

Energy for the

*Future*



## Forward-looking information

This document contains certain information that is forward-looking and is subject to important risks and uncertainties (such statements are usually accompanied by words such as “anticipate”, “expect”, “believe”, “may”, “will”, “should”, “estimate”, “intend” or other similar words).

Forward-looking statements do not guarantee future performance. Actual events and results could be significantly different because of assumptions, risks or uncertainties related to our business or events that happen after the date of this report.

Our forward-looking information in this document includes, but is not limited to, statements related to our goal to reduce GHG emissions intensity from our operations 30% by 2030; our goal to position to achieve zero emissions from our operations, on a net basis, by 2050; our five focus areas to reduce the emissions intensity of our operations, namely: (1) modernizing our existing systems and assets, (2) decarbonizing our energy consumption, (3) investing in low-carbon energy and infrastructure, (4) driving digital solutions and technologies, and (5) leveraging carbon credits and offsets; among other things.

Our forward-looking information is based on certain key assumptions and is subject to risks and uncertainties, including but not limited to: our ability to successfully implement our strategic priorities and whether they will yield the expected benefits, our ability to develop, access or implement some or all of the technology necessary to efficiently and effectively achieve GHG emissions targets and ambitions, the commercial viability and scalability of GHG emission reduction strategies and related technology and products, the development and execution of implementing strategies to meet our sustainability commitments and GHG emissions targets and ambitions, our ability to implement a capital allocation strategy aligned with maximizing shareholder value, the operating performance of our pipeline and power and storage assets, amount of capacity sold and rates achieved in our pipeline businesses, the amount of capacity payments and revenues from our power generation assets due to plant availability, production levels within supply basins, construction and completion of capital projects, cost and availability of labour, equipment and materials, the availability and market prices of commodities, access to capital markets on competitive terms, interest, tax and foreign exchange rates, performance and credit risk of our counterparties, regulatory decisions and outcomes of legal proceedings, including arbitration and insurance claims, our ability to effectively anticipate and assess changes to government policies and regulations, including those related to the environment and COVID-19, competition in the businesses in which we operate, unexpected or unusual weather, acts of civil disobedience, cyber security and technological developments, economic conditions in North America as well as globally, and global health crises, such as pandemics and epidemics, including the recent outbreak of COVID-19 and the unexpected impacts related thereto. In addition, there are risks that the effect of actions taken by us in implementing targets, commitments and ambitions for sustainability may have a negative impact on our existing business, growth plans and future results from operations. In addition, there are risks that the effect of actions taken by us in implementing targets, commitments and ambitions for our GHG emissions may have a negative impact on our existing business, growth plans and future results from operations.

For additional information about the assumptions made, and the risks and uncertainties which could cause actual results to differ from the anticipated results, refer to the most recent Quarterly Report to Shareholders and Annual Report filed under TC Energy's profile on SEDAR and with the SEC. As actual results could vary significantly from the forward-looking information, you should not put undue reliance on forward-looking information and should not use future oriented information or financial outlooks for anything other than their intended purpose. We do not update our forward-looking statements due to new information or future events, unless we are required to by law.



## Disclaimer

This document is included for historical reference only as it relates to our roadmap for our GHG targets released in 2021. Currently, our interim 2030 GHG target is under review. We remain committed to reducing emissions from our operations and positioning our operations to be net zero by 2050. However, in the near term, we are embarking on a comprehensive reassessment of our short-term GHG emissions reduction targets and our options and practical pathways to achieve our longer-term plans. We expect to speak to refreshed targets and plans in 2025.

## Legal notice

This document includes environmental or climate-related content relating to TC Energy's ESG goals, sustainability-related activities or statements about the environmental benefits of our business activities and any effects of our business on climate change and includes forward-looking information based on assumptions, estimates, judgments, risks and uncertainties. Our content has been developed with guidance from internationally recognized methodologies, frameworks, standards and/or recommendations for sustainability reporting. We continue to monitor developments for mandatory climate-related disclosure in jurisdictions where we operate and will adjust our disclosure and public statements as required to comply with new mandatory requirements. Where non-standard measures are used, we have disclosed the information in accordance with our internal standards, which are designed to reflect and be consistent with internationally recognized methodologies, frameworks, standards and/or recommendations to the extent possible.

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# About TC Energy



## Our purpose

Delivering the energy people need, every day.  
Safely. Innovatively. Responsibly. Collaboratively.  
With integrity.



## Our vision

To be the premier energy infrastructure company  
in North America, now and in the future.

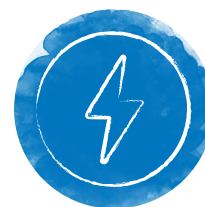
## Our business



### Natural gas pipelines



### Liquids pipelines



### Power and storage

We are a vital part of everyday life — delivering the energy millions of people rely on to power their lives in a sustainable way. Thanks to a safe, reliable network of natural gas and crude oil pipelines, along with power generation and storage facilities, wherever life happens — we're there.

Guided by our core values of safety, innovation, responsibility, collaboration and integrity, our 7,500 people make a positive difference in the communities where we operate across Canada, the U.S. and Mexico.

TC Energy's common shares trade on the Toronto (TSX) and New York (NYSE) stock exchanges under the symbol TRP.

*Please refer to the cover page for relevant updates to our GHG Emissions Reduction Plan*

## Protecting our planet

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Sustainability is foundational in everything we do — in our culture, our stakeholder engagements and partnerships, and in our decision-making. One of our 10 sustainability commitments is to contribute to global efforts to reduce climate change, including establishing GHG emission reduction targets. This plan describes our approach and key strategies for embracing the energy transition that is underway — meeting our climate change goals while delivering solutions for a lower-carbon future.

This publication is one element of our sustainability, environmental, social and governance (ESG) reporting.

Please see page 25 for a list of related reports and documents.

## Sustainability governance

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Our Board of Directors provides oversight and direction for our overall sustainability objectives including emissions reduction activities. The Board and its subcommittees are also responsible for monitoring our performance, and risk oversight, including environment, social and governance related risks. Our CEO and executive leadership team develop and implement our strategy and are accountable for our performance. More detailed information on our climate-related governance structures and processes can be found in our 2021 ESG Datasheet.

