
NOVA Chemicals®

# 2019 Sustainability Report

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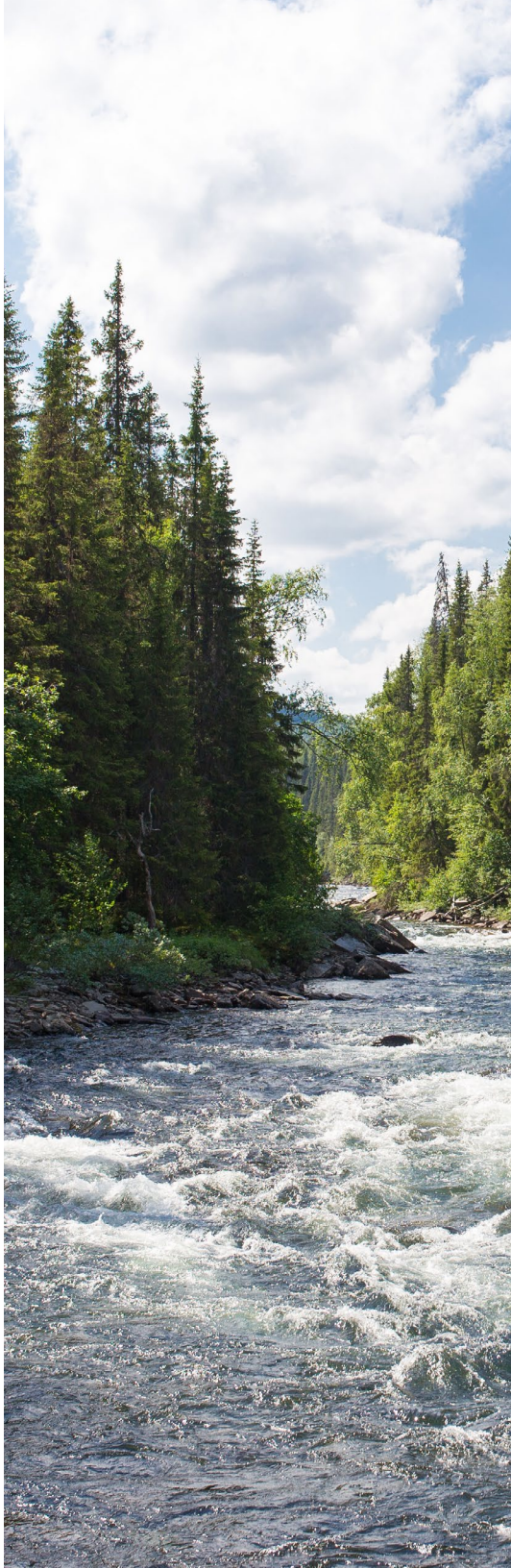
*All amounts in this report are in USD unless otherwise specified.*





# A Message from the NOVA Chemicals Management Board

At NOVA Chemicals, we believe businesses like ours can be a positive catalyst for change. Our vision for sustainability is captured in our 2019 sustainability strategy that guides how we collaborate and innovate on a variety of sustainability initiatives.

**We are making change on a global scale.** As a global citizen, we partner with others to amplify our positive impact. In our first year as a founding member of the *Alliance to End Plastic Waste*™, we saw exciting new projects begin as the organization and their strategy took shape. Our investment as a strategic partner in *Project STOP* is also making a tangible impact, with three municipalities in Indonesia developing waste management systems. Through the first project, 2,900 tonnes of waste were collected in 2019. This is waste that would have otherwise ended up in the environment or the ocean. Through global collaboration, we can replicate this success in other areas and solve the challenge of plastic waste together.

**We are advancing the circular economy.** Plastics make our everyday lives safer and healthier and should not end up as waste. We are drawing on our expertise to design plastics resins and products with a circular economy in mind. Our efforts are geared towards expanding a market for recycled plastics, furthering recyclable packaging designs, and helping customers choose more sustainable options. In 2019, we announced the development of seven innovative new polyethylene resins that will help our customers and their customers meet their sustainability targets and drive demand for recycled content. We also continue to advocate for science-based dialogue and policy decisions that encourage responsible use, collection, and recycling of plastic. Within our company and in collaboration with others, we are doing our part to make the circular economy a reality.

