

# CLIMATE RISK AND RESILIENCE REPORT 2019



Suncor Energy Inc.





## ABOUT THIS REPORT

Suncor has an extensive history of reporting on our environment, social and governance performance in our annual Report on Sustainability, Management Proxy Circular, Annual Information Form/Form 40-F, and through submissions to several third-party indices and climate change reporting organizations.

We appreciate that shareholders and other stakeholders may benefit from further information on how Suncor is addressing the challenge of climate change.

This report is intended to provide Suncor's perspective on our energy future. It includes information on our business strategy as we transition to a low-carbon economy.

This stand-alone report is focused specifically on Suncor's management of climate change risk. Additional disclosure of sustainability information can be found in Suncor's 2019 Report on Sustainability.

[www.sustainability.suncor.com](http://www.sustainability.suncor.com)

As of July 15, 2019

# LETTER FROM THE PRESIDENT AND CEO



Climate change is one of the most pressing challenges we face as a global community. A big part of that challenge is about how we best produce and consume the energy the world needs while reducing the greenhouse gas (GHG) emissions that contribute to climate change, all as we continue generating social benefit. Clearly, more needs to be done to address this complex global issue – and Suncor will continue to be an active partner as the world works to solve this energy and climate dilemma.

For Suncor, technology and innovation – core parts of our DNA – are critical to addressing climate change. In fact, both are key to Suncor achieving our goal of reducing the GHG emissions intensity of our operations by 30% by 2030.

Since 2014 we have reduced our intensity by 10%. With Fort Hills, our newest mining facility, we have deployed extraction technology that removes carbon from the oil before it is sent to market. The oil sands are the only place in the world that does this. This process results in a GHG emissions intensity similar to the average refined barrel in North America as well as lower operating costs.

Suncor continues to invest in a number of low-carbon solutions that have potential impact well beyond our business. This includes next-generation biofuels, low-carbon power through expanded use of cogeneration, and the construction, in 2019, of Canada's first coast-to-coast network of electric vehicle fast-charging stations through our Petro-Canada brand.

We plan to remain resilient and thrive in tomorrow's economy by continuing to reduce carbon intensity through operational excellence and by harnessing new technology. We also understand that investors and other stakeholders expect and deserve transparent and clear-headed carbon risk disclosure that describes how we aim to achieve our goals.

This year's report shares how we continue to advance our governance and management of carbon emissions as a principal risk – one that has the potential to materially impact our business. Managing carbon as a principal risk means that it receives oversight from the full Board of Directors. In 2019, the board completed a deep dive into carbon risk and the strategies we are taking to mitigate that risk. The report also describes how we continue to test our business and growth strategies against three long-term energy future scenarios. Suncor's commitment to climate risk disclosure is reinforced by our efforts to ensure consistency between our practices and standards and those embodied in the recommendations from the Task Force on Climate-related Financial Disclosures.

Our future will be shaped by how we respond to a number of complex – and sometimes competing – challenges. For example, there is a direct correlation between quality of life and life expectancy, and access to safe and affordable energy. So in a world headed towards a population of nine billion by 2050 – and where some 600 million people still live in extreme poverty – two facts that are indisputable: the amount of energy the world requires will continue to increase and, if we're to avoid the worst impacts of climate change, collectively we will have to tackle the emissions challenge associated with that growth.

We believe that Canada, with its vast resource base, democratic values and commitment to environmental performance and social well-being, is uniquely positioned to continue delivering the energy the world needs. It is my commitment that Suncor will play an important role investing in technology and innovation to reduce GHG emissions. We will continue to collaborate with others to help us all move toward a low-carbon future.

I encourage you to read this, our third climate report, along with our latest [Report on Sustainability](#), and give us your feedback. The opportunities and risks on the road to our energy future are significant; we will navigate it best if we do it together.

Sincerely,

Mark Little  
President and CEO

# EXECUTIVE SUMMARY

We share in the global challenge to tackle climate change by reducing emissions while meeting growing global energy demand.

Suncor continues to improve on our approach to climate disclosure. Our 2019 report includes a year-over-year discussion of greenhouse gas (GHG) performance with new 2018 emissions and energy data. We have new information on our input into climate policy development and our stakeholder engagement activities. We have also refreshed our low-carbon innovation section.

In 2018, Suncor announced support for the Task Force on Climate-related Financial Disclosures (TCFD) recommendations. We think disclosure is a foundational activity for investor engagement and we expect to see the number of companies and sectors reporting on climate risk to continue growing.

We completed a detailed review of the TCFD recommendations in 2018 and our analysis showed that, while we are largely aligned, we still have opportunities for improvement. To that end, we have added a discussion on our approach and progress toward our GHG goal and new information on Suncor's work to embed sustainability within our supply chain. We are also taking steps in 2019 to develop a 2°C scenario that looks beyond 2040 to include in our business strategy review. We will provide an update on this process in our 2020 report.

Suncor continues to support the Paris Agreement to limit global temperature rise to below 2°C. This requires an urgent and collaborative effort of all governments, businesses and individuals to meet this challenge at the same time as we work to meet the growing global demand for energy. We must pursue solutions across all parts of the economy, addressing both improvements to the existing sources of energy and implementation of new sources in order to advance the energy system transformation the world needs.

## GHG performance and low-carbon innovation

Suncor is aiming to reduce our emissions intensity through our GHG goal by continuing to drive operational efficiency improvements while accelerating the adoption of new technology. We are measuring our progress by targeting a 30% reduction in the emissions intensity of our products by 2030 relative to a 2014 baseline.

In 2018, corporate absolute GHG emissions rose approximately 11% primarily due to the start-up of the Fort Hills project. However, corporate GHG emissions intensity dropped 2% due to the lower GHG intensity associated with the paraffinic froth treatment (PFT) technology deployed at Fort Hills.

In order to meet our GHG performance goal there must also be additional advances in technology. Suncor invested approximately \$635 million in 2018 in technology development and deployment,

and digital technologies to optimize current assets and develop next-generation facilities. We believe technology and energy innovation have the potential to move emissions reduction from incremental to step change improvement.

## Integrating carbon risk into decision-making

In addition to setting an ambitious, long-term goal to reduce GHG intensity, carbon risk is embedded within Suncor's approach to governance and decision-making.

We undertake a corporate-wide process to identify, assess and report on significant risks to the business. Carbon is considered a principal risk with required oversight by the Board of Directors. This includes reviewing external trends, carbon risk pathways, and Suncor's plans to mitigate those risks.

To improve our understanding and prepare for the future, Suncor has embedded the current and potential costs of carbon into our business processes including operations planning, capital budgeting, as well as acquisition and divestiture evaluation. We test all of these decisions against future possible carbon price environments. This work helps us understand if current and potential assets and investments are resilient in a carbon constrained future. It also provides the organization with information to target improvement opportunities.

We use scenario planning<sup>1</sup> to assess the resilience of our strategy over the long term. All of our scenarios point to the need for us to continually lower costs and carbon intensity throughout our business. However, as the energy system transitions away from carbon intensive sources of energy, we believe some level of hydrocarbons will still continue to be needed for consumer products, commercial and personal transportation, agriculture and industrial uses.

## Strategy for a changing future

To successfully and responsibly deliver affordable energy to the world, Suncor has to continue to evolve with the energy system. We are well-positioned to do this with a strong upstream portfolio connected to efficient downstream refineries and strategic investments in new technology that help us reduce carbon emissions and lower costs across all aspects of our business.

For oil sands, the long-term and vast reserves base results in significantly lower exploration costs and risk providing resiliency to continue to deliver value to shareholders in a carbon-constrained future. New oil production and extraction technologies will only further improve our cost and carbon competitiveness.

<sup>1</sup> We used three scenarios defined by IHS Markit as the basis for the development of the Suncor scenarios. The IHS Markit Autonomy, Rivalry and Vertigo scenarios have been modified to fit our unique circumstances/needs.

Downstream, we expect to see a modest decline in demand for gasoline in North America over the next 10 years. Long-term gasoline demand is expected to be moderated by efficiency improvements in internal combustion engines and increased uptake of biofuels, as well as hybrid and electric vehicles. Our connection to a reliable source of crude oil combined with our investments in biofuels technology will allow us to continue to meet the demand for liquid fuels while reducing carbon intensity.

In addition to reducing carbon intensity of liquid fuels, we are also evolving and expanding our current offering to meet the growing customer demand by building a coast-to-coast electric vehicle fast-charging network spanning more than 50 Petro-Canada stations.

Suncor's combined wind and cogeneration power production make us a large independent power producer in Alberta. We expect to continue to develop low-carbon power generation capacity to support our own needs while reducing the carbon intensity of Alberta's power grid.



## OUR PERSPECTIVE ON CLIMATE CHANGE

*Energy remains the backbone of a modern economy and delivers much of our well-being. It is required to feed us, build and heat our homes, power manufacturing and facilitate transportation. At the same time, the science is clear that the world needs urgent action to reduce carbon emissions and avoid the worst effects of climate change.*

Our energy future will be shaped by a growing population, along with the continued need to move people out of poverty, improve health and education, grow food production, and meet transportation trends all within an increasingly digital world. All of these benefits require energy. The challenge is how to best deliver that energy affordably while reducing carbon emissions.

As a company, we will continue to do our part by taking steps to reduce our own GHG emissions intensity and by developing and investing in emissions-reducing technology that can be applied to other industries. We also encourage dialogue that considers our collective role as consumers of energy, given that 80% of overall carbon emissions occur at the point of consumption. Our future energy system will require commitments from both industrial emitters and individuals.

Suncor supports the approach outlined in the Paris Agreement, but no one group or industry alone can limit the global average increase to below 2°C, relative to pre-industrial levels. To achieve this objective, there must be significant advances in technology, a shift in consumer choice and behaviour, and the development of new energy systems.

All types of energy will be needed and no single solution will meet the challenge. The pathways to a diversified and robust energy system will require getting the best out of both traditional and new sources of energy.



## LEADERSHIP IN CLIMATE POLICY

Suncor operates in multiple jurisdictions across Canada and internationally, which requires that we work with governments and political parties, Indigenous Peoples, think tanks, universities, and environmental advocacy groups to support the development of smart policies that promote cost and carbon competitiveness. Our support for climate leadership is not tied to any particular government. We seek to contribute to the development of effective government policy in support of moving towards a low-carbon economy.

Good policy instills confidence in the industry, enables continued prosperity, and incents investment in technology and innovation that can lower emissions globally. We continue to advocate for environmental policies and regulations that help us address climate change, including supporting a broad-based price on carbon. If applied broadly across the economy to producers and consumers, it can be one of a suite of effective market and regulatory mechanisms to lower GHG emissions while promoting low-carbon innovation.

We demonstrate our commitment to support effective, practical and cost-efficient policy design by contributing to:

- The development of national low-carbon policies such as the:
  - › Pan-Canadian Framework on Clean Growth and Climate Change
  - › Clean Fuels Standard in Canada
  - › *Greenhouse Gas Pollution Pricing Act* (GGPPA) which encompasses the development of the consumer fuel tax and the industrial output based pricing system
- The development of provincial low-carbon policies such as:
  - › Alberta's industrial emissions reduction policy, 100 Mt oil sands emissions limit
  - › Quebec's cap-and-trade program and Energy Transition Action Plan
  - › Ontario's Emission Performance System
  - › British Columbia's CleanBC Climate Action Plan and Low Carbon Fuel Standards
- Supporting Canada's Ecofiscal Commission in broadening the discussion of carbon pricing into the realm of practical policy application. The commission brings together economists to inform the critical discussion about the ecofiscal reform that Canada's future requires
- Supporting the World Bank Carbon Pricing Leadership Coalition (CPLC), a voluntary initiative that aspires to catalyze action toward the successful implementation of global carbon pricing
- Participating in global energy discussions at the World Economic Forum and the United Nations Climate Change Conference of Parties (COP).

# STAKEHOLDER ENGAGEMENT

## Advancing the energy dialogue

Transitioning an energy system is as much a social and cultural shift as it is a technological and economic shift. Through the Suncor Energy Foundation, Suncor supports organizations to engage Canadians in meaningful discussions on the energy system and the linkages between the environment and the economy. We're also working with our foundation partners to promote an understanding of the changing energy realities of the 21<sup>st</sup> century and raise awareness among Canadians of the role their choices and lifestyles play in reducing emissions.

For years, we have created spaces for collective dialogue where multiple perspectives, experiences and the best minds may inform Suncor's approach to sustainable energy development. And while we might not always agree on everything, the conversations help us understand what we have in common – a desire for energy to improve quality of life, a healthy environment and vibrant communities. We do it because we all have a role to play in creating our energy future, we recognize the value of relationships and diverse perspectives, and believe it's important to listen, understand and learn from other points of view.

Examples of these collaborations include:

- Partnering with the Energy Futures Lab, a multi-sector collaboration designed to help shape the energy future and strengthen Alberta and Canada's position as a global energy leader.
- Working with a number of organizations to support reconciliation with Indigenous Peoples through leadership development and building community capacity including a focus on environmental priorities.
- Bringing together social innovators, funding partners, Indigenous leaders and youth, thought leaders, governments and community representatives to explore complex community needs that require collaboration to make progress and see lasting change.

We seek to engage with partners in an atmosphere of mutual respect. Our partners are free to publicly criticize our company or industry as they see fit except on specific initiatives in which we've agreed to co-operate. We, in turn, are free to counter statements and research by partners if we know it to be contrary to established facts. Simply put, both sides can agree to disagree, while continuing to work together for the greater good.

*And while we might not always agree on everything, we do have a common goal – produce energy to improve quality of life and do so in a sustainable way.*

Over the past year, we have engaged with stakeholders directly, through consultations, meetings, workshops, and conferences. We will continue these activities as we develop improved climate disclosure and risk management approaches.