## Ongoing dialogue with our stakeholders

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We welcome dialogue and engagement with our stakeholders.

For general inquiries, please contact us at [communications@tcenergy.com](mailto:communications@tcenergy.com).

Shareholders and others in the financial or investment community, please contact us at [investor\\_relations@tcenergy.com](mailto:investor_relations@tcenergy.com).

*Please refer to the cover page for relevant updates to our GHG Emissions Reduction Plan*

# Embracing the energy transition

## Message from leadership



**François Poirier**  
*President and  
Chief Executive Officer*



**Siim A. Vanaselja**  
*Chair of the Board*

Our vision is to be the premier energy infrastructure company in North America today and in the future. That future includes embracing the energy transition that is underway and contributing to a lower-carbon energy world.

The evolving energy transition supports society's climate-related goals by reducing energy-related greenhouse gas (GHG) emissions and incorporating low-carbon fuels and infrastructure into the energy system.

We believe today's energy industry must play a proactive role to enable change and help meet each country's climate goals. At the same time, we must make sure that a growing population continues to have the energy required to maintain quality of life — our transportation, agriculture, health care, education, and economic prosperity all depend on access to safe, reliable and affordable energy.

### Reducing our GHG emissions

In 2020 we announced 10 sustainability commitments, including our commitment to contribute to global efforts to reduce climate change and set GHG emission reduction targets.

In early 2021, we established a dedicated team to chart our path forward and determine measures to ensure accountability to our stakeholders. This team conducted detailed review and analysis to set ambitious and meaningful GHG emissions reduction targets.



In October 2021, we were pleased to release our goals to:

- Reduce GHG emissions intensity from our operations 30% by 2030, and
- Position to achieve zero emissions from our operations, on a net basis, by 2050.

Our detailed review included assessing our emissions profile and abatement programs, and evaluating future opportunities presented by emerging low-carbon fuels and infrastructure. As a result of this effort, we are confident that we have made informed decisions about our targets and associated action plan.

We intend to work towards our goals through a variety of strategies across our business units. Like everything we do at TC Energy, our plan is built with a disciplined approach that upholds the safety, reliability and integrity of our people and systems. Technical and commercial experts from each of our business units contributed ideas, insight and support for our enterprise-wide goals and plans.

We are targeting five focus areas to reduce the emissions intensity of our operations, while also capturing growth opportunities that meet the energy needs of the future:

1. Modernize our existing systems and assets
2. Decarbonize our energy consumption
3. Invest in low-carbon energy and infrastructure
4. Drive digital solutions and technologies
5. Leverage carbon credits and offsets

We also recognize the importance of current energy systems and infrastructure. Energy forecasts show that natural gas and liquids will play a vital role beyond 2050. Our existing assets will remain an essential element of these energy systems, providing an unparalleled base from which we will grow and evolve.

There are still many unknowns about how a global energy transition may unfold, and which low-carbon fuels and infrastructure may become widely adopted by society. To succeed, this transition will require policy, regulatory, and technology enablers. Governments will need to provide direct financial support for emissions reduction initiatives, emerging low-carbon fuels and infrastructure, and other decarbonization solutions. New technologies must come to market at a scale and cost that is competitive. We will adapt and respond as these factors change over the life of our plan.

## A bright and sustainable future

We believe our business is well-positioned to seize the exciting opportunities that a global energy transition presents, regardless of the path it ultimately takes. We already have many activities underway to reduce emissions and develop solutions for the future — for example, leak detection and repair programs, natural gas pipeline modernization and electrification programs, solar and battery storage projects, pumped hydro projects, transportation of renewable natural gas, and promising possibilities for developing carbon capture and storage solutions.

Our emissions reduction goals, while challenging, will help inform our strategy and how we make operational decisions. Our approach prepares us well to be competitive, remain resilient and deliver shareholder value for those seeking sustainable investment opportunities over the long term.

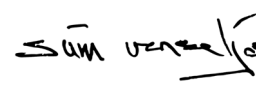
When we engage with our employees on the future of energy, we are always inspired by their excitement for the possibilities ahead and the ideas they bring forward. We are confident that our people have the technical capabilities, innovative mindset and commitment required to contribute positively to a lower-carbon world.

We welcome your comments and feedback and look forward to ongoing dialogue with our stakeholders,

Sincerely,



**François Poirier**  
President and  
Chief Executive Officer



**Siim A. Vanaselja**  
Chair of the Board

# Our roadmap to 2050

## Five focus areas

We are targeting five focus areas to reduce the emissions intensity of our operations while developing lower-carbon energy solutions for the future.

### Our goals

**30% by 2030**

Reduce GHG emissions intensity from our operations 30% by 2030.

**Net zero by 2050**

Position to achieve zero emissions from our operations, on a net basis, by 2050.

### Calculating emissions intensity

Emissions intensity is calculated, in aggregate, as CO<sub>2</sub> equivalent emissions per unit of energy that we transport or produce for our customers annually. For planning purposes, progress is measured relative to a 2019 baseline year (adjusted for material changes in our asset portfolio).

### Defining net zero

Net zero means achieving an overall balance where our operations have eliminated Scope 1 and 2 GHG emissions on a net basis by 2050. This means we have removed or offset emissions through abatement activities and/or the use of carbon credits and/or offsets.



## 1. Modernize our existing systems and assets

Reduce fugitive methane emissions, leaks, venting and flaring associated with regular operations and maintenance, and improve overall operational efficiency.

Waste heat recovery units on compressors



Leak detection and repair

Equipment enhancements (valves, meters, etc.)



## 2. Decarbonize our energy consumption

Seek low-carbon energy sources to support our operations.

Convert gas compressor stations to electric motor drives

Shift company fleet towards electric vehicles

Source renewable power

Continue to develop renewable energy projects and storage solutions



## 3. Invest in low-carbon energy and infrastructure

Develop a broad range of new low-carbon energy solutions for today and for the future.



## 4. Drive digital solutions and technologies

Develop and deploy software and systems to digitize our operations and monitor emissions – includes system automation, AI and machine learning applications.



## 5. Leverage carbon credits and offsets

Evaluate and leverage carbon offsets and assess opportunities to develop nature-based solutions.