**We are progressing our approach to climate care.** We are committed to reducing climate change impacts through a framework that balances environmental and business needs. In 2019, we developed a strategic greenhouse gas (GHG) management framework that includes a decision-making tool to guide our emissions mitigation activities and incorporates carbon pricing into our capital planning. In the last two years, we completed two projects that reduced our GHG emissions: a furnace revamp project that improves combustion and an equipment improvement project that reduces steam demand. The combined impact of those projects is a total reduction of 110,000 tonnes of $CO_2e$, which is equivalent to removing more than 20,000 cars from the road.

**We continue to embed sustainability in our operations.** One of our most important roles as a leadership team is to provide a vision for sustainability for our company. Our sustainability strategy, launched in 2019, brings this vision to life and outlines our internal and external areas of focus in sustainability. This marked a defining moment for our company, and a continuation of our sustainability journey. In 2019, we also became the first Canadian resin company to pledge our support to Operation Clean Sweep® Blue, an international product stewardship program aimed at preventing accidental loss of pellets into the environment.

*NOVA Chemicals' purpose is to help shape a world where the plastic products vital to our health and happiness are even better tomorrow than they are today.*

Todd Karran,
*President & Chief Executive Officer*

Julie Beck,
*SVP and Chief Financial Officer*

John Thayer,
*SVP, Polyethylene Business*

Rocky Vermani,
*SVP, Olefins & Feedstock*

Arnel Santos,
*SVP, Operations*

**We are living our commitments as a responsible company.** We have a responsibility to ensure the safety of our employees, contractors, customers who handle and use our products, and communities near our operations. In 2019, we launched six Life Saving Rules to help protect employees and contractors performing work in high risk situations. Also in 2019, we achieved our lowest recordable injury rate in 10 years. This milestone was made possible by the individual commitment of each employee and reflects our collective belief that a workplace with zero injuries is possible.

**We are responsibly planning for our future.** As business conditions in our sector continue to change, we are planning for responsible growth. Aimed at the financial sustainability of our business, we continue to implement continuous improvement programs to lower operating costs, foster operational reliability and solidify our competitive position. To provide a valuable business experience to customers, suppliers and employees, we are implementing a digitalization strategy and, at the same time, enhancing the resiliency of our IT systems.

As we begin 2020, we are dealing with unprecedented change for individuals, companies and governments due to the COVID-19 pandemic. However, our priorities remain clear: keeping our employees safe and ensuring adequate supply of our products. We are proud of the role our industry is playing in creating products that are supporting the medical community, keeping food fresh, and providing safe options for packaging.

We want to thank every one of our employees and contractors for their commitment to our company, and their contributions to our sustainability efforts. Our employees volunteered more than 6,000 hours in 2019 and participated in collection and recycling efforts inside and outside our company. As we face uncertainty, the collective spirit we have witnessed during the past few months leaves us with optimism and hope for the future. We are confident that we will emerge from this stronger, and that we will continue to shape a world that is better tomorrow than it is today.

*~ NOVA Chemicals Management Board*

*At NOVA Chemicals, we believe businesses like ours can be a positive catalyst for change.*

## 2019 Sustainability Highlights

1. Became a founding member of the *Alliance to End Plastic Waste*
2. Launched seven innovative ready-to-recycle resins
3. Reduced our GHG intensity by 4 percent in the last five years
4. Strengthened our commitment to zero pellet loss by pledging support to Operation Clean Sweep Blue
5. Achieved our lowest recordable injury rate in 10 years