Highlights from 2018 and early 2019 include:

- Hosted a Ceres<sup>2</sup>-facilitated stakeholder panel to review our sustainability progress. The stakeholders were asked to provide us with critical feedback on our approach and progress toward our sustainability goals, including our GHG goal. We also asked them for ideas to improve Suncor's disclosure in line with the TCFD recommendations.
  - › the feedback recognized that, while we've made progress, we still have work to do to clearly define and disclose our approach to meeting our GHG goal. To that end, we included more information in this report on our GHG goal methodology and pathways to reducing our emissions intensity by 30% by 2030.
- Met with investor network, Climate Action 100+, to discuss Suncor's governance approach and board oversight, commitment to the Paris Agreement, as well as disclosure in line with the TCFD.
- Hosted an Energy Transition Day of Learning workshop in partnership with Aviso Capital/NEI Investments, the Royal Bank of Canada, and Teck Resources. The workshop, attended by investors and industry leaders, shared the latest information on the energy transition and was designed to reduce polarization and promote dialogue on a lower-carbon economy in Canada.
- Participated in a number of events to advance climate policy and sustainable energy development such as the Energy Disruptors conference, Clean Energy Ministerial Meeting, and sustainable finance expert panel roundtables.

Over the next year, we expect to host another Ceres-facilitated stakeholder workshop and increase engagement with investors, including the Climate Action 100+ initiative. We look forward to these opportunities to build mutual understanding on the best approaches for Suncor to meet its business objectives and address stakeholder expectations.

<sup>2</sup> Ceres is non-profit organization that works with investors and companies to build sustainability leadership and drive solutions for a health global economy.

# TASK FORCE ON CLIMATE-RELATED FINANCIAL DISCLOSURES

Since mid-2017, the TCFD has worked to improve standards for carbon disclosure. Suncor supports these activities as a way to improve communication and promote learning with our investors on carbon reduction initiatives and performance. We believe the global context is required to provide a complete picture of operational performance, strategic planning and risk management.

**Suncor supports the desire for consistency and transparency embodied in the TCFD recommendations** and see them as a way to build on our two decades of sustainability reporting and environment, social, and governance (ESG) investor engagement. The recommendations provide a useful framework to describe how businesses are managing climate risk and ensuring corporate strategies remain resilient in a low-carbon future.

There are still many details to work out, particularly around the appropriate disclosure channels to ensure we can provide a transparent and fulsome discussion on our climate strategy over the long term while recognizing the challenges of providing forward-looking information within regulatory financial disclosure requirements. We look forward to working with the task force on this journey to shape and evolve climate risk disclosure so it meets the needs of both companies and investors and leads to better understanding of what's required to transition to a low carbon future.

We have provided below, a table showing the sections of this report that are aligned, fully or in part, with the TCFD recommendations. Improvements made in this report include additional information on our GHG goal methodology and our engagement with our supply chain. We have also begun developing a 2°C scenario looking beyond 2040 that we will use to test our business strategy.

TCFD RECOMMENDATION		REPORT SECTION
<b>GOVERNANCE</b>		
Disclose the organization's governance around climate-related risks and opportunities.	Describe the board's oversight of climate-related risks and opportunities.	<ul style="list-style-type: none"> <li>• <a href="#">Integration of carbon risk into our decision making processes</a></li> <li>• <a href="#">The energy system of tomorrow</a></li> </ul>
	Describe management's role in assessing and managing climate-related risks and opportunities.	<ul style="list-style-type: none"> <li>• <a href="#">Integration of carbon risk into our decision making processes</a></li> <li>• <a href="#">Business strategy for a changing energy future</a></li> </ul>
<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.	Describe the climate-related risks and opportunities the organization has identified over the short, medium, and long term.	<ul style="list-style-type: none"> <li>• <a href="#">Business strategy for a changing energy future</a></li> <li>• <a href="#">Carbon policy and impacts on Suncor</a></li> <li>• <a href="#">Facility resilience to extreme weather events</a></li> </ul>
	Describe the impact of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning.	<ul style="list-style-type: none"> <li>• <a href="#">Business strategy for a changing energy future</a></li> <li>• <a href="#">Carbon policy and impacts on Suncor</a></li> </ul>
	Describe the resilience of the organization's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario.	<ul style="list-style-type: none"> <li>• <a href="#">The energy system of tomorrow</a></li> <li>• <a href="#">Scenario summaries</a></li> <li>• <a href="#">Business strategy for a changing energy future</a></li> <li>• <a href="#">Carbon policy and impacts on Suncor</a></li> <li>• <a href="#">Facility resilience to extreme weather events</a></li> </ul>
<b>RISK MANAGEMENT</b>		
Disclose how the organization identifies, assesses, and manages climate-related risks.	Describe the organization's processes for identifying and assessing climate-related risks.	<ul style="list-style-type: none"> <li>• <a href="#">Leadership in climate policy</a></li> <li>• <a href="#">Stakeholder engagement</a></li> <li>• <a href="#">Integration of carbon risk into our decision making processes</a></li> </ul>
	Describe the organization's processes for managing climate-related risks.	<ul style="list-style-type: none"> <li>• <a href="#">GHG performance and mitigating emissions</a></li> <li>• <a href="#">Low-carbon innovation</a></li> </ul>
	Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the organization's overall risk management.	<ul style="list-style-type: none"> <li>• <a href="#">Integration of carbon risk into our decision making processes</a></li> </ul>

TCFD RECOMMENDATION		REPORT SECTION
<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.	Disclose the metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management process.	<ul style="list-style-type: none"> <li>• <a href="#">GHG performance and mitigating emissions</a></li> </ul>
	Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions, and the related risks.	<ul style="list-style-type: none"> <li>• <a href="#">GHG performance and mitigating emissions</a></li> </ul>
	Describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets.	<ul style="list-style-type: none"> <li>• <a href="#">GHG performance and mitigating emissions</a></li> <li>• <a href="#">Integrating our GHG performance goal</a></li> </ul>

## GHG PERFORMANCE AND MITIGATING EMISSIONS

*Through Suncor's program and culture of operational excellence, we focus on safe, reliable and energy efficient operations.*

### 2018 GHG performance<sup>3</sup>

In early 2018, Suncor started producing at Fort Hills and production volumes ramped up steadily throughout the year. This addition to our oil sands portfolio resulted in absolute full-year GHG emissions of 22 million tonnes of CO<sub>2</sub>e. While the total emissions increased approximately 11% year-over-year, the lower GHG emissions intensity associated with the paraffinic froth treatment (PFT) extraction process at Fort Hills helped to reduce corporate emissions intensity by 2% to 0.389 tonnes of CO<sub>2</sub>e per cubic metre of oil equivalent production. We expect the GHG intensity at Fort Hills to decline further, as the facility operates at steady state design capacity.

The GHG performance in our other upstream oil sands operations was slightly higher than their three-year average. These variations are attributed to a combination of factors such as a larger than usual turnaround event which disproportionately affected production in 2018 and to a lesser extent some modifications to emission calculation methodologies<sup>4</sup>.

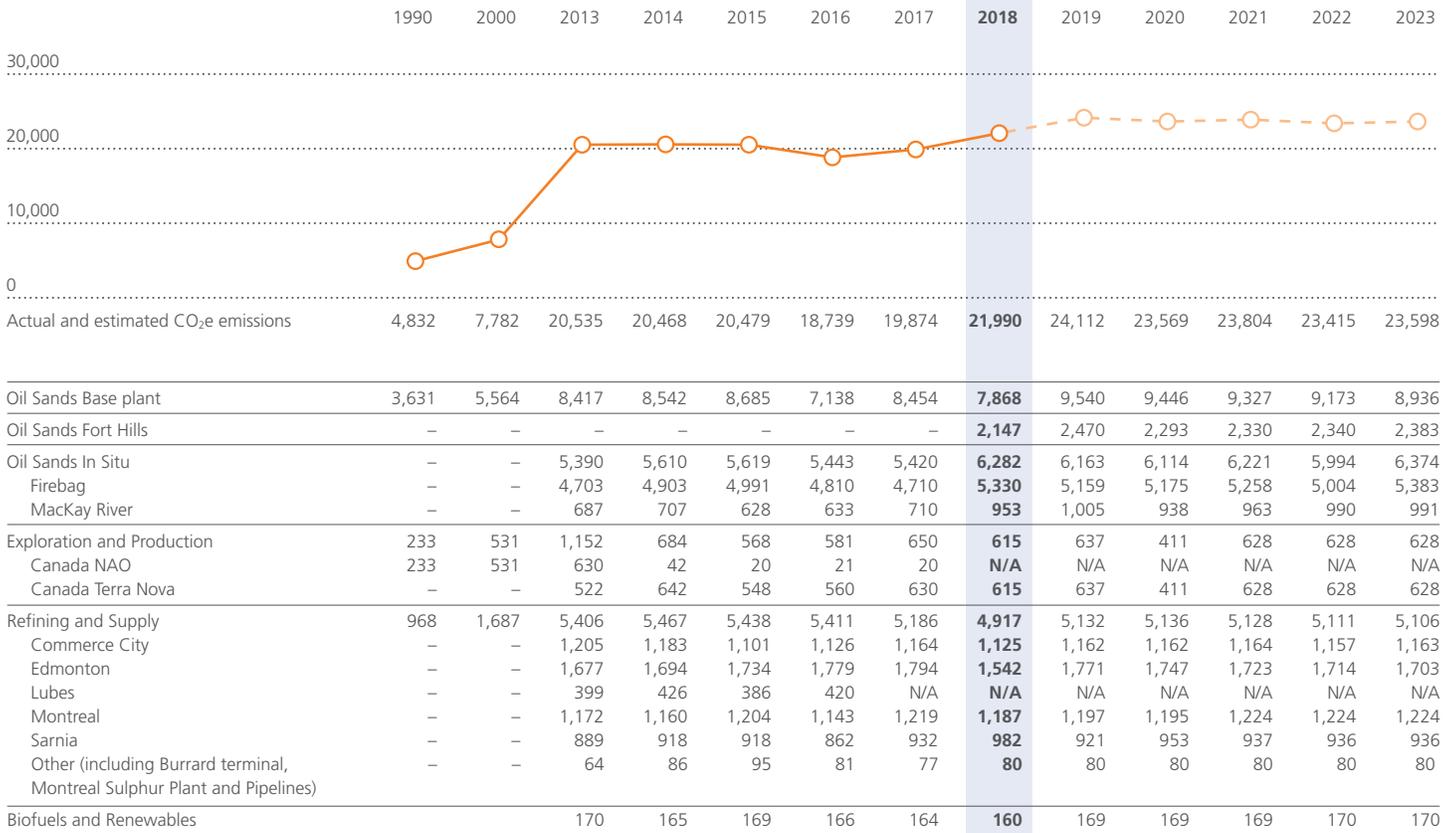
The emissions intensity of our downstream refining and supply facilities was slightly lower in 2018, driven by efficiency improvements following major maintenance at the Edmonton refinery and improved refinery utilization rates in Montreal and Commerce City.

Suncor's GHG goal is designed to encourage business choices that reduce Suncor's emissions and the emissions in the global energy system. To support tracking our goal progress, Suncor developed a methodology that includes both direct emissions reductions from our operated assets and indirect reductions from the use of our products. The data in the GHG performance section reflects our direct operations emissions. For more information on the goal methodology, please see the [Integrating our GHG performance goal](#) section of this report.

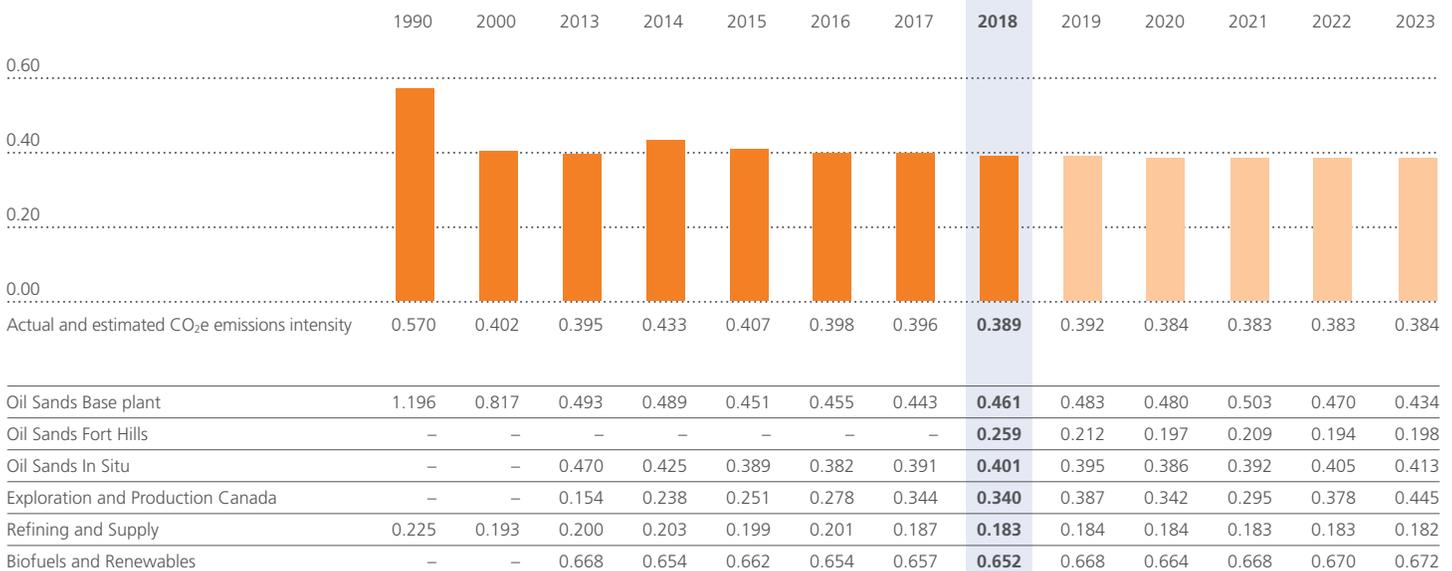
<sup>3</sup> All GHG performance values reflect Suncor-operated facilities only and represent 100% of the direct and indirect emissions at these facilities. Data is not broken down by working interest and does not include non-operated facilities.