CO<sub>2</sub>

Further the deployment of carbon capture, utilization and storage (CCUS)

Expand renewable natural gas and hydrogen opportunities

# Addressing emissions from our operations

Our targets address Scope 1 and 2 emissions, using a 2019 baseline year for planning purposes.

Our targets focus on reduction of carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrogen oxide (N<sub>2</sub>O) emissions, which are generated predominately from fuel combustion at our natural gas pipeline assets.

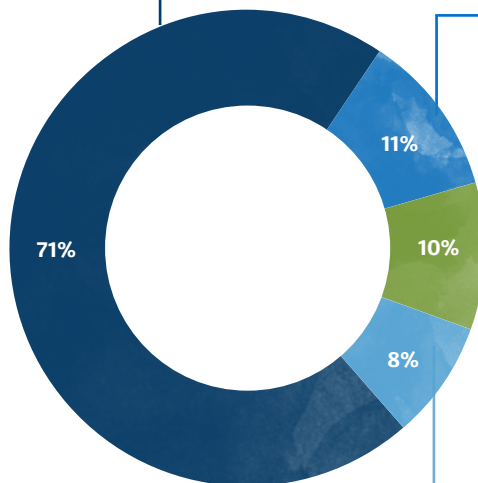
## Emissions by category

### 71% Combustion

Emissions from the combustion of natural gas to operate pipelines, power and storage assets. On our natural gas transmission system these are predominantly generated by our natural gas-fired compressor engines. At our power and cogeneration facilities these are from natural gas-fired turbine generators and duct burners that produce electricity and heat for our customers.

### 8% Venting and other emissions

Vented emissions are controlled releases of natural gas and other vapours during operation and maintenance, for example during blowdowns and purges. Other emissions include flaring, and aircraft and fleet vehicle transportation owned and leased by the company.



### 11% Electricity consumption

Emissions from purchased electricity used to power our assets, primarily for our Liquids pipelines.

### 10% Fugitive emissions and leaks

Unintentional releases of methane to the atmosphere. These include leaks from valves, fittings, and other pressurized equipment at meter stations, compressor stations and valve sites, and other uncontrolled releases.

*This data represents the GHG emissions profile in our 2019 baseline year. The baseline has been adjusted for material changes in our asset portfolio and is reported on an operational control boundary.*

*Please refer to the cover page for relevant updates to our GHG Emissions Reduction Plan*

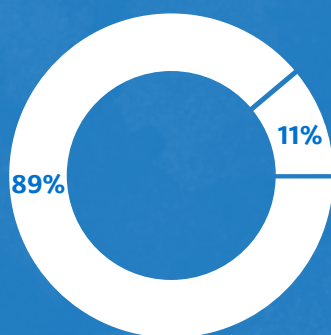


## Detailed review and analysis

We have completed a detailed review and analysis to ensure our targets are ambitious and meaningful and that our decisions are informed by the most recent and verifiable dataset available.

Our review included establishing our baseline emissions data, assessing our emissions profile and abatement programs, evaluating future opportunities presented by low-carbon fuels and infrastructure, and scenario analysis.

### Emissions by scope



#### 89% Scope 1

Emissions generated directly from operations that are owned or controlled by our company.

#### 11% Scope 2

Emissions from the generation of electricity that we purchase and consume.

## Approach to Scope 3 emissions

Scope 3 emissions occur from sources owned or controlled by other entities in TC Energy's value chain. They are organized into 15 distinct categories, which is intended to provide a systemic approach to understanding the diversity of activities within a company's value chain. Not all categories are relevant to all companies.

We currently track and report on four categories of Scope 3 emissions that are relevant to our business: Fuel and energy related activities (not already included in Scope 1 and 2), waste generated in operations, business travel, and upstream leased assets. We are actively working with our suppliers and customers to understand Scope 3 emissions along our entire value chain.

# Our guiding principles

As we consider various pathways to meeting our goals, we have established guiding principles to inform our decision-making. Our strategy includes reducing our GHG emissions while simultaneously taking advantage of the business growth opportunities presented by low-carbon fuels and infrastructure.

## Reducing our GHG emissions

### Develop proactive and commercially viable solutions

Pursue a path that reflects a proactive, commercially viable approach that meets or exceeds regulatory requirements. Consider emissions impacts in our project assessments and decisions.

### Target intensity-based reductions

Meet the growing demand for energy across our footprint while simultaneously reducing emissions.

### Use a wide spectrum of available tools

Leverage the full spectrum of available tools now and in the future — including optimizing our existing assets with improvements, using instruments such as renewable energy credits (RECs) and carbon credits, and implementing emerging technologies.

## Capturing growth opportunities

### Adopt low-carbon fuels and infrastructure

As the energy transition unfolds, continuously evolve our business mix in response to our customers' needs and as low-carbon fuels and infrastructure solutions emerge across North America.

### Leverage our competitive advantages

Develop opportunities that leverage our existing network of assets, technical skills and expertise, financial capacity, and strong stakeholder relationships as key competitive advantages.

### Maintain our financial flexibility and risk profile

Evaluate growth opportunities through the lens of long-term shareholder value and adhere to our risk-return profile for investors.

## Responding to change

There are many evolving external factors that will influence our plan over time, for example:

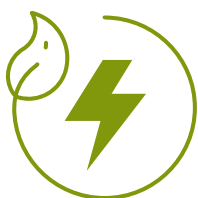
- Energy fundamentals
- The pace, scale and types of change that emerge in the global energy system
- Evolving expectations and requirements of our stakeholders
- Technology innovations and improvements
- Government regulation and decarbonization policy development
- Carbon markets and pricing
- Government innovation funding and incentives
- Reporting frameworks and standards

Internally, we continue to learn, innovate and build our own capabilities to measure and monitor our emissions, deploy new technologies, and work with partners to develop low-carbon energy solutions.

As the landscape evolves, we expect to adapt and adjust our plans accordingly.

# Building on strong foundations

Throughout our 70-year history, our people have continually found innovative solutions to the energy challenges of the day. We have been working towards emissions reduction for over two decades — we began voluntarily reporting GHG emissions in 2001. We have never stopped learning and evolving to ensure our business remains truly sustainable. These are strong foundations to build from as we work towards a cleaner energy future.



## 15+ YEARS

Experience with renewables and lower-carbon infrastructure.

## 400 MW

Renewable power purchase agreements.



