

## Development of the CSO role

We understand that our performance as a company is tied to the sustainability of our business practices. As an industry leader, we strive to meet growing energy demands in an economically, socially and environmentally sustainable manner. In our journey towards a balanced and sustainable energy future, we are committed to delivering on the needs of our stakeholders through our core values of safety, integrity, responsibility, and collaboration.

As we continue to evolve in our understanding on what sustainability means for TC Energy's strategic vision and objectives, we are proud to introduce the company's new role of CSO. Effective May 1, Patrick Keys was appointed Executive Vice-President, Stakeholder Relations and General Counsel and assumed the role of Chief Sustainability Officer. We have always set the highest priority on operating in a sustainable manner to meet the needs and expectations of our stakeholders. The CSO role formalizes this commitment by establishing a coordination role at the highest level of the organization. In addition to providing strategic vision and leadership, the CSO will oversee the communication and coordination of sustainability-related issues to ensure alignment with our corporate strategy. The CSO will communicate with Board members, management, shareholders, customers, employees and other stakeholders to address sustainability matters.

## HSSE Committee amendment

We continually work to evolve our governance model to reflect the needs and expectations of the organization and our stakeholders. In late 2018, we added "Sustainability" to the Health, Safety and Environment Committee of the Board (now the "Health, Safety, Sustainability and Environment Committee" or the "HSSE Committee") to recognize and provide coordinated focus on the growing intersection of risk, governance, environmental and social issues. Over the next year, the responsibilities and oversight activities of the HSSE Committee will evolve as we further integrate sustainability into our business practices.



## Board

The board fosters the long-term success and sustainability of TC Energy.

## Board committees

The Health, Safety, Sustainability and Environment Committee reviews, monitors and reports to the Board on actions undertaken by TC Energy to prevent, mitigate and manage risks related to HSSE matters, including risks related to climate change.

The Governance Committee oversees management's approach to strategy and risk management, both of which incorporate climate-related assessments of risks and opportunities.

## Management

The CEO and Executive Leadership Team develops and implements TC Energy's strategy, and the Chief Risk Officer (CRO) is responsible for our Enterprise Risk Management (ERM) Framework.

The Chief Sustainability Officer (CSO) is responsible for directing the coordination, communication and management of sustainability-related issues for TC Energy, particularly the intersection of risk, governance, environmental and social issues. The CSO reports to the HSSE Committee of the Board on sustainability matters, as well as to the CEO and Executive Leadership Team.

The Health, Safety, Sustainability, and Environment Management Committee recommends strategic priorities relating to HSSE matters to the CSO, monitors HSSE developments, and shapes communication strategy on HSSE matters. The committee is co-chaired by the CSO and is comprised of management representatives from various departments.

Figure 2. Segregation of duties between the Board, Board Committees and Management as it relates to TC Energy's management of climate-related risks and opportunities.

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## Key Responsibilities of the CSO

The role of the CSO brings strategic vision and oversight to sustainability-related issues at TC Energy. Key responsibilities of this role include:

- Providing strategic leadership and direction to develop and oversee corporate strategies for sustainability-related issues such as climate change, energy and resource conservation, environmental stewardship, stakeholder issues and awareness.
- Directing the development and implementation of policies and processes to identify, manage and monitor the effectiveness of sustainability-related activities.
- Collaborating with key internal stakeholders, such as risk, strategy and business unit leads, to understand sustainability issues that could affect the company, and subsequently develop strategies to address these issues.
- Representing the organization's activities, approach and interests related to sustainability, environment, social topics, and governance to external parties, including government bodies, shareholders, lenders, and other stakeholders.
- Directing the development of the company's position and messaging on key sustainability and environment topics, such as climate change, ESG disclosure, human rights, Indigenous relations, etc.
- Responsible for the company's sustainability-related reporting and messaging (e.g. voluntary indices reporting, periodic reporting on sustainability matters to the HSSE Committee, etc.).
- Ensuring emerging trends and regulations in sustainability related to governance, stakeholder social issues, environment, technology development, etc. are considered in strategic decision-making.
- Co-chairing the internal, management-comprised HSSE committee, with specific focus on sustainability and environment. Duties include:
  - Approve agendas for meetings
  - Set strategic priorities for the corporation as it relates to sustainability and environment
  - Liaise with TC Energy executive leadership to contribute, shape and support strategic priorities
  - Review, monitor and report to the HSSE Committee of the Board on the performance, governance, approach to voluntary disclosure, activities and regulations related to environment and sustainability matters