<sup>4</sup> In 2018, Suncor revised its absolute GHG calculation methodology to align with the GHG Protocol. We also modified the emissions intensity calculation to reflect oil production emissions net of exported electrical power emissions. This was implemented retroactively to 2013 and also in the forecast to 2023. The result is that overall emissions intensity is more comparable to other crude oil production intensities and does not inflate the values due to cogeneration power emissions.

**SUNCOR-WIDE ABSOLUTE GHG EMISSIONS\***  
actual (1990 – 2018) and estimates (2019 – 2023)  
thousand tonnes CO<sub>2</sub> equivalents (CO<sub>2</sub>e)



**SUNCOR-WIDE GHG EMISSIONS INTENSITY\***  
actual (1990 – 2018) and estimates (2019 – 2023)  
tonnes CO<sub>2</sub>e/cubic metres of oil equivalent (m<sup>3</sup>OE)



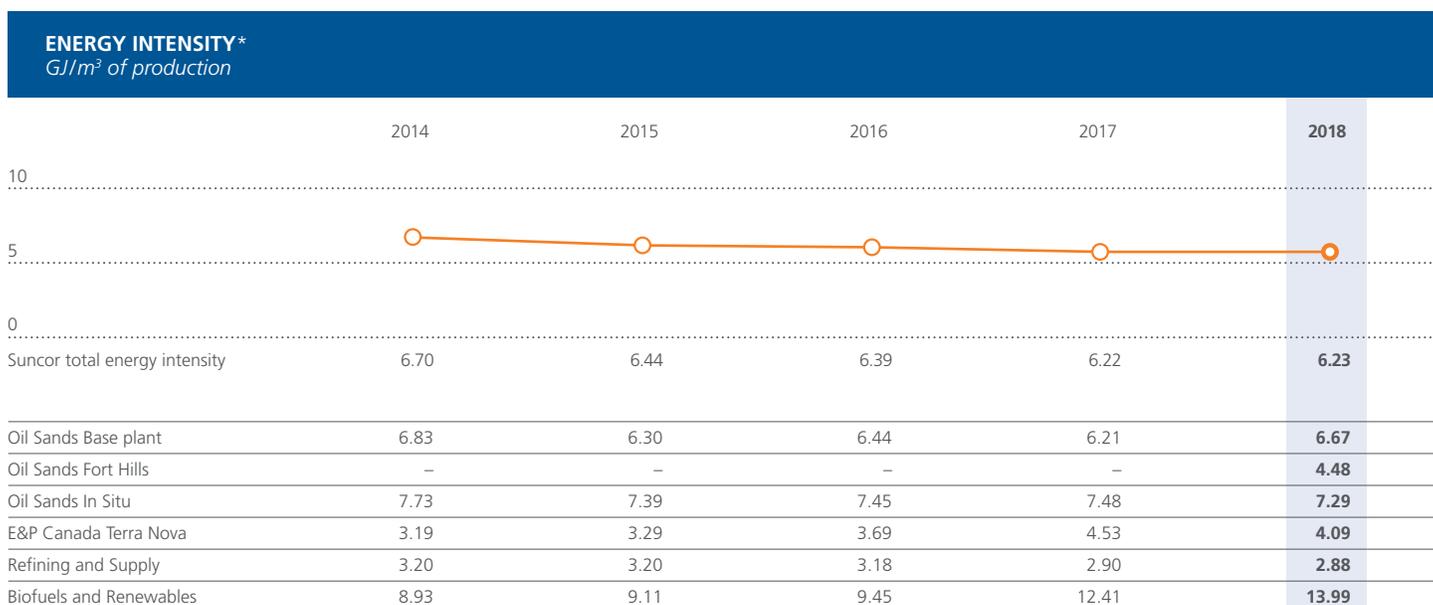
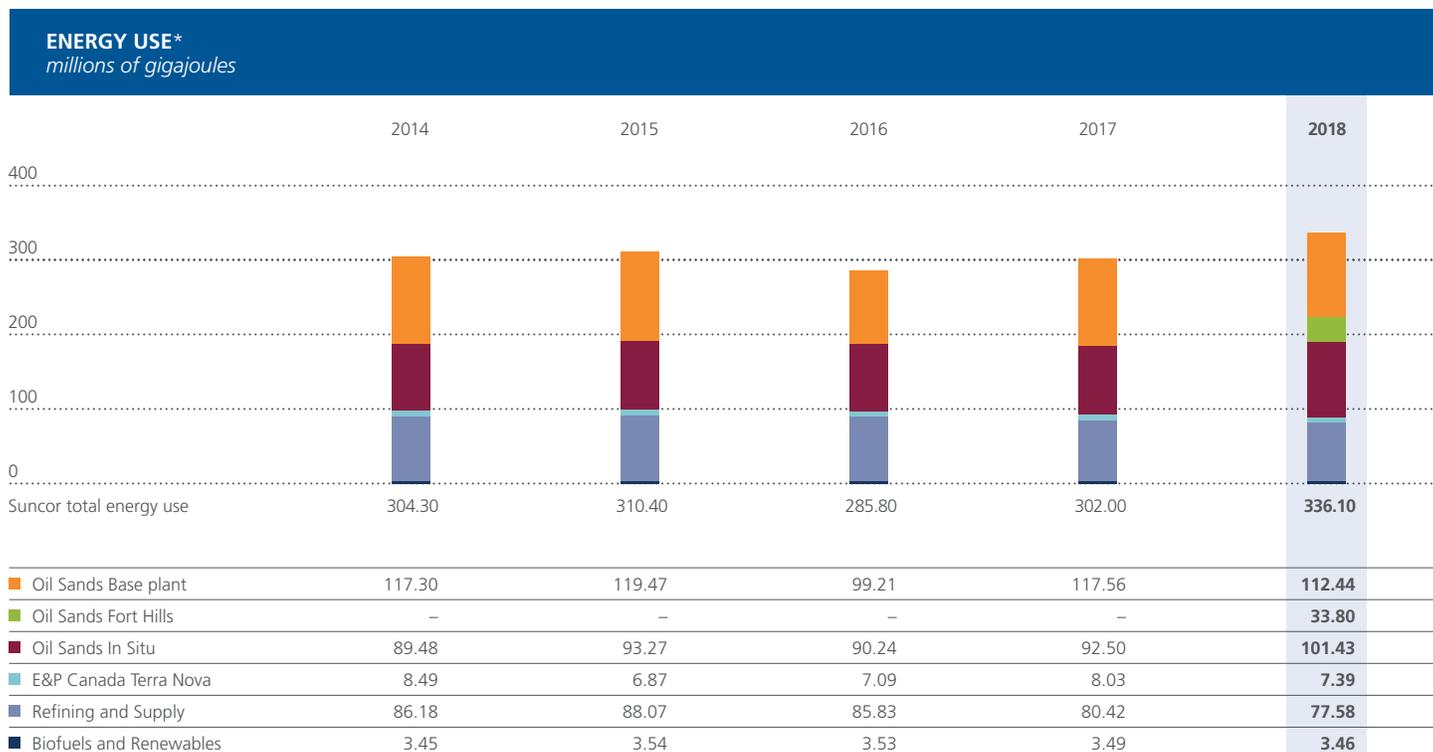
Converting corn into fuel is more energy intensive than turning hydrocarbons into fuel. We are evaluating optimization work at our St. Clair facility to develop lower carbon intensity ethanol. The GHG benefit of biofuels is that the carbon emitted during end-use combustion came from plants that recently captured CO<sub>2</sub> from the atmosphere. Its combustion is considered to be net neutral with regards to carbon emissions.

\* For additional information about this chart and its data please refer to the performance data notes

## Suncor energy use and energy intensity

GHG emissions are closely linked to energy use, with approximately 90% of direct GHG emissions and nearly all indirect emissions accounted for by consumption of energy for operations.

Suncor is committed to continuously improving energy management and reducing GHG emissions as part of everyday operational excellence. Similar to the GHG trends, energy use increased in 2018 with the addition of Fort Hills but total intensity remained relatively flat.



\* For additional information about this chart and its data please refer to the performance data notes

## Performance highlights

### Oil Sands Base Plant Mining

Our Oil Sands Base plant upgrader underwent a major maintenance turnaround event in 2018, resulting in lower bitumen production and lower energy efficiency. Due to this event, absolute emissions from our operations were 7% lower at 7.9 million tonnes of CO<sub>2</sub>e but emissions intensity increased by 2% to 0.461 tonnes of CO<sub>2</sub>e per m<sup>3</sup> of oil equivalent over the 2015-2017 average. The higher intensity was partially offset by projects which improved heat integration and energy efficiency.

### Fort Hills Mining

Fort Hills saw first oil in January 2018 and successfully ramped up to full operating capacity by the fourth quarter of 2018, with 94% average plant utilization. This new facility added more than 2.1 million tonnes of CO<sub>2</sub>e to our overall GHG emissions. However, the less energy and carbon-intensive extraction process used at Fort Hills removes heavy hydrocarbon molecules to create a lighter, higher quality bitumen that requires less diluent for shipping. As a result, the 2018 GHG intensity of production was 0.262 tonnes of CO<sub>2</sub>e per m<sup>3</sup> of oil equivalent and full cycle (well-to-wheels) emissions intensity was similar to the average refined barrel in the U.S.<sup>5</sup> Fort Hills emissions intensity is expected to drop further with a full-year of steady state operations.

### In Situ

The absolute emissions at our steam assisted gravity drainage (SAGD) operations increased 16% year over year to about 6.3 million tonnes of CO<sub>2</sub>e. Following a 2017 turnaround season, our In Situ facilities had higher production volumes as well as increased cogenerated power production for export and thus higher overall emissions. Suncor's In Situ facility intensity was 2% higher at 0.406 tonnes of CO<sub>2</sub>e per m<sup>3</sup> of oil equivalent than the 2015-2017 average. The intensity increase was due to a higher steam-oil-ratio at Firebag in 2018.

### Exploration and Production

On the East Coast of Canada, Terra Nova emissions decreased 2% to 0.6 million tonnes CO<sub>2</sub>e in 2018. While the 2018 emissions intensity decreased 5% to 0.340 tonnes of CO<sub>2</sub>e per m<sup>3</sup> of oil equivalent, it is above the 2015-2017 average due to natural production declines. Terra Nova is the only East Coast Canada asset that Suncor operates. Other international and offshore production interests are joint ventures and not within our direct operational control.

### Refining and Supply

Suncor's Refining and Supply assets saw improved utilization rates in 2018 with the exception of the Edmonton refinery, which had a major turnaround event that impacted its GHG intensity. This was partially offset by plant improvements, including a new process catalyst.

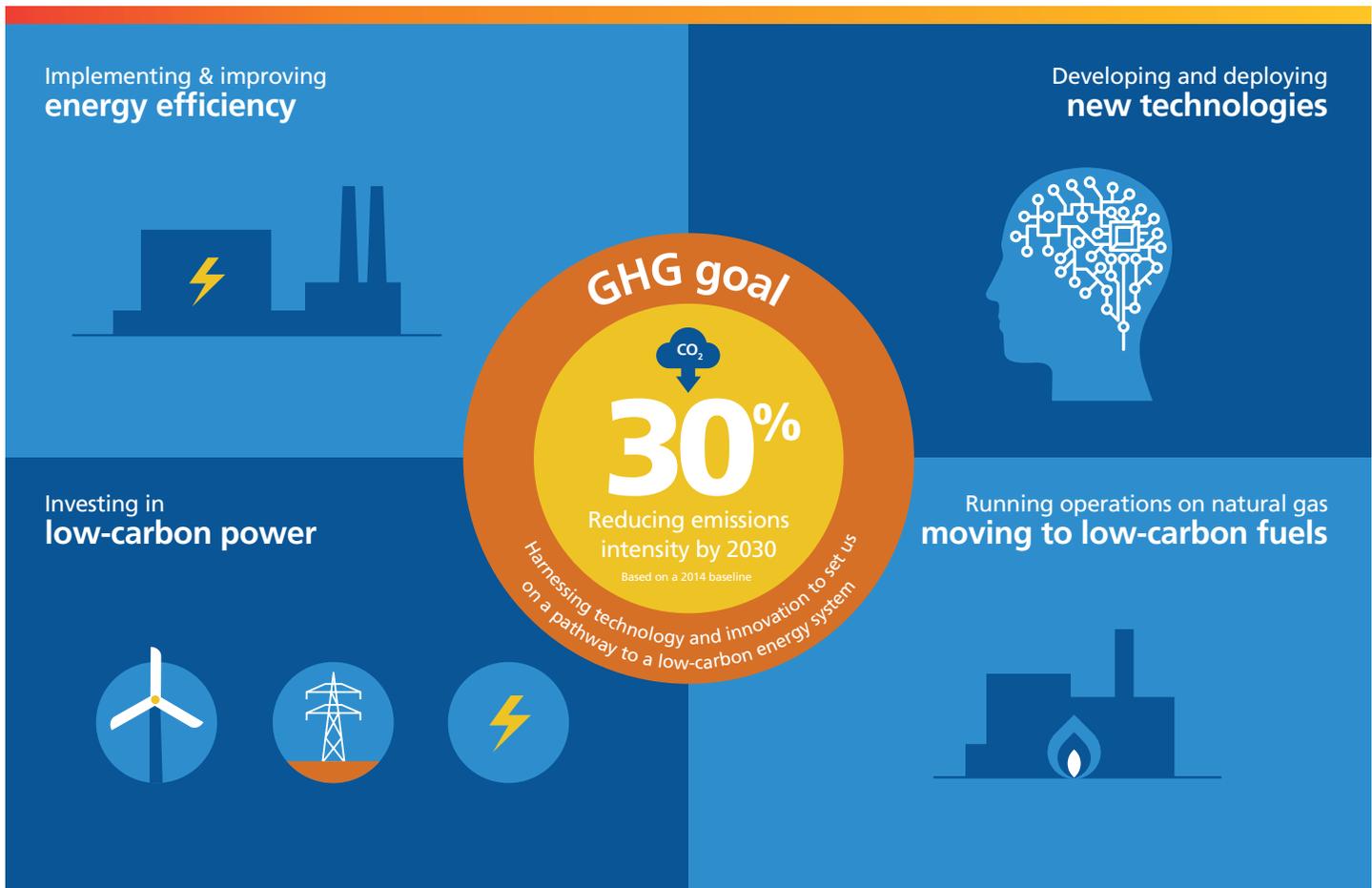
Total GHG emissions at our downstream facilities fell 2% to 5.1 million tonnes of CO<sub>2</sub>e. Emissions intensity held steady at 0.183 tonnes of CO<sub>2</sub>e per m<sup>3</sup> of oil equivalent which is approximately 5% below the 2015-2017 average intensity.