## 200,000 tCO<sub>2</sub>e

Eliminated through our enhanced Canadian Natural Gas Pipelines LDAR program in the first 18 months of operation (started in 2020).

Approximately 10% of our Canadian and 5% of our U.S. compressor fleet is already electric.



## 20 MILLION TONNES CO<sub>2</sub>

Would be eliminated each year through the Alberta Carbon Grid, a project we are currently exploring.

## 12 RNG INTERCONNECTS

Transporting renewable natural gas for our customers since 2002.

## \$75 MILLION

Committed to venture funds developing clean energy technologies — Energy Impact Partners (EIP) in the U.S. and NGIF (Natural Gas Innovation Fund) Cleantech Ventures in Canada

## Founding member of the EMERGING FUELS INSTITUTE

Established by the Pipeline Research Council International (PRCI) in 2021

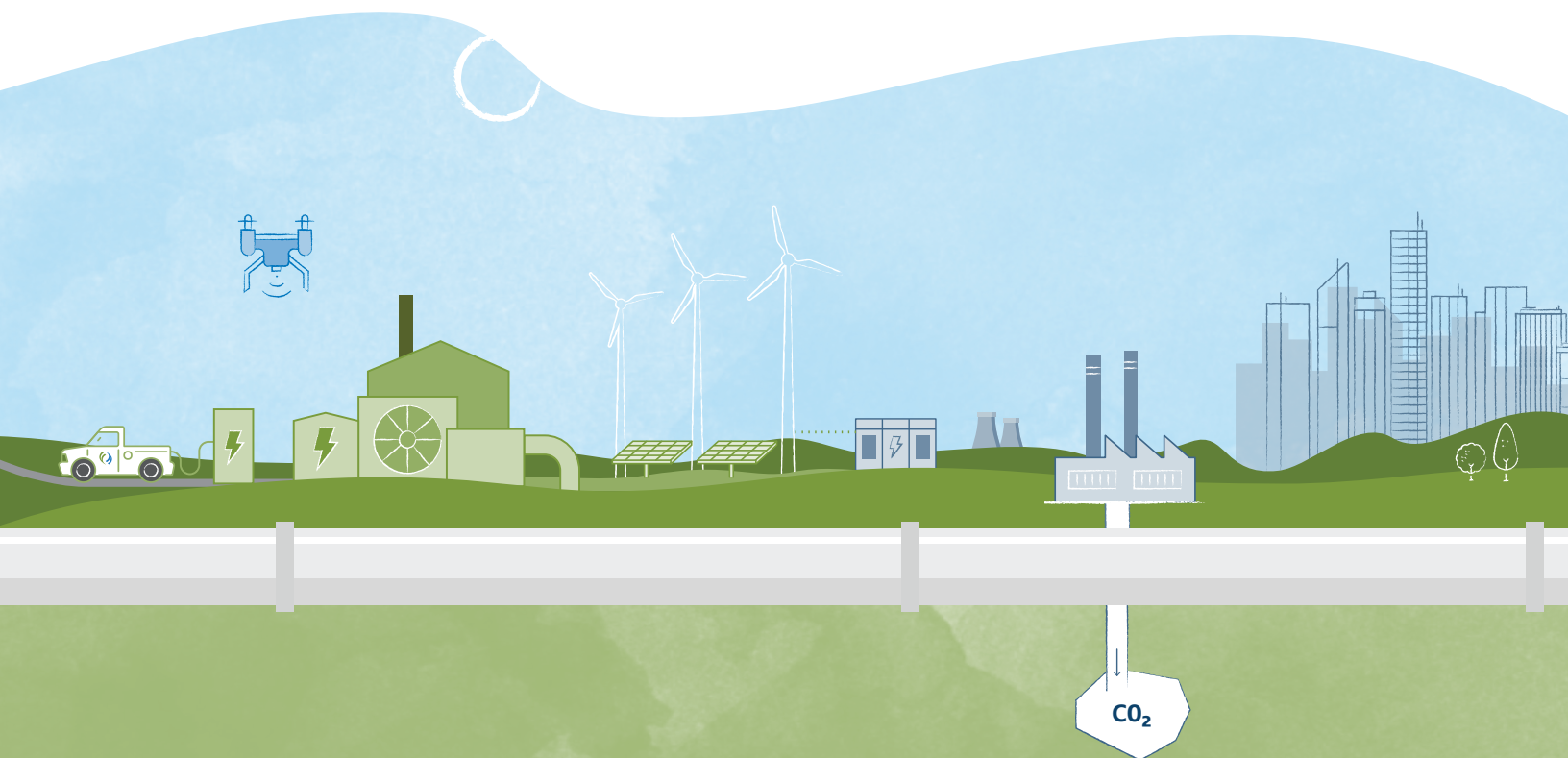


# Our action plan

## Five focus areas

We are targeting five focus areas to reduce the emissions intensity of our operations while developing the next generation of lower-carbon energy solutions. We are working with customers and other partners within our industry, fostering innovation, and investing in research and development. We are adopting emerging technologies as they evolve, to drive safe, reliable and sustainable operations.

Beyond our own direct emissions, we are developing infrastructure and services that help decarbonize the energy system and reduce the full lifecycle GHG emissions of the energy we deliver. For example, we will continue to assess and progress opportunities to transport renewable natural gas and hydrogen; develop renewable power projects; develop carbon capture, utilization and storage (CCUS) infrastructure; and develop other low-carbon technologies such as pumped hydro power storage.





## Modernize our existing systems and assets

Reduce fugitive methane emissions, leaks, venting and flaring associated with regular operations and maintenance, and improve overall operational efficiency.

### Managing methane emissions

Fugitive emissions from our natural gas pipeline systems represent approximately 10 percent and controlled vented releases are approximately eight percent of our Scope 1 and 2 emissions<sup>1</sup>. These emissions occur during operations and maintenance and are primarily methane. Managing these emissions over the long term will help ensure that natural gas remains a sustainable fuel for today and into the future.

We continue to enhance our leak detection and repair programs, modernize and enhance our equipment, and develop and implement new practices and technologies.