## Risk management

Risk management is integral to the successful operation of our business. Since our inception in 1951, we have managed risks throughout our organization to keep our employees and communities in which we operate safe and secure. In early 2018, management commenced a comprehensive review of the risk management process as part of our commitment to continuous improvement.

A formalized ERM Framework was approved in late 2018 (see [Figure 3](#), page 26). The ERM Framework is a process for risk identification, analysis, evaluation, and treatment, and the ongoing monitoring and reporting to the Board and Executive Leadership Team. Recognizing that many risks are interrelated and are managed across the enterprise, the ERM Framework promotes a centralized and pragmatic approach to prioritizing risks, clarifying roles and responsibilities, and improving Board and management oversight. It supports informed decision-making by identifying areas of value capture and value preservation that is aligned with our strategic and business objectives.

As part of our increased formalization of ERM in 2018, TransCanada has now established a Chief Risk Officer (CRO) role. The CRO has accountability for the implementation, execution, and continuous improvement of the ERM Framework and chairs the Management Risk Committee, comprised of the Executive Leadership Team and other leaders.

The CRO's responsibilities in the ERM Framework include:

- Ensuring the ERM Framework governance model and processes are established, properly documented, and maintained in a manner that is suitable for TransCanada's culture and operating model.
- Facilitating the annual Enterprise Risk assessment and management of the Enterprise Risk Register.
- Periodically reporting enterprise and emerging risks to the Board and Board Committees.

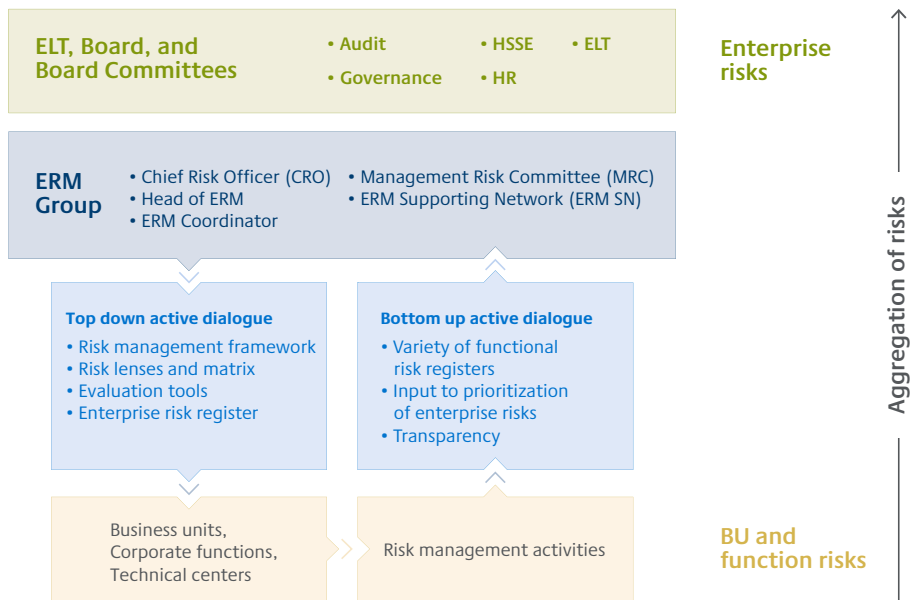


Figure 3. TC Energy's Enterprise Risk Management Framework.