### Renewables and Biofuels

Suncor is currently a partner in four operational wind power facilities with a generating capacity of 111 megawatts (MW), enough to power about 52,000 Canadian homes. Performance data is reported for operated wind farms only and is not adjusted to reflect ownership share.

We've been blending ethanol in our retail fuels since 1992 and Suncor's St. Clair ethanol plant is the single largest ethanol production facility in Canada. There were no notable changes in plant performance in 2018. Absolute emissions were 0.162 million tonnes CO<sub>2</sub> and emissions intensity was 0.656 tonnes CO<sub>2</sub>e per m<sup>3</sup> oil equivalent.

<sup>5</sup> IHS Energy Special Report: Comparing GHG Intensity of the Oil Sands and the Average US Crude Oil. May 2014.



## INTEGRATING OUR GHG PERFORMANCE GOAL

In 2016, we announced a greenhouse gas goal that we will work to harness technology and innovation to set us on a transformational pathway to a low-carbon energy system. We will measure our progress by reducing the total emissions intensity of the production of our oil and petroleum products by 30% by 2030.

This ambitious goal, based on a 2014 baseline year, stretches us beyond our current technology and know-how, and ultimately aims to alter the trajectory of our absolute emissions, with the intent to make us a producer of low-carbon intensity crude and refined products. While our goal will be measured by the reduction of our corporate emissions intensity by 30%, the goal is also intended to embed low-carbon thinking into the day-to-day activities and decisions of our employees.

The goal is driving operational, energy and fuel efficiency improvements, accelerating the development and implementation of new technologies and encouraging the evaluation of potential low-carbon business opportunities. Operational metrics are part of the corporate scorecard and are critical to meeting the goal. The initiatives required to meet the goal cascade into annual performance targets.

We are targeting emissions reductions in four key areas.

### Energy efficiency and continuous improvement

We continue to drive energy efficiency at all of our facilities.

- We are implementing new digital technologies such as operation performance management (OPM) dashboards at Firebag to measure, review and make real-time decisions that improve reliability, reduce energy intensity, and lower cost and GHG emissions.
- The design of our new facilities leverages operational experience to significantly lower energy intensity. For example, in addition to using an extraction technology that removes heavy hydrocarbon molecules at the source, the Fort Hills design is highly heat integrated through the use of high efficiency cogeneration, recovery of warm process water, and closed loop cooling for enhanced process heat capture.

## Investing in low-carbon power

Our GHG goal is also driving us to seek and evaluate new business opportunities in our value chain and within the evolving energy system.

- All of our oil sands facilities use cogeneration, and we are a net exporter of power to Alberta’s electricity grid. By producing both industrial steam and electricity through a natural gas-fuelled process, cogeneration is the most energy-efficient form of hydrocarbon-based power generation. The GHG intensity of the power produced from Suncor’s cogeneration units is approximately 75% below that of an average coal-fired power plant and 30% below a combined-cycle natural gas facility. The excess power from our cogeneration facilities combined with our wind energy, significantly contribute to reducing the overall GHG intensity of Alberta’s electricity grid.
- We are progressing a project to replace the GHG intensive coke-fired boilers with cogeneration or natural gas boilers at our Oil Sands Base plant. In addition to providing the facility with steam and hot water needed for our operations, the cogeneration option could export up to 800 MW of low GHG intensity electricity to the provincial grid in Alberta.<sup>6</sup>
- In addition to our current partnerships in wind power, we continue to evaluate renewable energy investments that deliver economic, environmental and social benefits. We also are continuing to explore the opportunity to develop our first utility-scale solar photovoltaic facility in Alberta.

## Moving to low-carbon fuels

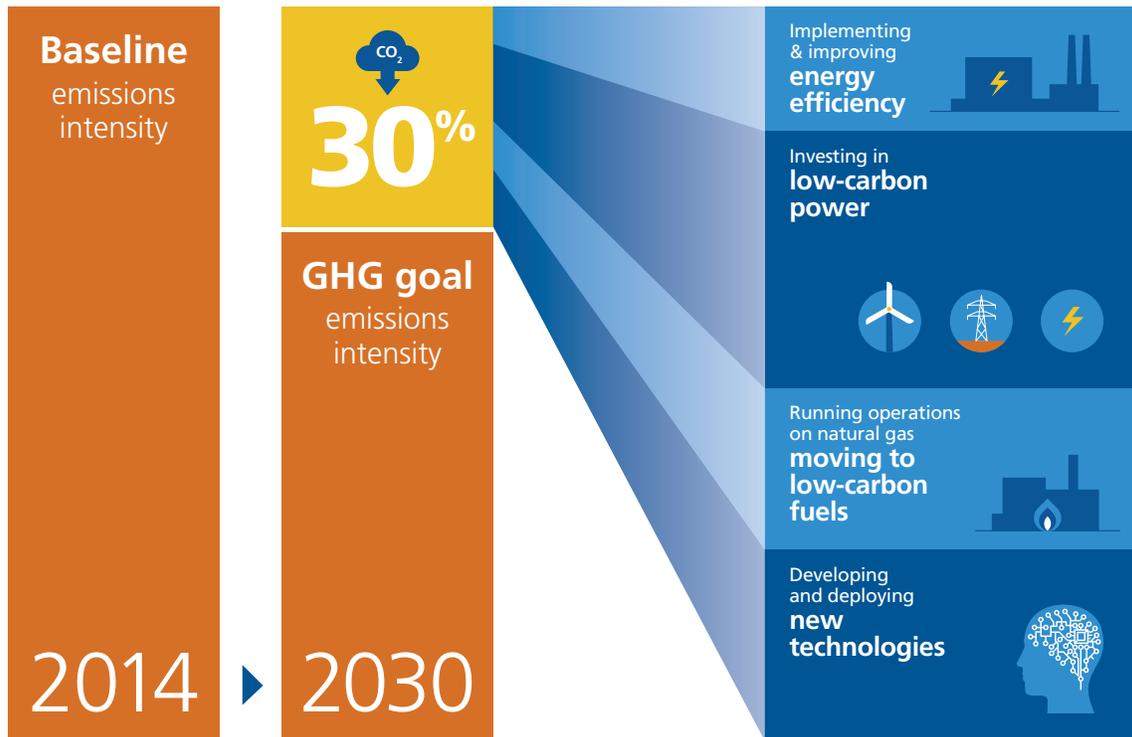
We continue to look for low-carbon opportunities in our operations and evaluate new business opportunities in renewable fuels.

- We are considering fuel switching from high to low carbon sources in our processes such as the proposed coke-fired boiler replacement project at base plant which would replace coke combustion with natural gas.
- We continue to invest in renewable fuels including our 2019 investment in [Enerkem Inc.](#) which manufactures biofuels and renewable chemical products from household garbage that would otherwise be landfilled.
- We are evaluating optimization work at our St. Clair ethanol plant to increase the quality of our products to develop lower carbon intensity ethanol.

## Developing and deploying new technologies

Our goal will require us to go beyond today’s capabilities, and we are aggressively working on new technologies that lower the costs and carbon emissions of our processes and products.

- We are participating in the Government of Alberta’s research and analysis of a potential bitumen partial upgrading program to improve the GHG profile of oil sands crudes.
- We are amplifying our climate actions through:
  - › technology collaboration efforts through [Canada’s Oil Sands Innovation Alliance \(COSIA\)](#).



6 This project has not been sanctioned and is subject to climate policy clarity.

- › focused investments in clean technology funds such as [Evok Innovations](#).
- › advancing the work of the [Clean Resource Innovation Network \(CRIN\)](#), an industry-led group created to leverage the oil and gas industry's strengths in large-scale heavy industrial collaboration with the potential to export to other industries globally.
- Advancing new in situ extraction technologies that incorporate injected hydrocarbon solvents such as propane or butane that are expected to reduce emissions from in situ facilities.
- Directly investing in technology companies like [Enerkem Inc.](#) and [LanzaTech](#).

In some instances, the development and deployment of these technologies will take us beyond 2030 and we are looking at longer term technology-aspirational goals to motivate decision-making. More details about some of the technologies and innovations we are advancing can be found in the [low-carbon innovation](#) section.

## Goal methodology

Suncor's GHG goal is intended to improve decision-making and our methodology is specifically designed to encourage business choices that will reduce emissions in the global energy system. To support this change, we have established principles that guide the implementation of the goal. The goal should:

- Drive real emissions reductions in the energy system both within and external to Suncor's operations.
- Encourage new, lower intensity production as part of our evaluation of new projects. Embedding the GHG goal and carbon price assumptions within our asset development execution model enables a rigorous process to promote the selection of efficient assets and technology for any new oil sands, offshore, downstream and renewable projects.
- Lead to additional emissions reductions and will not be met by changing our product sales mix or through acquisition

and divestment. For example, reducing the sales volume of premium synthetic crude could reduce Suncor's direct emissions but would simply shift emissions downstream and not result in emissions reduction overall. Similarly, buying low carbon- or selling high carbon-intensity assets simply transfers ownership and does not reduce global atmospheric emissions. If we change our product mix or portfolio of assets, we will adjust our goal baseline.

To allow us to measure progress against our goal, we have established the following:

### **Suncor tracks the GHG intensity of our production within the facilities we operate**

The focus of our goal is on the assets we control and operate. As such, we establish the baseline GHG emissions intensity of our operated assets by calculating the direct (Scope 1) and indirect (Scope 2) emissions of our production. This allows us to identify opportunities for our controlled assets to reduce emissions directly in our operations and also for our products to reduce emissions indirectly within the energy system. We continue to promote safe and efficient production in our non-operated assets.

### **Suncor actions and/or investments that reduce emissions outside of operational fence lines will be captured as indirect credits**

Indirect emissions are not directly emitted by our operations but are required to produce our products and include the electricity, hydrogen, or steam that we import from third-party suppliers. In addition to this, our low-carbon products can help reduce indirect emissions within the energy system. For example, the cogeneration power we generate for Alberta's electricity grid displaces high-carbon sources of power.

### **The goal will adjust to account for changes in asset mix**

We have developed a methodology for asset acquisitions or divestitures that does not benefit or hinder our ability to meet our goal.

# LOW-CARBON INNOVATION

New technologies and innovative thinking are fundamental to how we do business. In 2018, we invested approximately \$635 million in technology development and deployment, and digital technologies as part of a robust strategy to optimize current assets and develop next-generation facilities.

## GHG: Technology development and deployment

	DISCOVER	DESIGN	DEVELOP	DEPLOY
IN SITU	<ul style="list-style-type: none"> <li>Well-bore technologies</li> <li>Novel subsurface technologies</li> <li>Alternative gas co-injection</li> </ul>	<b>Solvent +</b> <ul style="list-style-type: none"> <li>Wellbore heating</li> <li>Superheat</li> <li>Electromagnetic (EASE)</li> <li>ESEIEH®</li> </ul>	<ul style="list-style-type: none"> <li>High Temperature Reverse Osmosis Produced Water Treatment</li> <li>In Situ Demonstration Facility</li> </ul>	<b>Steam-solvent technologies</b> <ul style="list-style-type: none"> <li>ES-SAGD (Expanding Solvent – Steam Assisted Gravity Drainage)</li> <li>Non-condensable gas co-injection pilots (Firebag and MacKay River)</li> </ul> <b>Well-bore enhancements</b> <ul style="list-style-type: none"> <li>Multilateral well pilot (Firebag)</li> <li>Electric Submersible Pump pilots</li> <li>Flow control devices M-Tool pilot (Firebag)</li> </ul>
MINING		<ul style="list-style-type: none"> <li>Non Aqueous Extraction</li> </ul>		<ul style="list-style-type: none"> <li>Paraffinic Froth Treatment (PFT)</li> </ul>
UPGRADING & REFINING		<b>Partial upgrading</b> <ul style="list-style-type: none"> <li>Mild thermal cracker technology</li> <li>De-asphalting</li> </ul>		



**LEGEND**

○ Technology name / grouping

● Time to implementation

● Operational ● 0-3 years ● 4-6 years ● 7-10 years

## Low-carbon in situ production

Our current technology for in situ production, steam assisted gravity drainage (SAGD), employs two parallel horizontal wells to recover the bitumen. The top well distributes steam to heat the reservoir, allowing the bitumen to flow to the lower well where it can be pumped to the surface. One of the challenges of SAGD is that the reservoir is typically heated to 200°C or more to get the bitumen to flow, consuming a significant amount of natural gas, and necessitating large amounts of water handling and treatment for steam production.