We are collaborating with industry groups on methane-reduction initiatives including:

- Interstate Natural Gas Association of America (INGAA) [ONE Future Coalition](#)
- U.S. Environmental Protection Agency's (EPA) [Natural Gas STAR program](#)
- [Canadian Energy Partnership for Environmental Innovation](#) (CEPEI)
- Canadian Emissions Reduction Innovation Consortium (CanERIC), an initiative of the [Petroleum Technology Alliance Canada](#) (PTAC)

TC Energy is also a signatory to the [Methane Guiding Principles](#), which focus on actions to reduce methane emissions across the natural gas supply chain.

### Installing waste heat recovery units on compressors

Combustion of natural gas to fuel compressors generates excess heat alongside the resultant GHG emissions. This heat has the potential to be converted into electricity and generate zero-carbon power at locations with specific technical and economic attributes. We currently employ waste-heat-to-power technology on a commercial scale at select locations across our footprint.

### Enhancing our leak detection and repair (LDAR) programs

In 2020, in response to new Canadian methane reduction regulations, we began implementing an enhanced approach to managing and reducing fugitive emissions from routine operations on our Canadian Natural Gas Pipelines. We have digitized our processes and created a unique-in-Canada emissions management application (EMA), improving our ability to plan maintenance activities. The EMA enables us to capture emissions data from field surveys, pinpoint leak locations with precise GPS coordinates, and rapidly triage required maintenance and repair work on pipeline and compressor station valves and other components. In the first 18 months of the enhanced Canadian LDAR program, we eliminated almost 200,000 tCO<sub>2</sub>e. We continue to assess and deploy new practices and technologies to make further improvements.

Through this effort, we have gained much experience that we will apply to develop leak detection and repair strategies on our other natural gas pipeline systems.

### ONE Future Coalition

In the U.S., we participate in Our Nation's Energy Future (ONE Future) Coalition, a growing group of 50 natural gas companies working together to voluntarily reduce methane emissions intensity across the natural gas value chain. The coalition is focused on implementing innovative, performance-based approaches to the management of methane emissions, with a goal to achieve a methane intensity of one percent (or less) of total produced natural gas by 2025.

The coalition represents approximately 15 percent of the U.S. natural gas value chain. As of 2020, the net methane intensity from ONE Future member companies was well below the one percent goal.

<sup>1</sup> Figures are for our 2019 baseline year.

## Ongoing equipment enhancements to optimize our systems

Safety and reliability are always top priorities for us, and our pipeline safety programs are among the most robust in the industry. Through ongoing integrity and maintenance programs, we are continually replacing parts, retrofitting, and adjusting equipment to reduce fugitive emissions and venting and/or modernizing our natural gas pipeline systems for greater energy efficiency. For example:

- Stringent and disciplined valve maintenance
- Compressor station piping modifications that provide greater operational flexibility to run the system for efficiencies and reduce venting and blowdown volumes during maintenance activities
- Replacing reciprocating compressor rods (based on condition)
- Use of low-emitting dry gas seals and installation of other vent capture systems on compressor equipment
- Use of electric starters on new and existing turbine installations, in place of gas starters
- Deployment of enclosed incineration equipment and portable transfer compressors to reduce or eliminate vented emissions
- Flow meter enhancements to provide greater precision in emissions quantification

## Piloting new technology and equipment to capture vented emissions

We are also piloting new technology and equipment that reduces vented emissions — for example, in 2021:

- We piloted a field trial of a zero emissions vacuum and compressor (ZEVAC) unit during an in-line inspection of one of our Canadian Natural Gas pipelines. Traditionally, the gas inside the launcher and receiver barrel is vented to the atmosphere and blown down to zero to launch and receive our in-line inspection tools. Using the ZEVAC, zero emissions were released into the environment.
- We also installed Canada's first methane capture and reinjection skid to collect vented emissions at a compressor station in Manitoba. Captured methane is reinjected into the pipeline instead of being released into the atmosphere.



## Modernizing our Columbia Gas Transmission system

We are undertaking a modernization program for our Columbia Gas Transmission system, which consists of more than \$2.5 billion in system enhancements. The work done under this program has led to improvements in reliability of service, integrity of assets and efficiency of operations — all while reducing emissions. Our efforts to address GHG emissions on the Columbia system have resulted in 258,000 tCO<sub>2</sub>e emissions avoided since 2013. Based on the work currently completed, it's estimated that 57,000 tCO<sub>2</sub>e emissions will continually be avoided on an annual basis. This trend is expected to continue over the next several years amid a proposed third phase of the modernization program.





## Decarbonize our energy consumption

Seek low-carbon energy sources to support our operations.

### Sourcing renewable power

We are taking significant steps to address our Scope 2 emissions, which are primarily generated by the consumption of electricity used to power our Liquids pipelines.

Our Liquids systems use a fleet of electric-powered pumps and we are advancing plans to source renewable power for that fleet. There is little to no change in the equipment or infrastructure required to transition to renewable power, and the pipeline right-of-way traverses many geographies that are well-suited to wind or solar power.

Earlier this year we put out a request for information to over 100 suppliers to source renewable energy to power our Keystone system in the U.S. We may invest in new renewable energy projects and/or contract to procure renewable power purchase agreements for the associated renewable energy certificates (RECs). These power purchase agreements, underpinned by the operating Keystone pipeline, will facilitate the construction of multiple new wind and solar facilities across the U.S., in the power pools where Keystone operates. These projects will create new investment, new employment through construction and operations, and help to “green” the jurisdictions touched by the pipeline.

We intend to extend this plan to Liquids pipelines in Canada once agreements in the U.S. are finalized. Once all our Liquids assets are powered by renewable generation, we will see an annual GHG reduction of up to two million metric tonnes annually.

### Shifting company fleet towards electric vehicles

Our field operations teams drive millions of kilometers each year to monitor, maintain and operate our pipeline systems safely and reliably. With increasing availability of electric SUVs and light-duty trucks, we are developing a strategy to transition our fleet to electric vehicles and reduce the carbon intensity of our driving. To ensure safety, reliability and viability of electric fleet vehicles, we are assessing factors such as availability of charging infrastructure; range of the vehicle for each battery charge; expected lifespan of the vehicle before replacement; and costs for vehicle purchase, fuel, and maintenance. We anticipate that our fleet will be partially electric by 2030 and we will continue a gradual transition over the longer-term, as larger-sized trucks and charging infrastructure become more widely available.