## Risk topics

### Transition risk

#### **Policy and regulatory risk**

We have assets and business interests in several regions subject to GHG emissions regulations, including emission management and carbon pricing policies. In 2018, we incurred \$62 million of expense under existing carbon pricing programs. Across North America, there are a variety of new and evolving initiatives in development at the federal, regional, state and provincial level aimed at reducing GHG emissions. We expect that, over time, most of our assets will be subject to some form of regulation to manage GHG emissions.

**Impact:** Changes in regulations may result in higher operating costs or other expenses, or higher capital expenditures to comply with new regulations. Changing environmental requirements or revisions to the current regulatory process may also adversely impact the timing or ability to obtain permit approvals for new energy infrastructure projects.

**Monitoring and mitigation:** We actively monitor and submit comments to regulators as these new and evolving initiatives are undertaken. We support transparent climate change policies that promote sustainable and economically responsible natural resource development.

#### **Technology risk**

To be competitive, we must offer energy infrastructure services in supply and demand areas, and for forms of energy that are attractive to customers.

**Impact:** Should alternative lower-carbon forms of energy result in decreased demand for our current services, the value of our long-lived energy infrastructure assets could be negatively impacted.

**Monitoring and mitigation:** We have a diverse portfolio of assets and we utilize portfolio management to divest of non-strategic assets. We conduct strategic analyses to identify resilient supply basins as part of our energy fundamentals and strategic development reviews. We also monitor the development of innovative technologies to inform our capital allocation strategy.



### **Market risk**

We view commodity price and volume risk as the primary market risk related to climate change.

**Impact:** Lower crude oil, natural gas and/or electricity prices could lead to producers curtailing their investment in development of energy infrastructure. Reduction in energy supply production could negatively impact opportunities to expand our asset base and, in the longer term, to re-contract with pipeline shippers and power customers as current agreements expire.

**Monitoring and mitigation:** Our business model is based on a long-term, low-risk strategy in which the vast majority of our earnings in all of our business lines are underpinned by regulated cost-of-service arrangements or long-term contracts with creditworthy counter parties. This makes us confident that we can continue to deliver on our commitments to our shareholders and stakeholders in an increasingly uncertain and disruptive energy market.

### **Reputation risk**

Our operations and growth prospects require us to have strong relationships with key stakeholders including Indigenous communities, landowners, governments and government agencies and environmental non-governmental organizations. Inadequately managing expectations and issues important to stakeholders, including those related to climate change, could affect our reputation and our ability to operate and grow, as well as our access to and cost of capital.

**Impact:** Our reputation with stakeholders, including Indigenous groups, can have a significant impact on our operations and projects, infrastructure development and overall reputation. Should investors develop negative perceptions regarding the energy infrastructure business, future access to investment capital could be negatively impacted.

**Monitoring and mitigation:** Our four core values – safety, integrity, responsibility and collaboration – are at the heart of our commitment to stakeholder engagement, and guide us in our interactions with stakeholders. We also have specific stakeholder programs and policies that set requirements, assess risks and facilitate compliance with legal and policy requirements.

### **Physical risk**

Significant changes in temperature and weather have many effects on our business, ranging from the impact on demand, availability and commodity prices, to efficiency and output capability. Extreme temperature and weather can affect market demand for power and natural gas and can lead to significant price volatility. Extreme weather can also restrict the availability of natural gas and power if demand is higher than supply.

Natural disasters and other catastrophic events, including those related to climate change, may lead to business interruption and other adverse impacts.

**Impact:** Physical risks may result in decreased revenues and increased operating costs, legal proceedings, regulatory actions or other expenses all of which could reduce our earnings. Losses not recoverable through tolls or contracts or covered by insurance could have an adverse effect on operations, cash flow and financial position. Certain events could lead to risk of injury and environmental damage.