We are advancing a portfolio of in situ technologies to lower the carbon intensity of producing bitumen and improve cost competitiveness. We believe the solution will be a hybrid of the technologies we’re progressing with the aim to reduce energy and water use, lower capital and operating costs, and improve production rates and resource recovery. Some of these technologies could be applied to existing facilities or new growth facilities and, if successful, would significantly reduce our GHG emissions intensity.

These technologies could have a significant impact in the following areas:

- energy use and GHG emissions
- water use and treatment
- land impacts
- production rates and resource recovery
- capital and operating costs
- product quality and value

Suncor works extensively with research organizations and technology providers as well as our own technical experts to identify, evaluate and advance technologies in our Upstream and Downstream operations. Here are some of the technologies we are advancing:

### Solvent+

Suncor is focused on hydrocarbon solvents as an alternative to steam for bitumen production from in situ reservoirs. Suncor’s current focus on solvent recovery processes builds on our experience and

background knowledge of solvent-dominated processes, gained from participation in pilots and testing for more than 20 years.

In the solvent-based processes Suncor is pursuing, a light hydrocarbon solvent such as propane or butane is used as the primary means to mobilize the bitumen. We are beginning to pilot a suite of technologies referred to as Solvent+, where the “+” refers to a range of heating technologies that can be coupled with solvent injection. These include wellbore heating, superheated solvent injection, electromagnetic assisted solvent extraction (EASE) and Enhanced Solvent Extraction Incorporating Electromagnetic Heating (ESEIEH®)<sup>7</sup>. If successful, Solvent+ offers the potential for several significant environmental improvements over SAGD including reducing GHG emissions intensity by 50 to 70%.

## ES-SAGD

Expanding Solvent SAGD (ES-SAGD) is an enhancement of SAGD technology wherein a small volume of hydrocarbon solvent is co-injected with steam. The addition of the hydrocarbon solvent is expected to accelerate bitumen production and reduce steam requirements, process water requirements and greenhouse gas emissions. An important component of our evaluation of this technology is enhancing our understanding of solvent retention and recovery. Pad-scale demonstration commenced in February 2019 at Firebag and its results will determine the viability of this technology.

Solvent+ and ES-SAGD technologies have the potential added benefit of lowering the carbon composition of the oil through the production process. This raises the value of the oil and reduces the full life cycle emissions intensity.

### Paraffinic froth treatment

Fort Hills uses a paraffinic froth treatment (PFT) to convert bitumen froth generated in the extraction circuit into an upgrader feedstock. In PFT, we selectively remove the heavy hydrocarbon molecules (the low-value, heavy fraction of the mined bitumen) to create a lighter, higher quality-bitumen that requires less diluent to transport and requires no additional upgrading for the downstream processing. The oil sands is the only place in the world that alters the carbon content of oil at the production source prior to sending to the market.

As a result of this partial decarbonization process, our greenhouse gas emissions for the average barrel extracted at Fort Hills are on par with the average crude refined in the United States<sup>8</sup> on a full life cycle basis.

## Low-carbon oil sands mining technology

### Non-aqueous extraction

Through partnerships with equipment suppliers and research organizations, we are pursuing new technologies to reduce the need for water in bitumen extraction from mining operations. Currently, warm water is used to separate bitumen from the sands. By replacing that water with an alternative solvent, we have the potential to

significantly reduce tailings, costs, and our GHG emissions. A demonstration pilot is tentatively planned for 2020.

## Low-carbon innovation in our Downstream business

Since 2006, Suncor has been making a significant impact in Canada’s emerging biofuels industry. Our downstream carbon reduction initiatives include alternative fuels, fuel switching, energy efficiency and investing in new technologies including:

- a coast-to-coast level three high-speed direct current electric vehicle charging network spanning more than 50 Petro-Canada stations.
- investment in companies focused on biofuel technologies such as [LanzaTech](#) and [Enerkem Inc.](#)
- the largest ethanol plant in Canada which provides the ethanol that we blend into our gasoline as well as research into lower carbon intensity ethanol.
- increasing renewable fuel options for our diesel and gasoline blending including investment in hydrotreated renewable diesel (HRD) and fatty acid methyl ester (FAME).

### Collaboration and partnerships

Innovation is a process that is best served by inviting the brightest minds and diverse perspectives to collaborate.

Venture capital funding supports entrepreneurs to advance their ideas to commercialization and build businesses to market their technology world-wide. An example of this is **Evok Innovations**, a \$100 million technology fund co-founded by the BC Cleantech CEO Alliance, Cenovus Energy Inc. and Suncor. Suncor and Cenovus each have committed up to \$50 million over 10 years to develop technologies to help address some of the most pressing environmental and economic challenges of our industry.

**Canada’s Oil Sands Innovation Alliance (COSIA)** – brings together Canada’s largest oil sand producers to pool expertise and intellectual property to accelerate technologies and improve the industry’s environmental performance. COSIA’s environmental focus areas attract the brightest minds from around the world. The NRG COSIA Carbon XPRIZE is a global competition in which teams from around the world, including Canada, are proving their technologies can be economically scaled up to transform CO<sub>2</sub> into valuable, useful products.

Suncor is an active member of the **Clean Resource Innovation Network (CRIN)**, which aims to position Canada as a global leader in producing clean hydrocarbon energy from source to end use. The network brings together the oil and gas industry, innovators, investors, start-ups, policy-makers, incubators and accelerators, researchers and students. It facilitates the connections to advance technologies for use in Canada and with the potential for export to global markets emphasizing the potential impact that our country can make to help address global challenges.

<sup>7</sup> ESEIEH® is a registered trademark of L3Harris Technologies Inc. in the US, Canada, and other countries.

<sup>8</sup> IHS Energy Special Report: Comparing GHG Intensity of the Oil Sands and the Average US Crude Oil. May 2014.

# INTEGRATION OF CARBON RISK INTO OUR DECISION-MAKING PROCESSES

Suncor takes an integrated approach to managing carbon risk and we embed carbon into our decision making processes in multiple ways.

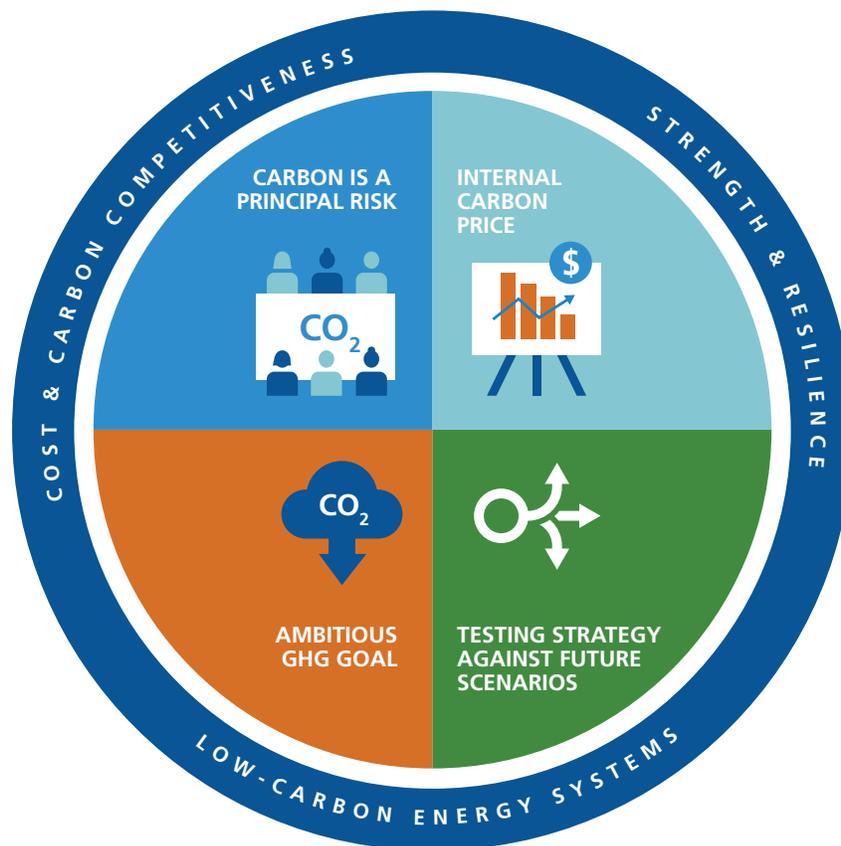
Carbon risk is considered one of Suncor’s principal risks. As such, it undergoes a regular Board of Directors review. This includes reviewing external trends, carbon risk pathways, and Suncor’s plans to mitigate those risks. Carbon risk is also brought forward to the Environment, Health, Safety and Sustainable Development Committee of the board on a quarterly basis for ongoing oversight.

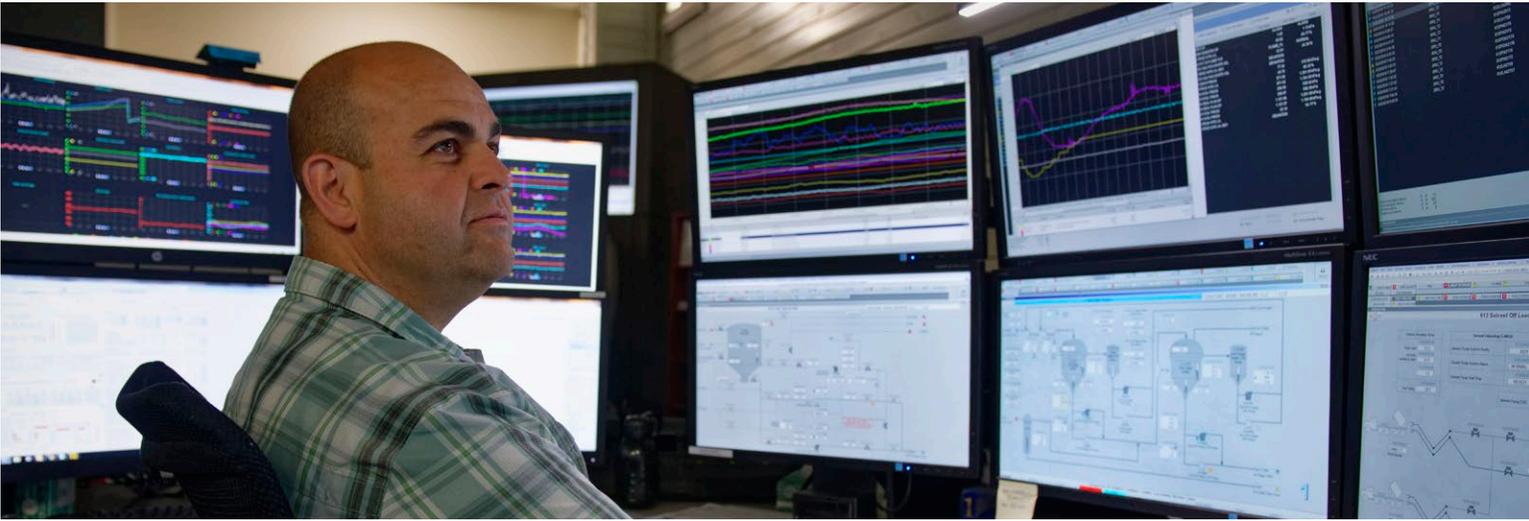
Each year, as part of our normal integrated business planning process, we develop price assumptions for a variety of economic variables. This includes both base and alternative case carbon prices that take into account existing regulations and the expected trajectory of those regulations as they apply to our assets. These assumptions are used in the evaluation of all business, acquisition, divestiture, capital and strategic planning activities. The alternative case takes a much higher view of future carbon prices and serves as a “stress test” which adds confidence to capital decisions.

In addition to carbon price, other factors such as crude oil price and demand changes over time, are evaluated in business, capital, and strategic planning processes. Each business is required to consider these material factors and demonstrate that it will be able to continue to meet an acceptable rate of return, including funding its sustaining capital and enabling Suncor to maintain and grow its dividend. If the business cannot meet these objectives, it is required to outline the steps needed to achieve this target.

Our internal management model for project and asset development incorporates carbon pricing and our GHG goal prior to a commitment of significant resources, and ensures that all material climate change risks and opportunities are well understood. The process allows for analysis of technical options, but also the regulatory and external stakeholder context to be recognized in decision-making.

At an enterprise-wide level, we use scenario planning to assess the resilience of our business strategy over the long term. We also test our whole portfolio of businesses against our long-term GHG goal to ensure it is achievable.





## THE ENERGY SYSTEM OF TOMORROW

We are starting to see global efforts to reduce emissions through nationally determined commitments in accordance with the Paris Agreement. Broader technology and policy pathways are necessary to deliver energy to a growing global population, while at the same time mitigating climate change. Limiting emissions will be achieved at an energy system-wide level in the most appropriate way for each region or jurisdiction. There are no single or simple solutions to this challenge.

In our base case energy outlook, we take the following broad trends into consideration:

- Forecasted population growth, the increasing need for energy in developing economies and the aspiration for a better quality of life. As such, we see the global demand for energy increasing steadily. Much of this increase is expected to come from developing countries in Asia, the Middle East, Latin America and Africa.
- We believe decoupling of economic growth and carbon emissions is required to fundamentally change the energy mix.
- National emissions reduction commitments made as part of the Paris Agreement will drive carbon pricing and complementary policy frameworks that are expected to accelerate energy efficiency and emissions reduction technology and incent broader scale adoption of alternative low-carbon energy.
- We expect oil demand will continue to grow until approximately 2040 due to population growth, urbanization and increased living standards, but oil is expected to decline as a percentage of the global energy consumption mix.
- Given natural declines, staying at current production levels, much less meeting increased demand, will require investment in new production from global shale, deep-water and oil sands reserves – a major challenge, given the reduction in capital investment due to depressed commodity prices in recent years.
- We expect supply cost will continue to be moderated by industry efforts to optimize production and invest in technological advances.