## Converting gas compressor stations to electric motor drives

Approximately 70 percent of our GHG emissions come from combustion of the fuel used in our natural gas pipeline operations. To reduce this predominant emissions source, we are working to gradually convert our compressor fleet to electric motor drives, where it is feasible to do so.

Today, approximately 10 percent of our Canadian and five percent of our U.S. compressor fleet is already electric. We intend to continue to install electric motor drives throughout the next decade, using dual electric and natural gas drives to manage risks associated with electricity grid reliability.

Future growth and modernization programs will also incorporate compressor electrification, where appropriate.

To further reduce the emissions intensity of our natural gas pipeline operations, we are investigating opportunities to power our electric compressors with renewable sources. The experience we are gaining in sourcing renewable power for our Liquids pipelines will enable us to implement a similar approach to our natural gas pipeline business both in the U.S. and Canada.

## Installing dual-drive compressor motors lowers emissions while maintaining reliability

Our proposed Virginia Electrification Project will provide much-needed natural gas supply to meet the increasing market demand in the State of Virginia, as well as reduce net GHG emissions on Columbia Gas Transmission's pipeline system.

Reduced GHG emissions will be achieved through the installation of strategic, incremental facilities and upgrading outdated, existing infrastructure with brand-new, more efficient facilities.

New, Dual Drive Technologies, Ltd.<sup>TM</sup> ("dual-drive") electric motor compressor units will replace some of our existing gas-powered compressor units. New units will run exclusively on electric motors. To ensure local energy reliability, each unit will be capable of running on natural gas in the event of local power outages or other emergencies, thereby assuring customers retain their energy when needed most. The project will result in an overall net operating emissions reduction of over 27,000 tCO<sub>2</sub>e per year.



## Replacing higher carbon-emitting fuels with natural gas

Our Coastal GasLink pipeline project, now under construction, will supply one of the world's cleanest and safest energy sources — natural gas — to LNG Canada's liquefaction facility on the West Coast of British Columbia. LNG Canada will export the energy to Asian markets, where coal-fired electricity is commonly used.

In Mexico, we are supporting the country's transition away from fuel oil and diesel as its primary energy sources for electric generation. For example, in 2019, we placed the Sur de Texas-Tuxpan marine pipeline into service. This major feat of engineering allows Mexico to import affordable clean-burning natural gas from the U.S.



## Invest in low-carbon energy and infrastructure

Develop a broad range of new opportunities that offer energy solutions for today and for the future.

### Renewable energy projects

As renewable electricity demand grows across North America, new hydro, solar, wind and energy storage capacity will be needed to meet that growing demand and support a shift in the energy mix. TC Energy is well positioned to capture these opportunities given our 20+ years of experience in the power business and the multiple projects and opportunities we have underway. Our operating experience with hydro, wind, solar and nuclear power assets demonstrates the expertise required to excel in these evolving markets. We are also exploring opportunities to serve our own electricity requirements with renewables.

TC Energy is committed to providing renewable energy solutions in North America for our own assets as well as those of customers. For example, we can offer customers access to a variety of renewable energy resources via the long-term power purchase agreements (PPAs) we have recently finalized in Alberta, including:

- 74 MW of solar energy at Claresholm Solar, which came online in April 2021.
- 20 MW of solar energy at East Strathmore Solar, which will come online in the first quarter of 2022.
- 297 MW of wind energy at Sharp Hills Wind Farm, which is now under development by EDP Renewables Canada. Subject to customary regulatory approvals and conditions, the wind farm is anticipated to be operational in 2023.

With the addition of Sharp Hills, we have access to about 400 MW of renewable power. Our agreements include the rights to all the environmental attributes of these projects, enabling us to apply carbon credits to our business, or market the environmental attributes for our customers.



### Energy storage solutions

Large scale energy storage solutions are critical to solving intermittency issues with renewable power sources such as wind and solar while optimizing the efficiency of the electricity grid. We have active projects developing large scale multifaceted power storage opportunities. These include:

- A 1,000 MW pumped hydro energy storage project under development in Ontario, one of Canada's largest climate change initiatives
- A majority ownership of the proposed Canyon Creek pumped hydro storage facility in Alberta, currently seeking remaining governmental permits for construction; the project would have an initial generating capacity of 75 MW
- A teaming agreement with Lockheed Martin to identify and develop large-scale, long-duration energy storage projects using innovative flow battery technology
- A novel, utility-scale solar-plus-storage electricity generation facility in Alberta that contemplates the use of state-of-the-art bifacial solar panels that take advantage of local climate conditions

## Renewable natural gas (RNG)

We have transported RNG in our systems since 2002 and currently have 12 RNG interconnects across our footprint. This fuel is produced by our customers by capturing methane emissions from biological sources and landfills. We are actively focusing on growing our RNG receipts — in 2021 we doubled the amount of renewable natural gas flowing in our U.S. pipeline system, from 2Bcf to 4Bcf per year. This brings our 2021 total to 8Bcf for Canada and the U.S. combined. We continue to develop opportunities to increase this amount by another 30 Bcf per year. Because of the high demand, we are working to create a standard biogas meter skid that will cut installation cost and time and make future participation in these projects more efficient.

This year, TC Energy joined the RNG Coalition, a non-profit organization that brings together members from each sector of the RNG industry to educate and advocate for the advancement of RNG. Our involvement reinforces that we envision a future where natural gas and renewables work together.

## Nuclear

In 2003, we made our initial investment in the Bruce nuclear power facility in Ontario. Bruce Power provided 70 percent of the electricity needed to phase out coal power stations in the province. Today, we continue to invest in a multi-billion dollar life extension program that will enable Bruce to deliver emissions-free energy for over the next 40 years. Innovating for the future, Bruce is now participating in exploring small modular reactor technology, which could be another complement to intermittent power sources such as wind and solar in the decades ahead.

## Carbon capture, utilization and storage (CCUS)

CCUS is one of the most promising forms of emissions-reduction technology and it will be critical to meeting global climate goals. CO<sub>2</sub> pipelines are a mature technology and, with CO<sub>2</sub> in supercritical or liquid phases, pipeline operation is largely analogous to our other Liquids pipelines. There are many opportunities to leverage our pipeline and storage network and expertise for this purpose. For example, we are now furthering the development of a world-scale carbon transportation and sequestration system, the Alberta Carbon Grid, with our partner Pembina Pipeline Corporation.