**Monitoring and mitigation:** TC Energy's Operational Management System (TOMS), corporate health, safety, sustainability, environment and asset integrity programs prevent incidents and protect people, the environment and our assets. Our pipeline and power generation facilities are designed to withstand severe weather events and significant geophysical disturbance, and we have proven our ability to continue operating safely and reliably in the midst of hurricanes, wildfires, earthquakes, tornadoes and flooding that has impacted the communities where we operate. TOMS includes incident, emergency and crisis management programs to ensure we can effectively respond to operational risk events, minimize loss or injury and enhance our ability to resume operations.

This is supported by our business continuity program that identifies critical business processes and develops corresponding business resumption plans. We also have a comprehensive insurance program to mitigate a certain portion of these risks.

# Appendices

## Appendix A – Table of alignment with the TCFD recommendations

TCFD Recommendation	TC Energy's Report on Climate Change & Sustainability Section	Additional Resources
<b>Governance</b>		
Disclose the organization's governance around climate-related risks and opportunities.	Climate change risks and opportunities <ul style="list-style-type: none"> <li>• Overview: Effectively managing risk and opportunities across our business</li> <li>• Governance</li> <li>• Risk management</li> </ul>	Annual Report Management Information Circular
<b>Strategy</b>		
Disclose the actual and potential impacts of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning where such information is material.	Energy Fundamentals and TC Energy's Strategy <ul style="list-style-type: none"> <li>• Scenario analysis</li> <li>• Management of climate change risks and opportunities</li> <li>• Overview: Effectively managing risk and opportunities across our business</li> <li>• Risk management</li> </ul>	Annual Report Management Information Circular
<b>Risk management</b>		
Disclose how the organization identifies, assesses, and manages climate-related risks.	Energy fundamentals and TC Energy's strategy Actions to reduce emissions <ul style="list-style-type: none"> <li>• Our carbon performance</li> <li>• Climate Change Risks and Opportunities</li> <li>• Overview: Effectively managing risk and opportunities across our business</li> <li>• Governance</li> <li>• Risk management</li> </ul>	Annual Report Management Information Circular
<b>Metrics and targets</b>		
Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities where such information is material.	Appendix B – Greenhouse Gas Emissions Data	Corporate Responsibility Report 2017

## Appendix B – Greenhouse gas emissions data

Indicator: Direct (Scope 1) greenhouse gas emissions  
Update as of October 31, 2018

Greenhouse gas emissions	2013	2014	2015	2016	2017
Direct GHG emissions (millions tCO <sub>2</sub> e) <sup>1</sup>	12.2	12.7	13.0	16.2	12.6
Natural Gas pipelines	7.1	7.4	7.3	8.3	8.7
Liquids pipelines	0	0	0	0	0
Power generation	5.1	5.3	5.7	7.8	3.8
Transportation fuel	-	-	-	0.018	0.062

Notes: TC Energy's direct GHG emissions reporting boundary is based on an asset equity share.

TC Energy does not track emissions based on an operational control boundary, and thus this information is omitted. However, our 2012 CDP Report, which disclosed 2011 data, used an operational control boundary.

This data includes:

- Canada, the U.S. (including CPG assets as of July 1, 2016) and Mexico natural gas pipelines
- Power assets

The following assets are excluded:

- Oil and gas storage assets and liquids pipelines – both are below direct GHG regulatory reporting thresholds. Emissions from pumping operations are low, as pumps are mainly electrically driven and, therefore, have no emissions for normal operation; however, auxiliary power units during power outages can generate some GHG emissions.
- U.S. Northeast power assets, including Ravenswood and Ironwood, which were sold in April 2017

<sup>1</sup> TC Energy calculates its direct GHG emissions using a combination of methods required by various regulations in different jurisdictions. We report our emissions to British Columbia, Alberta, Ontario, Québec, Environment and Climate Change Canada, the U.S. EPA, California, Oregon, Washington, the Regional Greenhouse Gas Initiative and Mexico's Ministry of Environment and Natural Resources (SEMARNAT). Due to the sale of U.S. Northeast power assets in 2017, TC Energy did not report full year for the Regional Greenhouse Gas Initiative. These calculation methods can include direct measurement and emission factors in conjunction with operating conditions. Emissions are estimated for vented and fugitive emissions and based on assumptions about operations using experienced staff with direct operational knowledge, including, for example, estimated fuel consumption.