### Scenario Planning

We use three long-term energy futures scenarios<sup>9</sup> to test our business strategy. All of the scenarios are plausible and could affect our operating environment and business strategy in markedly different ways. Under each of these scenarios, including the one with the most aggressive decline in oil demand, we believe a substantial amount of oil will be required for decades as the world gets on track to meet its climate ambitions. This view is also supported by forecasts from organizations such as the International Energy Agency and the US Energy Information Administration. Meeting that demand at either low, or highly volatile, oil prices will be a challenge.

Each scenario has an implied crude oil price range and climate change regulatory impact. Two of the three reflect the current global aspiration toward reducing carbon emissions; what differentiates the scenarios is the context, pace and scale at which that comes about.

Of these scenarios, “Autonomy” is the scenario we consider best represents the technology and policy context that would be essential to meet the aspiration of limiting cumulative emissions to 450 ppm. In 2019, Suncor is currently working on the development of a 2°C scenario that we can use to test our business strategy beyond 2040.

The scenarios are used annually by the CEO, the Executive Leadership Team and the Board of Directors to assess business and growth strategy and identify alternative strategic directions. This process continues to be a useful tool for stress-testing our business on a number of key dimensions, including climate risk.

<sup>9</sup> These scenarios are substantially based on the IHS Markit Autonomy, Rivalry and Vertigo scenarios. The scenario descriptions have been modified by Suncor for applicability to its business.

## Scenario Summaries<sup>10</sup>

### AUTONOMY

Rapid technological and societal change transforms the energy landscape in Autonomy, supported by a peaceful and collaborative world.

- Millennial shift – focus on sustainability and collaboration, sustainable urbanization.
- Falling costs and improved reliability of clean energy allow developing countries to bypass large-scale hydrocarbon-based energy infrastructure.
- Natural gas is a transitional fuel for power generation, but after 2030 increasingly renewable power generation fuels a largely electrified energy system
- Break through battery technology development supports growth in electric vehicles.
- Oil's role in geo-politics is substantially diminished contributing to a generally stable geo-political environment.
- Stable moderately strong economy.
- Carbon-intensive industries face high regulatory costs and requirements.
- No new export pipelines are built out of the Athabasca oil sands region.

#### ENERGY MARKETS IMPACT

- Abundant and cost-effective supply of energy coupled with moderation and eventual decline in demand, particularly in transportation, drives oil prices to stay low in the long term.
- Oil exploration and production slows as investment moves to other sectors, reducing but not choking supply.
- High cost supply falls off fast.
- Oil is still required and continues to provide a significant share of the world's energy need.

#### EXPECTED IMPACT ON SUNCOR

- No existing assets are stranded.
- Existing long-life assets continue to produce, funding their own sustaining capital or modest growth capital requirements for incremental production expansion.
- New oil sands growth projects are challenged and unlikely to proceed.
- Oil sands continue to provide a stable dividend base while growth options in other resource basins are considered.
- Only the top tier refineries remain profitable – Suncor's Downstream maintains a focus on reliable, efficient and low-cost operations.

### RIVALRY

In Rivalry, population growth, urbanization and growing middle class drive energy demand – diverse supply is required to satisfy demand, with intense competition for market share between energy sources.

- Improving standard of living and greater personal wealth, particularly in China.
- Expanding use of advanced technologies increases demand for energy.
- Shift of economic power to millennials with the desire and means to address pollution and climate change.
- Geo-political landscape remains tense and strong global economic growth shifts global influence.
- Technology advancements allow access to greater oil reserves, with unconventional supply growing.
- Natural gas and LNG play a larger role in transportation.
- Strong growth in renewable energy.
- Carbon-intensive industries face high regulatory costs and strict standards.

#### ENERGY MARKETS IMPACT

- High global energy demand fed by diverse energy supply.
- Refined products still dominate transportation fuels, but are losing market share to alternative fuels.
- Fuel efficiency standards and technological innovation moderate growth in refined product demand.
- Oil and natural gas are increasingly costly to produce and the oil price continues to trend upwards with some cyclical downturns.

#### EXPECTED IMPACT ON SUNCOR

- No existing assets are stranded.
- High price and market access enable robust oil sands growth and further investment in improved extraction techniques.
- Continued focus on carbon footprint reduction through capital projects, technology development and efficient operations.
- Competitive downstream provides robust returns and enables physical integration of oil sands crude.

## VERTIGO

Continued conflict and geo-political instability are at the forefront of the world. Vertigo is a world with economic volatility, unbalanced wealth distribution, and overall weaker GDP growth.

- International trend towards isolation and self-preservation with energy security a key concern.
- Air quality, traffic congestion lead to smaller, higher-efficiency vehicles and some electric vehicle adoption.
- Extreme weather events lead to social unrest.
- Investor risk aversion and tight capital markets constrain both technology advancement and high capital projects.
- Pipe-line projects constrained by stakeholder protests and investor risk aversion.
- Unstable, boom/bust energy market.
- Environmental progress and climate change mitigation takes a back seat to economic concerns.

## ENERGY MARKETS IMPACT

- Fossil fuels remain the primary source of affordable energy and dominate the global energy mix.
- The price of oil recovers from current levels but fluctuates widely with rapid shifts in demand and supply.
- Slower economic growth and technological progress limit the proliferation of electric and other alternative fuel vehicles; energy mix does not change significantly.
- Slower economic growth limits growth in energy, oil and refined product demand.

## EXPECTED IMPACT ON SUNCOR

- No existing assets are stranded.
- Long-life assets able to deliver free cash flow through commodity price volatility, enabling Suncor to maintain competitive returns to shareholders.
- Integrated model helps smooth oil price cycles.
- Growth projects rigorously tested to ensure ability to deliver returns in volatile oil price environment.
- Financial strength is leveraged to consolidate assets at the bottom of the cycle.

## Scenario Signposts

Along with scenarios, we also develop and annually update our signposts which are milestones to identify critical shifts in the external context. The world is in a constant state of change, sometimes moving faster than we expect. Tracking the pace and direction of the change is an integral part of our scenario work and helps us develop and evaluate strategic alternatives for our business by incorporating both global and Canadian current events, trends and actions.

Signposts include changes in global energy demand and supply mix, political and economic indicators, climate data, policy and consumer trends, and technology advances. Current signposts tell us:

- the global energy mix shows signs of global demand growth for all forms of energy.
- volatility and uncertainty in geopolitical and global economic environments could hinder the growth of the global economy.
- technology continues to evolve at a rapid pace, which drives down costs and improves energy efficiencies for producers and consumers alike.
- economic priorities and geopolitical tensions appear to impede coordination on climate change action.



## BUSINESS STRATEGY FOR A CHANGING ENERGY FUTURE

The global oil and gas industry is in the midst of a major structural adjustment due in large part to technology that opened up new oil supply, such as shale oil, and reduced the supply cost curve. As the industry adjusts in an effort to emerge stronger and leaner, a focus on where the industry is headed and the key influencers in both the short and longer term is essential.

### Oil sands

Suncor's Oil Sands operations are a concentrated unconventional oil play. Our perspective of the future tells us that now is the time to know where our competitive advantage lies and to play to that advantage.

We have been an operator in the Athabasca oil sands for more than 50 years and the majority of our production comes from the oil sands. There is strategic advantage in having a top-tier resource base of some of the highest-quality reservoirs in the Athabasca oil sands region and substantial scale of physically integrated operations in the region. Furthermore, our largely integrated value chain allows us to extract full value for our resource.

*By operating multiple, large oil sands facilities in this region, we are able to leverage location and logistics synergies between the facilities, allowing us to drive efficiencies and reliability, and optimizing and reducing environmental impact including greenhouse gas emissions.*

Over the past few years, we have increased facility reliability resulting in Oil Sands operations cash operating costs falling from \$39.05/bbl in 2011 to \$25.25/bbl in 2018.

Recent market conditions have provided opportunities to assemble a larger base of top-tier reserves. Our acquisition in 2018 of an additional 5% equity position in the Syncrude joint operation has increased our ownership to almost 59%. This counter-cyclical investment increases our production at a very attractive cost per flowing barrel relative to a greenfield project of a similar scope and nature.

This acquisition increases our exposure to carbon pricing. However, by increasing our position in Syncrude, we have the opportunity to leverage our relationship with an experienced operator with a strong technology program to further advance energy efficiencies at both our base plant and the Syncrude facility.

While often characterized as being the oil basin most vulnerable to a low oil demand scenario, the very long operating life and low decline rate of our assets are, paradoxically, a major advantage

under a scenario of either declining demand for crude oil or a correspondingly lower oil price environment. Our long-term reserves base presents minimal finding and exploration costs or risk. The nature of the resource requires high upfront capital investment to develop a project, but once the initial infrastructure is in place, the reservoir can be incrementally developed over a long period of time, without exploration risk, or the high capital requirements of a new project. Oil sands facilities are more comparable to manufacturing operations. Once operating, they are built to last 40 plus years with a steady output. Production does not rapidly peak and decline, so each new incremental expansion results in production growth. Once high upfront capital costs are depreciated, a facility can continue to operate with low operating costs and sustaining capital requirements while continuing to evaluate energy efficiency opportunities. These characteristics also provide a unique opportunity to advance technologies to reduce emissions given the concentration of assets in the basin.

## Transportation fuels in a carbon constrained future

While we expect our upstream crude oil production will continue to supply oil markets, our downstream and marketing business is more exposed to North American refined product supply and demand dynamics.

Governments at all levels in Canada are seeking to diversify transportation fleets to use lower carbon intensity fuels and, as a result, the transportation fueling landscape is expected to change over time. Reducing GHG emissions from the transportation sector is arguably one of the toughest challenges, in that transportation is fundamental to economic productivity and because liquid petroleum fuels are available at a relatively low cost and high energy density.

We see demand for gasoline moderating over the next 10 years, as light vehicle fuel efficiency standards take effect and alternative fuels adoption widens. We see no near-term demand destruction for distillates in North America. In the longer term, we believe diesel will remain the predominant fuel for heavy haulage, aviation, marine and rail, and we see demand growth with increasing economic activity. Heavy-duty vehicle fuel efficiency standards and biodiesel blending are expected to offset some of the economically-driven demand growth.

Enormous strides in fuel efficiency have been made to date through ambitious regulation and by consumer uptake of more efficient light-duty vehicles. Between 2000 and 2010, fleet emissions in Canada decreased from 193 grams per kilometre to 166 g CO<sub>2</sub>e/km, a drop of 14%. As the vehicle fleet continues to turn over in the next decade, fleet average emissions are projected to reach 97 g CO<sub>2</sub>e/km by 2025<sup>11</sup>. While it is unclear what course the United States will take on vehicle efficiency standards, there is technical potential to meet even more ambitious fuel efficiency standards. The advances in engine and drivetrain technologies as well as the development and use of lighter weight materials mean that, on the basis of fuel use per kilometre travelled, the internal combustion engine of the future will, we

believe, not only be cost competitive, but also be very carbon competitive with alternative fuels.

In our view, hybrid, plug-in hybrid and electric vehicles are becoming cost-effective additions to the passenger vehicle fleet and will, along with fuel efficiency standards, contribute to moderating growth in long-term global gasoline demand. However, we believe that cost, carbon competitiveness and consumer convenience mean liquid fuels will remain the primary fuel source of vehicle mobility for many years.

Regardless of the external policy environment, Suncor is taking action to reduce the emissions intensity of our liquid fuels in several ways. One way is through biofuel blending. Suncor owns and operates the largest ethanol plant in Canada, which provides the ethanol we blend into our gasoline. Heavy haul trucks, aviation and marine fuels of the future will require advanced biofuel blending. We are evaluating optimization work at our St. Clair ethanol plant to increase the quality of our products and develop lower carbon intensity ethanol. We are also increasing biocontent to our diesel and gasoline.

Suncor also monitors technologies being developed by other parties to determine if, and when, an investment in the technology could be applied to our business. In 2019, we invested in [Enerkem Inc.](#), which manufactures biofuels and renewable chemical products from household garbage that would otherwise be landfilled. In addition to a financial investment, a number of Suncor employees have been seconded to Enerkem's facility in Edmonton. We also continue to invest in biofuel technology companies such as [LanzaTech](#).

While we continue to reduce the emissions intensity of our liquid fuels, we are evolving and expanding our current product offering to meet growing customer demand. Through our Petro-Canada brand, we announced construction in 2019 of a coast-to-coast electric vehicle fast-charging network spanning more than 50 Petro-Canada stations. These sites will provide universal options to charge a variety of electric vehicles and will provide a charging experience that is above the current norm in Canada. We have invested in level three direct current fast chargers, a step change technology that is built beyond the needs of today and positioned for the future of charging in Canada. This exciting initiative will enable us to learn more about this emerging market as we continue to evaluate options and respond to the evolving needs of our customers.

## Offshore oil production

Suncor has an interest in every major development offshore of Canada's east coast. Suncor operates Terra Nova and has interests in the Hibernia, White Rose and Hebron projects. We are a non-operating partner in the Buzzard and Golden Eagle fields in the United Kingdom North Sea and have expanded our options in this area through the purchase of a participating interest in the Rosebank pre-development opportunity. We have also recently acquired a participating interest in the Fenja development located in the Norwegian Sea. With diligent management of produced methane, offshore crude oil is generally among the lowest carbon intensity sources of crude globally.

11 <https://www.pollutionprobe.org/pathways-initiative/>

## Low-carbon and renewable power generation

Our energy scenarios tell us that a key pathway towards a lower-carbon energy system is to substantially increase cogeneration and renewable power generation capacity and then electrify a greater percentage of the energy system.