Work is ongoing to assess additional CCUS opportunities in other regions. These opportunities may exist in industrial hubs with associated emissions from power generation, petrochemicals, iron/steel, and cement manufacturing, along with other industrial activities. CCUS infrastructure also has application at certain hydrogen production facilities as the hydrogen economy grows. Many of these hubs are located in regions where we already have a strong presence and CCUS infrastructure could be a natural extension of our existing network.



## Hydrogen

Hydrogen represents a key lever in the transition to a low-carbon future, although some end use applications remain in an early stage. We see a role for TC Energy in hydrogen infrastructure development as it closely aligns with our core business and operating expertise. Experience and expertise in fuel transportation, power generation, and gaseous fuel storage are all required in the growth of a hydrogen economy. Our recently announced partnership with Irving Oil will assess the opportunity to support the development of low-carbon hydrogen as part of a broader suite of low-carbon opportunities within the Atlantic region.



## Further exploring decarbonization projects with our partners

We are building collaborative partnerships within industry to further explore and develop commercially viable decarbonization projects. These partnerships enable us to leverage the assets of multiple partners, combine capabilities and expertise, and develop customer-focused solutions.

### Alberta Carbon Grid

We recently announced plans to develop the Alberta Carbon Grid, a world-scale carbon transportation and sequestration system. The plan will leverage existing pipelines and a newly developed sequestration hub to create the infrastructure platform needed for Alberta-based industries to effectively manage their emissions and contribute positively to Alberta's lower-carbon economy. The Alberta Carbon Grid would be capable of transporting more than 20 million tonnes of CO<sub>2</sub> annually — representing approximately 10 percent of Alberta's industrial emissions.

For Canada to achieve its enhanced climate targets, including a 40–45 percent reduction in greenhouse gas emissions below 2005 levels by 2030, CCUS technology and infrastructure will need to play a vital role. With partners, TC Energy is uniquely positioned to take a leadership role in the transportation of CO<sub>2</sub> given our skills and extensive network of pipeline infrastructure. Utilizing existing assets dramatically accelerates timing, greatly reduces cumulative environmental and community impacts, and is significantly less capital intensive than building a new pipeline.

### Irving Oil partnership

In August 2021, TC Energy and Irving Oil announced that we will explore the joint development of four proposed energy projects focused on decarbonizing current assets and deploying emerging technologies to reduce overall emissions.

The initial focus will consider a suite of upgrade projects at Irving Oil's refinery in Saint John, New Brunswick, with the goal of significantly reducing emissions through the production and use of low-carbon power generation.

The partnership will also explore opportunities to aid decarbonization over the medium- and long-term via the production and distribution of low-emissions hydrogen and a world class carbon capture and sequestration network. Targeting industry solutions to lower emissions aligns with regional goals and enhances the opportunities for future development in Atlantic Canada.

### Co-development of large-scale clean hydrogen hubs

In October 2021, we announced a strategic collaboration with Nikola Corporation in the U.S., aimed at the development, construction, ownership and/or operation of critical hydrogen infrastructure for hydrogen fueled zero-emission heavy-duty trucks.

A key objective of the collaboration is to establish hubs producing 150 tonnes or more of hydrogen per day near highly traveled truck corridors to serve Nikola's planned need for hydrogen to fuel its Class 8 fuel cell electric vehicles (FCEVs) within the next five years.

TC Energy has significant pipeline, storage and power assets that can potentially be leveraged to lower the cost and increase the speed of delivery of these hydrogen production hubs.

Both Nikola and TC Energy are committed to reducing the carbon intensity (CI) of hydrogen produced and delivered to end-use markets utilizing renewable energy, as well as low-cost natural gas, renewable natural gas and biomass feedstocks, paired with carbon capture and storage. Nikola and TC Energy are aligned in a technology agnostic approach to find the best pathway to hydrogen production for each unique geography that is intended to result in the lowest CI and a clear pathway to achieve net-zero over time.



## Drive digital solutions and technologies

Develop and deploy software and systems to digitize our operations and monitor emissions.

Our digital transformation journey is ongoing. Our focus to date has been on using digital solutions to enhance operational efficiency, safety and reliability — delivering on customers' needs. More recently, we have begun to drive digital solutions that also help us meet our emissions reduction goals. As well, we are working with strategic partners to develop industry-accepted emissions technology and data standards.

### Harnessing artificial intelligence (AI) and machine learning for data-based decision-making

We are investing in AI innovations using both machine learning and deep learning technologies. These technologies use algorithms to parse complex datasets and enable us to make more informed business decisions, based on data.

We are working to integrate real-time data from disparate sources including sensors along our pipeline, compressor monitoring systems, pipeline reliability and integrity data, energy demand forecasts, emissions monitoring programs, pipeline capacity and nominations data, and data from our enterprise resource planning (ERP) system.

A centralized data repository will connect these previously siloed datasets, and AI engines will perform analysis on this aggregated data. These advanced analytics can reveal correlations, patterns and anomalies that may have otherwise gone undetected, giving us an enterprise-wide view that was not available before. These “big data” insights will augment human expertise, enabling informed decisions that address critical operational factors as well as emissions management considerations.

AI and machine learning applications could ultimately support a variety of interconnected business processes — for example, our gas control, operations planning, maintenance planning, and field work management processes.

### Incubating new technology in our innovation lab

To speed new ideas to implementation, we have established an AI and machine learning innovation lab, where our team of data scientists, and subject matter experts, from various departments and specializations, can experiment with new technologies in a test environment. This is a safe digital space that allows for new systems and programs to be tested virtually and fine tuned before we deploy them.



### Detecting and quantifying emissions

Emissions detection and quantification technology has been rapidly evolving in the past two years. TC Energy has been piloting various emissions data capture technology including:

- Direct manual measurement techniques performed by our field personnel
- Fixed continuous sensors that detect emissions and other operational data in real time
- Satellite emissions monitoring
- Aerial imaging methods from drones, helicopters, fixed wing planes and unmanned aerial vehicles

These technologies enable us to monitor emissions in near-real-time and track our emissions performance on a more frequent basis. This data also helps us to prioritize required maintenance and repairs to rapidly address fugitive emissions when detected.