- CO<sub>2</sub>, methane, and nitrous oxide are included in Scope 1 emissions.
- CO<sub>2</sub> emissions are calculated based on fuel gas measurements at pipeline and power generation facilities.
- Methane emissions are calculated using field reports for blowdowns and an extensive in-house set of emission factors for calculating fugitive emissions.
- Nitrous oxide is calculated based on engine-specific emissions factors.

The global warming potentials are based on IPCC assessments. An emission factor of 0.0086 for methane combustion at natural gas turbines is based on EPA AP 42, fifth edition.



## Indicator: Indirect (Scope 2) greenhouse gas emissions

Update as of October 31, 2018

Greenhouse gas emissions	2013	2014	2015	2016	2017
Indirect GHG emissions (millions tCO <sub>2</sub> e) <sup>1</sup>	0.19	0.19	0.19	0.35	0.34
Natural Gas Pipelines	0.19	0.19	0.19	0.35	0.34
Power Generation	0.0	0.003	0.004	0.007	0.009
Total direct and indirect GHG emissions (tCO <sub>2</sub> e) <sup>1</sup>	12.3	12.9	13.3	16.5	12.8
Natural Gas Pipelines	7.3	7.6	7.5	8.7	9.0
Power Generation	5.1	5.3	5.7	7.8	3.8

Notes: Scope 2 emissions are calculated based on accurate invoices for procured electric power. Assumptions include the completeness of the invoice process and grid average factors. We continue to develop processes and procedures to potentially collect emissions data from currently excluded sources to include them in the future.

This data includes:

- Natural gas pipeline assets in Canada, the U.S. and Mexico.
- Liquids pipelines in Canada and the U.S.
- Power assets in Canada

This data does not include:

- Utility consumption of natural gas pipeline assets in the U.S.
- Oil and gas storage assets in Canada, the U.S. and Mexico

Numbers may not add up due to rounding. Values reported in previous disclosures may differ from the above, as inputs may be updated after the date of publication of annual reports including the CR report, and we regularly review reporting scopes and methodologies.

## Indicator: Greenhouse gas emissions intensities

Greenhouse gas emissions intensity	2013	2014	2015	2016	2017
Natural Gas Pipelines emissions intensity <sup>1</sup> (tCO <sub>2</sub> e/Bcf)	500	520	560	-	-
Canada	-	-	-	991	779
U.S.	-	-	-	293	280
Mexico	-	-	-	136	145
Power Generation emissions intensity <sup>2</sup> (tCO <sub>2</sub> e/MWh)	0.17	0.17	0.15	0.19	0.12

Notes: Emissions intensities are calculated based on Scope 1 emissions, excluding Scope 2 and eat products (for power generation emissions intensity).

### For natural gas pipelines emissions intensity:

This data includes:

- Natural gas pipeline assets in Canada, the U.S. and Mexico

This data does not include:

- Oil and gas storage assets and liquids pipelines in Canada, the U.S. and Mexico
- Power facilities in Canada, the U.S. and Mexico

### For power generation emissions intensity:

This data includes:

- All TC Energy power facilities (excluding U.S. Northeast power assets sold in April 2017)

This data does not include:

- Liquids and natural gas pipeline assets in Canada, U.S. and Mexico

<sup>1</sup> The relationship between natural gas transmission pipeline GHG emissions and the volume of gas transported is complex. Comparisons of emissions intensities between natural gas transmission pipeline systems must consider the type of pipeline network and the service that it is providing.

<sup>2</sup> Many of TC Energy's electricity generating facilities also generate a heat product, which is not accounted for here. Therefore, the emissions intensity presented for this indicator is only partially representative of the company's true emissions intensity. 2016 Bruce Power generation was used for the 2017 data, as the data was not provided in time for production of the 2017 Corporate Responsibility Report.

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