Suncor entered the renewable power generation business in 2002. Since then, we have developed eight wind projects totalling 395 MW. Today, we are partners in four operational wind power facilities with a generating capacity of 111 MW. By developing new renewable projects and subsequently selling down our working interest, Suncor is able to generate profitable returns on investment and create cash flow to support further renewable developments. Suncor has a strong portfolio of renewable power development sites across Canada that will further reduce grid intensity in regions like Alberta and Saskatchewan, which have a carbon-intensive grid.

We are also exploring the opportunity to develop our first utility-scale solar photovoltaic facility in Alberta to complement our experience in developing, constructing and operating wind power projects. As part of investment evaluation, we assess economic, environmental and social benefits including Indigenous partnerships in renewables. This activity also generates emission credits that can be used to offset the emissions in our oil sands operations.

The requirement for steam at crude oil extraction, processing and refining facilities creates the opportunity for high-efficiency cogeneration that provides steam and power to our facilities and delivers surplus power to the grid at a carbon intensity lower than any other hydrocarbon-based generation. For an energy system in transition, the value of cogeneration is high; in addition to providing a reliable, low-cost baseload to manage the intermittency of wind and solar power, cogeneration can economically replace coal generation with a much lower carbon intensity power. Suncor currently has cogeneration units installed at its Oil Sands base plant, Firebag, and Fort Hills facilities, and exports low-carbon excess electricity generated from these units to the provincial grid.

With both renewable and cogeneration capacity, Suncor provides approximately 900 MW to its own sites and exports approximately 400 MW to the Alberta grid.

As climate regulations are implemented across jurisdictions, renewable power benefits from greater scale which can improve technology, efficiency and improve economics. Equipping wind and solar sites with battery storage to optimize the facility's integration to the power grid could further improve effectiveness. An enabling factor will be market design that allows for dynamic interaction between a renewable, but intermittent, power source and baseload sources like cogeneration.

In 2017, we took the first steps in the regulatory process to potentially replace the coke-fired boilers with cogeneration units<sup>12</sup> at our Oil Sands base plant. In addition to providing the facility with steam needed for operations, the cogeneration units may export an additional 800 megawatts (MW) of electricity to the provincial grid, equivalent to roughly 7% of Alberta's current electricity demand. Should the project proceed as planned, construction is targeted to begin in 2020, with commissioning of the cogeneration units expected to commence by 2023.

## Engagement with our supply chain

Suncor is also more aggressively integrating sustainability into our supply chain. Through our Supplier Code of Conduct, we are clear that we expect our business associates to be aligned with our sustainable development approach and that we will work together to seek ways to reduce environmental impacts, support the communities in which we work and collectively contribute to economic growth. To that end, we have taken further steps towards engaging with our suppliers on their sustainability performance, including:

- identifying sustainability risks and opportunities in our supply chain
- building collaborative relationships with peers and suppliers
- embedding sustainability into market activities and supply chain management and field logistics culture.

One of our first steps was to review our suppliers' available sustainability reports, codes of conduct and CDP responses. We assessed the performance of suppliers that make up the top 50% of our annual spend. Through this assessment, we learned that more than 90% of those suppliers publicly report on sustainability, and 42% report to the CDP.

We also kicked off strategic supplier meetings that included sharing sustainability goals and targets, and how our companies can work together to achieve continuous improvement. This resulted in new prequalification questions that incorporate multiple sustainability factors including GHG performance and goal-setting.

For specific requests for proposal (RFP), we are drafting the next version of our sustainability supplemental questionnaire for all potential suppliers responding to Suncor RFPs. This enhanced supplemental questionnaire is expected to launch later in 2019.

Lastly, as we know collaborative relationships will help us advance sustainable procurement, we are in the planning stages to host a supply chain sustainability forum with suppliers and service providers in the fourth quarter of 2019. This work will enable us to further explore opportunities with current and potential partners and create more environmental and social impact opportunities within Suncor and the market.

<sup>12</sup> This project has not been sanctioned and is subject to, among other items, climate policy clarity.



## CARBON POLICY AND IMPACTS ON SUNCOR

Since the ratification of the Paris Agreement, the focus of governments globally is on the technology pathways and policy frameworks required to achieve a stable and responsible transition to a low-carbon energy system at the same time as meeting the continued rising global demand for energy.

### Canadian federal government

The federal government's *Pan-Canadian – Framework on Clean Growth and Climate Change* requires each province to implement a carbon pricing policy with an overall stringency equivalent to a minimum price of \$20 per tonne in 2019, rising to \$50 per tonne over the next four years. Provinces and territories that do not comply are subject to a federal carbon pricing backstop. Provinces and territories that volunteered to accept the federal plan may use the revenue as necessary for the unique circumstances of their region, including protecting carbon-intensive, trade-exposed industries. Involuntary provinces with policies that were viewed to be inadequate are subject to the federal backstop. In these jurisdictions, carbon revenues are generally collected from two streams:

- a consumer-facing carbon tax on all fossil fuels where the majority of the carbon revenues collected are returned to their citizens in the form of a rebate, not their provincial governments.
- to protect the competitiveness of the industrial sector, an output-based pricing system for industrial facilities that emit above 50 kt CO<sub>2</sub>e or more per year, with the ability to opt-in for smaller facilities.

The federal government is consulting with industry on how best to use the carbon revenues to help industry reduce their emissions.

#### Impact of Canadian climate change regulations

Our carbon price outlook assumes the current carbon price will rise to \$100 per tonne on an increasing percentage of our emissions, by 2040. As most of our facilities are currently regulated under various carbon pricing regimes, the impact of our outlook is built into our planning assumptions.

Based on the outlook for new emissions regulations, we have updated our cost estimates. The production weighted average after-tax cash cost per barrel of global production over the period 2019 to 2028 has increased from 2018 and is now estimated at an average of \$0.70 per barrel.<sup>13</sup>

<sup>13</sup> Regulatory changes in 2018-19 contributed to the modified cost per barrel. Additional information on the Output Based Allocation for Upgrading under Alberta's Carbon Competitiveness Incentive Regulation (CCIR) was the largest contributor to the year-over-year changes. Carbon emissions policy development remains in flux with a high degree of uncertainty.

## Alberta

In April 2019, Alberta elected a new provincial government that has eliminated the consumer portion of Alberta's carbon tax and reduced overall tax on industry. However, for the remainder of 2019, Alberta's industries will continue to be regulated under the Carbon Competitiveness Incentive Regulation (CCIR) at the current economy-wide price of \$30 per tonne. Starting in 2020, Alberta industries will be regulated under a yet-to-be-developed Technology Innovation and Emission Reduction Fund program (TIER). The construct of the TIER is expected to be modelled after the previous Specified Gas Emitters Regulation (SGER) that was in place from 2007 to 2017. Similar to the SGER, the TIER will apply to facilities that emit greater than 100,000 tonnes of carbon dioxide (or equivalent) per year. It will require carbon emissions intensity reductions from industrial operations by 10% per year relative to a historical baseline. Electricity generators will be required to meet a "good as best gas" output based standard similar to the current CCIR. Regardless of the methodology (i.e. SGER, CCIR or TIER) Suncor continues to support carbon pricing policies designed to mitigate the competitiveness impact on trade exposed sectors like oil and gas, while continuing to accelerate emissions performance improvements. Given that there is no universal approach to carbon pricing around the globe, we recognize that leading policy includes a carbon price.

*The Oil Sands Emissions Limit Act* includes a precedent-setting 100 Mt emissions limit<sup>14</sup> by 2030 on oil sands development. As a limit on emissions, rather than production, it allows production to grow as long as the total emissions of the sector remain under the limit. The emissions limit is expected to encourage the innovation required to reduce both carbon and cost in the oil sands industry.

## Ontario

In June 2018, Ontario withdrew its participation in the WCI cap-and-trade program in favour of introducing its own Emission Performance System intended to meet the overall stringency of the federal backstop. In the interim, Ontario has become an involuntary province subject to the Federal backstop. Suncor's Sarnia refinery and St. Clair ethanol plant are both regulated facilities under the federal out-based pricing system (OBPS) and free emission receive emissions allowances, a measure intended to maintain sector competitiveness. Suncor will work with the provincial government to explore solutions that achieve the required outcomes.

## Quebec

Suncor's refinery in Quebec is regulated under a cap-and-trade program linked to the Western Climate Initiative (WCI). Regulated refining facilities receive an allowance allocation that aligns with a benchmark performance and takes into account competitiveness in a trade-exposed context. Fuel suppliers are required to purchase allowances to cover the tailpipe emissions of all fuel sold, the cost of which is expected to be largely passed to the consumer, thus acting as a carbon price on fuel consumption.

## Transportation fuels policies in Canada

Transportation emissions are approximately 25% of total emissions in Canada. Jurisdictions across the country are considering policy mandates and incentives for alternative fuels, as well as major public transit and urban planning initiatives intended to reduce the carbon intensity of transportation.

British Columbia's *Renewable and Low Carbon Fuel Requirement Regulation* requires fuel suppliers to meet a provincial fuel pool carbon intensity target through blending incremental renewable fuel or investing in alternative fuels infrastructure. Federal and provincial renewable fuel standards mandate blending of ethanol into gasoline, and blending biodiesel into diesel.

In addition, the federal government has recently proposed implementing a national Clean Fuels Standard, which remains under development.

## U.S. GHG Regulations

The U.S. Environmental Protection Agency (U.S. EPA) has established a rule mandating that all large facilities (defined as facilities emitting greater than 25,000 tonnes of CO<sub>2</sub>e per year, which includes Suncor's refinery in Commerce City, Colorado) must report their GHG emissions. The mandate of the U.S. EPA is under review by the current administration. In June 2017, the withdrawal of the U.S. from the Paris Agreement was announced. The current administration has also overturned a number of decisions made by the previous administration. Efforts have also been made at the state level to adopt legislation requiring entities to report on GHG emissions. Suncor continues to monitor these developments. The outcome of these changes in approach to GHG emissions is currently unclear and the impact on Suncor, including its Commerce City, Colorado refinery, is unknown at the time of publication.

<sup>14</sup> Emissions from the production of power through cogeneration are excluded from this limit, as is an incremental 10 Mt of upgrading capacity.



## FACILITY RESILIENCE TO EXTREME WEATHER EVENTS

Suncor assesses specific risks to its physical assets in light of various potential operational hazards to which those assets may be subject, including the risk of extreme weather events, which are possible in the course of operations in the areas where we operate. Suncor manages these risks through facility design and operational procedures. We also maintain insurance for damage to, or loss of, assets as well as production interruption.

### Temperature extremes

Many of Suncor's facilities routinely operate in an annual temperature range of -40 to +40°C and facilities are built to withstand extreme weather events. Prolonged periods of extreme cold could force these facilities to shut down for periods of time to ensure worker safety and prevent undue stress on equipment. Prolonged periods of extreme heat may lead to production cuts if adequate supply of cooling water is not available. Suncor's refineries in Montreal and Sarnia have access to extremely large bodies of cooling water, so are far less exposed to this risk.

### Hurricanes and icebergs

Suncor's Terra Nova installation, off the coast of Newfoundland, operates on the edge of the Atlantic windstorm area which is subject to hurricanes and icebergs. The risk of hurricane season is managed through a continuous weather tracking service that monitors storm systems in the North Atlantic. There is also a risk in the region of floating icebergs causing damage to our installations. This risk is managed through the design of facilities and a continuous monitoring system tracking iceberg locations. Where the course of an iceberg cannot be altered, an emergency response system allows for the floating platform to be disengaged and moved to safer water, protecting the asset and mitigating environmental risks but resulting in production disruption.

### Precipitation, droughts and wildfires

Most of Suncor's operated facilities are not in stressed watersheds where the availability of water, or severe restrictions on water withdrawals, could compromise our ability to operate. Limits to oil sands water withdrawal during winter low flow periods are managed through on-site water storage where facility design permits. Our Commerce City refinery is located in a water-stressed region and a potential curtailment of water supply would require bringing in water by pipeline or truck. Water management is a priority at Suncor, driving industry-leading innovation at our facilities to reduce, recycle, reuse and return water.

There is also a risk of seasonal flooding in certain areas in which Suncor operates, which we manage through contingency plans to protect facilities that include backup generators and pumps to drain critical operating units and equipment.

Suncor's oil sands facilities are located within Canada's boreal forest and wildfires pose a risk to our operations and the communities nearby. To mitigate this risk, we manage our production facilities in line with [FireSmart guidance](#). We have detailed emergency preparedness and response plans in place to ensure emergency situations resulting from wildfire risks are managed effectively. Suncor also partners with other operators and the Regional Municipality of Wood Buffalo in mutual aid agreements to collectively manage emergencies.

## PERFORMANCE DATA NOTES

### 1. Reporting boundaries

Environmental and social performance data is collected and reported for all facilities operated by Suncor (100%, not adjusted for Suncor's ownership share), and our joint venture interests operated by other organizations are not included.

### 2. Summary of business segments and operations included in performance data:

- a. Suncor-totals reflect consolidation of data where relevant and applicable.
- b. Upstream (Oil Sands Base) include Millennium and North Steepbank mining, extraction and integrated upgrading facilities, integrated Poplar Creek cogeneration facility (owned and operated by Suncor as of 2015), and associated infrastructure for these assets, but does not include Syncrude.
- c. Upstream (Fort Hills).
- d. Upstream (Oil Sands In Situ operations) data includes oil sands bitumen production from Firebag and MacKay River operations and supporting infrastructure.
  - › Upstream Exploration & Production (E&P).
  - › E&P Terra Nova FPSO vessel situated off the east coast of Canada.
  - › E&P North America Onshore (NAO) natural gas assets operated by Suncor. Assets were significantly divested from 2013-2015 and in 2018 Suncor sold its mineral land holdings in north-eastern British Columbia to Canbriam Energy Inc.
- e. Additional information about our E&P business can be found at [www.suncor.com](http://www.suncor.com).
- f. Downstream (Refining and Supply) includes refining operations in Montreal, Sarnia, Edmonton, and Commerce City Colorado. Suncor previously operated a lubricants business in Mississauga, Ontario, which was sold on February 1, 2017. 2017 performance data reflects this sale. Other assets include a petrochemical plant and sulphur recovery facility in Montreal, and product pipelines and terminals in Canada. Additional information about our downstream business is available at [www.suncor.com](http://www.suncor.com).
- g. Renewables includes wind power facilities operated by Suncor, and in graphs are reported with the St. Clair ethanol plant, located in Ontario.