## Piloting AI and machine learning applications on our natural gas pipelines

Our natural gas pipeline system includes close to 100,000 km of pipe, almost 250 compressor stations, 1,100 compressor units, and approximately 2,500 meter stations. There are close to one million data streams from sensors on equipment and facilities. We are piloting advanced data and analytics applications that help optimize key activities and functions required for the safe, reliable performance of this extremely complex system. In 2021 we implemented two such tools.

### Using machine learning to optimize system operations

We have created a machine learning application to provide predictive forecasts and recommendations for our U.S. Natural Gas Pipeline operators. This application, dubbed the “autonomous pipeline” monitoring system, collects critical real-time data from many different sensors and systems, at many locations along our pipeline. The application uses advanced data analytics to evaluate millions of potential scenarios then predict operational outcomes. Computer models make recommendations for station pressures and produce operational recommendations to meet the predicted flow requirements. This allows controllers to look to one dashboard in real-time to assess how best to optimize the pipeline. We are now completing studies to determine which other assets are suited for this technology.



### Using AI to detect and predict pipeline anomalies

We developed and launched an operational business intelligence program that uses AI and machine learning to help our customers optimize gas throughput. The program, nicknamed “ORBIT” (Operations Resiliency Business Intelligence Tool), uses advanced analytics techniques and a comprehensive knowledge base to detect and predict potential anomalies on our Canadian Natural Gas Pipeline system — faster and more efficiently than current computer systems. Through machine learning, the program then recommends actions to help mitigate and resolve issues with more precision. Going forward, we anticipate ORBIT will help identify pipeline integrity anomalies and improve operational efficiency, as well as reduce greenhouse gas emissions across the system.

Our experience with these applications gives us a strong foundation to build from, as we apply our digital capabilities to our emissions reduction goals.





## Leverage carbon credits and offsets

Evaluate and leverage carbon offsets and assess opportunities to develop nature-based solutions.

### Engaging in voluntary markets

Carbon offsets will continue to play a role in helping hard-to-abate sectors mitigate their emissions. As we look to address the balance of our residual emissions, we may invest in carbon offsets or purchase carbon credits, prioritizing projects that are co-located in the areas we operate, and maximize the socio-economic and environmental benefits for our company and the communities in which we operate. When participating in voluntary carbon markets we will strive to invest in the highest quality offsets, including nature-based solutions, that are verified by internationally recognized standards such as Verra, Gold Standard, the Climate Action Reserve and the American Carbon Registry.

We will investigate opportunities to develop projects that generate other environmental, social, and economic co-benefits beyond just GHG reductions.

### Participating in compliance markets

Today, all our Canadian Natural Gas assets (except for Trans Québec & Maritimes Pipeline (TQM)) are regulated under carbon pricing — these include cap-and-trade in Quebec, the carbon tax in British Columbia, baseline-and-credit through the Alberta Technology Innovation and Emissions Reduction (TIER) regulation, and the federal output-based pricing system (OBPS). In managing our carbon compliance obligations, we maintain a portfolio approach — evaluating abatement opportunities within our own footprint (e.g., waste heat recovery, process optimization, electrification), as well as procuring carbon offset credits and emission allowances. We continue to advocate for the use of carbon markets for compliance purposes to create immediate and measurable reductions in GHGs at the lowest possible cost.



### Developing quantification protocols

Over the past decade, we have been partnering with project proponents to develop quantification protocols under the Alberta Offset System. We have contributed to the development of over 10 approved protocols and invested in projects that promote development of sustainable practices and clean energy such as wind generation, biomass, landfill gas recovery, energy efficiency and sustainable forestry practices.

# Funding our plan

As with all of our capital allocation decisions, we intend to continue our disciplined approach to funding and financing our GHG emissions abatement programs and low-carbon fuels and infrastructure projects.

## Making strategic capital allocation decisions

Our climate goals will help inform our future capital expenditure decisions — and we believe there are abundant opportunities for emission reduction investments that leverage and enhance the resiliency of our asset footprint. We are seeking low-carbon investments which will also support our objectives to deliver growth in earnings, dividends and total shareholder return, while aligning to our risk preferences.

We are already allocating capital to lower-carbon infrastructure investments — for example, investments in pumped hydro storage projects, solar and wind projects, natural gas pipeline modernization programs, and the Bruce nuclear power generation facility in Ontario. We regularly provide information and updates on our capital program through our quarterly and annual reports, news releases and other communications.

We will continue to review and evaluate all relevant funding sources to ensure optimal financing solutions are implemented to support our GHG emissions abatement programs.

## Evaluating innovation funding sources and incentives

The innovation funding ecosystem in Canada and the U.S. continues to rapidly evolve in support of GHG emissions reduction projects.

We continue to identify and assess potential external funding sources and incentives which could be available. These may include government grants and incentives, tax credits and infrastructure bank programs among others.

Funding opportunities are specific to each jurisdiction and type of project, and so must be identified on a case-by-case basis. It is a highly competitive space — however, climate-related funding sources continue to grow, and we expect new opportunities will become available to us over time. Our ability to access external funding may influence the sequence and timing of our abatement projects.

# Communications and reporting

This publication describes our plans for progressing towards our GHG emissions reduction targets, which contribute to meeting our broader sustainability commitments. Going forward, our intention is to report on our progress and performance against these targets in our Report on Sustainability and other reporting as appropriate. We remain committed to full transparency in our communications and reporting as our plans evolve.

## Additional sustainability and ESG reporting

This publication constitutes one element of our environmental, social and governance (ESG) reporting. More information and data, including content that is aligned with global reporting standards, can be found in the following documents:

[2021 Report on Sustainability](#)

[2021 ESG Data Sheet](#) — with downloadable performance data tables

[2021 TCFD Alignment Table](#)

[2021 SASB Alignment Table](#)

[2021 Reconciliation Action Plan](#)

[2021 CDP Climate Change Report](#)

[2020 Materiality Assessment](#)

[ESG Directory](#)

## Other communications

Our quarterly and annual reports, news releases and other communications can be found on our website ([TCEnergy.com](https://www.tcenenergy.com)), on SEDAR ([www.sedar.com](https://www.sedar.com)) and on EDGAR ([www.sec.gov/edgar.shtml](https://www.sec.gov/edgar.shtml))









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