### 3. Notes on greenhouse gas emissions (GHG)

This report (and our 2014-2018 Reports on Sustainability) uses the 100-year GWPs issued by the Intergovernmental Panel on Climate Change's (IPCC's) fourth assessment report (2007), which aligns to several jurisdictions of GHG reporting, including Environment Canada and the U.S. Environmental Protection Agency.

Forward looking GHG estimates are based on current production forecasts and methodologies and users of this information are cautioned that the actual GHG emissions and emission intensities may vary materially. Please see Advisories.

- a. GHG emissions data from 1990 and 2000 do not include Suncor's U.S. operations, or legacy Petro-Canada facilities, and only include business areas in operation during these years. These data points have been provided for historical comparability, consistent with previous sustainability reports.
- b. GHG emissions are calculated using facility-specific and referenced methodologies accepted by the relevant jurisdictions each facility is required to report GHG emissions to. Methodology has been followed where a jurisdiction has a prescribed one and if none exist then the most applicable and accurate methods available are used to quantify each emission source.
- c. Suncor-wide emissions intensity uses net production, which is the sum of net facility production minus all internal product transfers. The resulting net production is our Suncor product sales to market. The sum of the business unit GHG intensities therefore will not equal the Suncor-wide intensity.
- d. In situ (MacKay River) indirect emissions methodology reported since 2014 include electricity purchased from the grid, purchased electricity and steam from the third party TransCanada cogen. Firebag cogeneration units are owned and operated by Suncor and therefore all cogen emissions contribute to total direct emissions including emissions associated with generating electricity that is sold to the AB grid.

- e. Absolute (total) GHG emissions are the sum of direct and indirect emissions.
- f. Direct (Scope 1) GHG emissions are from sources that are owned or controlled by the reporting company. Refining & Supply direct emissions do not deduct CO<sub>2</sub> transfers to third parties, such as the food and beverage industries.
- g. Indirect (Scope 2) GHG emissions are energy-related emissions that are a consequence of our operations, but occur at sources owned or controlled by another company (e.g. purchases of electricity, steam, heat, and cooling). The indirect energy calculation methodology credits operations for electricity exported to external users and/or other Suncor facilities. Emissions are calculated based on actual supplier data where possible and published literature where supplier data is unavailable.
- h. Indirect (Scope 3) GHG emissions include hydrogen purchased from third-parties and CO<sub>2</sub> volumes sold from our facilities to third-parties for further processing, and can fluctuate annually depending on supplier demand. This is consistent with provincial government reporting requirements. Additional scope 3 emissions include:
  - › aviation (commercial and charter)
  - › facilities (Suncor Energy Centre, East Canada and USA)
  - › ground transportation services for employees and contractors
  - › licensed fleet vehicles on site
  - › lodges
- i. Annual variance in indirect (Scope 3) emissions from 2016-2018 is attributed to the following:
  - › reporting more information (more complete data set than 2017)
  - › emission factors were updated for consistency
  - › scope changes
  - › actual data instead of estimated
- j. Suncor's GHG goal is designed to encourage business choices that reduce Suncor's emissions and the emissions in the global energy system. To support tracking our goal progress, Suncor developed a methodology that includes both direct emissions reductions from our operated assets and indirect reductions from the use of our products. The data in the GHG performance section reflects our direct operations emissions.

#### 4. Notes on energy consumption

- a. Total energy is equal to the sum of direct and indirect energy. Electricity that is produced and sold to the provincial grids by oil sands and in situ cogeneration units and operated wind farms is converted to an equivalent amount in GJs and deducted from total energy use.
- b. Direct energy is primary energy consumed on-site by Suncor operated facilities.
- c. Indirect energy includes imported electricity, steam, heating and cooling duty from third parties. The indirect energy calculation methodology credits operations for electricity exported to external users and/or other Suncor facilities.
- d. The energy intensity of renewables business is based on energy input for ethanol production with wind energy production deducted from that total energy input.
- e. Suncor has improved consistency and has updated the scope of direct and indirect emissions.

## ADVISORIES

All financial figures in this document are in Canadian dollars, unless otherwise noted.

### Forward-Looking Information

This document contains certain forward-looking information and forward-looking statements (collectively referred to herein as “forward-looking statements”) within the meaning of applicable Canadian and U.S. securities laws. Forward-looking statements in this document include: that Suncor will continue to be an active partner as the world works to solve this energy and climate dilemma and that Suncor will play an important role investing in technology and innovation to reduce GHG emissions and continue to collaborate with others to help us all move toward a low carbon future, the belief that Suncor and Canada are uniquely positioned to continue to deliver the energy the world needs, the expectation that all types of energy will be needed and no single solution or pathway will meet the challenge and the reasons for such beliefs; the belief that the amount of energy the world will require will continue to increase and in order to avoid the worst impacts of climate change, collectively the world will have to tackle the emissions challenge associated with that growth by taking urgent action; statements about Suncor’s emissions intensity reduction goal, the impacts thereof, the belief that we are on track to meet the goal, the belief that additional advances in technology will be required to meet the goal, the key areas Suncor is focusing on to reach its goal and the potential impact of such areas and the principles that guide the implementation of the goal; statements about our energy future, including the factors and trends that are expected to shape it; expectations regarding demand for energy, oil, natural gas, distillates, gasoline, biofuels, diesel and other energy sources as well as the reasons for such expectations; the belief that the number of companies reporting on climate risk will continue growing; that Suncor will continue to take steps to develop a 2°C scenario that looks beyond 2040 to include in its business strategy review and will provide and update on this process next year; the expected requirements to achieve the aims and objectives of the Paris Agreement; the belief that technology and energy innovation has the potential to move emissions reduction from incremental to step change improvement; the expectation that new oil production and extraction technologies will further improve Suncor’s cost and carbon competitiveness; the belief that Suncor will continue to meet the demand for liquid fuels while reducing carbon intensity and the reason for such belief; the belief that Suncor plans effectively for potential future business environments; that Suncor’s long-term and vast reserves base results in significantly lower exploration costs and risk which allows Suncor to continue to deliver value to shareholders; expectations relating to increasing low carbon power generation capacity and that it will support our own needs while reducing the carbon intensity of Alberta’s power grid; the belief that a broad-based price on carbon can be a key market mechanism to lower emissions; expectation regarding stakeholder engagement and its anticipated benefits; statements about the TCFD, including the expected benefits from disclosure of climate-related financial information and that global context is required to provide a complete picture of operational performance, strategic planning and risk management; the belief that production intensities of crude oils will not remain static over the coming years and that technology and innovation will lower carbon intensity and that carbon competitiveness will be as important as cost competitiveness; statements about the Fort Hills project, including the expectation that GHG intensity will decline further as the facility operates at steady state design capacity and that the less carbon intensive paraffinic froth treatment will result in a GHG intensity of production roughly on par with the average crude refined in the U.S.; estimates of Suncor’s future GHG emissions and emissions intensity; statements about the potential opportunity to develop a utility-scale photovoltaic facility in Alberta; expectations relating to technology and the expected impacts and benefits therefrom, including, amongst others, technology being designed, developed or tested by Suncor and its partners such as in situ extraction technologies, SAGD, Solvent+, EASE, ESEIEH®, ES-SAGD, non-aqueous extraction thermal-solvent technologies, solvent-only technologies, steam-solvent technologies, high temperature reverse osmosis produced water treatment, mild thermal cracker technology, well-bore technologies, novel subsurface technologies, alternative gas co-injection, froth treatment tails, in situ demonstration facility, SAGD LITE, well-bore enhancements, permanent aquatic storage solution, de-asphalting, demonstration pit lake, paraffinic froth treatment, autonomous haulage systems, Nikanotee Fen and wastewater treatment membrane ultrafiltration; the belief that the solution to lowering the carbon intensity of producing bitumen and improve cost competitiveness will be a hybrid of the technologies we’re progressing and that some of these technologies could be applied to existing facilities or new growth facilities which would, if successful, significantly reduce our GHG emissions intensity; Suncor’s base case energy outlook, including the trends that are incorporated therein; long-term energy future scenarios used to test Suncor’s business and growth strategy, the trends that shape them and the expected impact of the scenarios on the energy markets generally and Suncor specifically; opportunities for advancing energy efficiency involving Syncrude; the expectation that oil sands facilities, once operating, will last 40 plus years with a steady output and can continue to operate with low operating costs and sustaining capital requirements and provides a unique opportunity to advance technologies to reduce emissions; the expectation that our upstream crude oil production will continue to supply global oil markets; Suncor’s expectations with respect to the transportation fueling landscape, the factors causing such expectations and the impacts therefrom; expectations for fleet emissions and internal combustion engines in the future; expectations relating to hybrid, plug-in hybrid and electric vehicles; statements regarding the construction and operation of a coast-to-coast electric vehicle fast-charging network, including that it will enable us to learn more about this emerging market while continuing to evaluate options and respond to the evolving needs of customers and the timing of the project; that opportunities presented due to the requirement for steam at crude oil extraction and processing facilities; the impact of scale on renewable power and the belief that equipping wind and solar sites with battery storage could further improve effectiveness; statements about the

replacement of coke-fired boilers with cogeneration units, including the expected amount of electricity which will be exported to the provincial grid, the timing associated with this project and the factors expected to impact whether or not this project gets sanctioned; the belief that integrating sustainability into our supply chain will act as a driver of change, and the processes that will be used to foster the integration; the expected impact of Canadian climate change regulations and the expectations about the actions and areas of focus of governments around the world as it relates to the transition to a lower carbon system; Suncor's facility resilience to extreme weather events, including temperature extremes, hurricanes and icebergs and precipitation, droughts and wildfires, including the expected impact of Suncor's mitigation efforts with respect to such events; and the estimated impact of our carbon price outlook. Some of the forward-looking statements may be identified by words like "expect", "will", "estimates", "plans", "intended", "believe", "projects", "could", "focus", "vision", "goal", "outlook", "proposed", "objective", "continue", "may", "aims", "would", "potential", "opportunity" and similar expressions.

Forward-looking statements are based on Suncor's current expectations, estimates, projections and assumptions that were made by the company in light of information available at the time the statement was made and consider Suncor's experience and its perception of historical trends, including expectations and assumptions concerning: the accuracy of reserves and resources estimates; commodity prices and interest and foreign exchange rates; the performance of assets and equipment; capital efficiencies and cost savings; applicable laws and government policies; future production rates; the sufficiency of budgeted capital expenditures in carrying out planned activities; the availability and cost of labour, services and infrastructure; the satisfaction by third parties of their obligations to Suncor; the development and execution of projects; the receipt, in a timely manner, of regulatory and third-party approvals; assumptions relating to demand for oil, natural gas, distillates, gasoline, diesel and other energy sources; the development and performance of technology; population growth and dynamics; assumptions relating to long-term energy future scenarios; and Suncor's carbon price outlook. Forward-looking statements are not guarantees of future performance and involve a number of risks and uncertainties, some that are similar to other oil and gas companies and some that are unique to Suncor. Suncor's actual results may differ materially from those expressed or implied by its forward-looking statements, so readers are cautioned not to place undue reliance on them.

Suncor's most recently filed Annual Information Form/Form 40-F and Annual Report to Shareholders and other documents it files from time to time with securities regulatory authorities describe the risks, uncertainties, material assumptions and other factors that could influence actual results and such factors are incorporated herein by reference. Copies of these documents are available without charge from Suncor at 150 6th Avenue S.W., Calgary, Alberta T2P 3E3; by email request to [invest@suncor.com](mailto:invest@suncor.com); by calling 1-800-558-9071; or by referring to the company's profile on SEDAR at [sedar.com](http://sedar.com) or EDGAR at [sec.gov](http://sec.gov). Except as required by applicable securities laws, Suncor disclaims any intention or obligation to publicly update or revise any forward-looking statements, whether as a result of new information, future events or otherwise.

## Non-GAAP Measures

Oil Sands operations cash operating costs per barrel is not prescribed by Canadian generally accepted accounting principles ("GAAP"). For the year ended December 31, 2018, this non-GAAP measure is defined and reconciled in Suncor's Annual Report to Shareholders for dated February 28, 2019. For the year ended December 31, 2011, this non-GAAP measure is defined and reconciled in Suncor's Management Discussion and Analysis for the year ended December 31, 2013 dated February 24, 2014. This non-GAAP measure does not have any standardized meaning and therefore is unlikely to be comparable to similar measures presented by other companies. This non-GAAP measure is included because management uses the information to measure Oil Sands operating performance, and should not be considered in isolation or as a substitute for measures of performance prepared in accordance with GAAP.

**BOEs** – Certain natural gas volumes have been converted to barrels of oil equivalent (boe) on the basis of one barrel to six thousand cubic feet. Any figure presented in boe may be misleading, particularly if used in isolation. A conversion ratio of one barrel of crude oil or natural gas liquids to six thousand cubic feet of natural gas is based on an energy equivalency conversion method primarily applicable at the burner tip and does not necessarily represent a value equivalency at the wellhead. Given that the value ratio based on the current price of crude oil as compared to natural gas is significantly different from the energy equivalency of 6:1, utilizing a conversion on a 6:1 basis may be misleading as an indication of value.

Cubic metres of oil equivalent and are calculated on the basis of one boe to 0.159 standard cubic metres. As cubic metres of oil equivalent are based on a conversion involving boe, all values are subject to the same limitations as boe, noted above.

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