# Looking Forward

We are continually advancing our practices and performance. During 2020, our teams plan to focus on the following key activities:

| | 2020 Focus |
|---|---|
| Plastics Circular Economy | Pursue innovations in post-consumer recyclate (PCR) supply and demand, and progress new ways to capture the value of post-use plastic through advanced recycling innovations |
| Sustainability Citizenship | Continue to support initiatives that lead to the global elimination of plastic waste, protect oceans and waterways, and enable a circular economy |
| Climate Care | Refine our GHG reduction strategy and expand internal performance measures |
| Sustainability in Operations | Enhance processes to report waste and water metrics, particularly those aimed at zero pellet loss in alignment with our commitment to Operation Clean Sweep (OCS) Blue and water resource management objectives |
| Ethics | Develop a *Business Partner Due Diligence Program* to enhance ethical business practices and ensure legal compliance when working with business partners |
| Governance and Systems | Enhance our Responsible Care® (RC) Management System to meet RC14001® technical specifications and continue RC Procedure Standardization |
| Safety | Achieve our internal total recordable injury rate target and continue working towards Goal ZERO<br>Conduct process safety audits at all of our facilities |
| Employees | Finalize our inclusion and diversity strategy and implement digital tools to evaluate performance<br>Ensure our employees are safe and supported during the COVID-19 pandemic |
| Communities | Conduct gap analysis against the new Responsible Care Indigenous Accountability Code<br>Support our communities as they navigate the challenges associated with COVID-19 |

# About NOVA Chemicals

NOVA Chemicals develops and manufactures chemicals and plastic resins. Our company is headquartered in Calgary, Alberta, Canada and has operations in Alberta and Ontario in Canada, as well as Pennsylvania, Ohio and Louisiana in the U.S. NOVA Chemicals is wholly owned by Mubadala Investment Company of the Emirate of Abu Dhabi, United Arab Emirates.

Our plastic resins are used in a wide range of consumer and industrial applications, including flexible packaging for dry, liquid and frozen foods, as well as protective packaging for electronics and other durable goods, and a wide range of rigid goods and containers such as bulk storage containers, recreational equipment and closures. You can learn more about our company in this video.

NOVA Chemicals' purpose is to help shape a world where the plastic products vital to our health and happiness are even better tomorrow than they are today. Through our commitment to sustainability and Responsible Care principles, our employees consistently work to ensure health, safety, security and environmental stewardship throughout every facet of our operations.

## Company Changes and Project Updates

- Naushad Jamani retired from his role as Senior Vice President, Olefins and Feedstock after almost 40 years of service. Rocky Vermani was appointed by the Board of Directors as his successor.
- Musabbeh Al Kaabi, Chief Executive Officer, Petroleum & Petrochemicals for Mubadala Investment Company, was appointed as the new Chairman of the Board of Directors in February 2020.
- In April 2020, Borealis acquired NOVA Chemicals' 50 percent ownership interest in Novealis Holdings LLC.
- We continue to advance our growth projects in the Sarnia-Lambton region. These growth projects include a 50 percent capacity expansion of the Corunna cracker and a new Advanced SCLAIRTECH™ technology facility (AST2) that will increase polyethylene production capacity by approximately 450,000 tonnes per year.
- We continue implementing our SAP® Gen Z project, deploying the latest technologies to make a better digital experience for our customers, suppliers, and employees. The project includes e-commerce for customers, a customer management system that streamlines the invoicing and payment process, employee expense management, and a more effective way to provide information to leaders and employees.

Responsible Care®
Our commitment to sustainability.

*When the Responsible Care initiative was developed in 1985, it was an expression of the chemistry industry's commitment to safety. Over the years it has evolved to include the industry's commitment to sustainability — the betterment of society, the environment and the economy.*

## NOVA Chemicals' Locations

CANADA

**Alberta**
Joffre Manufacturing Site
Red Deer Executive Place Office
Pipeline Office, Red Deer
Pipeline Office, Sherwood Park
NOVA Chemicals Head Office, Calgary
Centre for Performance Applications, Calgary
Centre for Applied Research, Calgary

**Ontario**
Corunna Manufacturing Site
St. Clair River Manufacturing Site
Moore Manufacturing Site
Manufacturing East Corporate Centre, Sarnia
Mississauga Product Safety Team Office

UNITED STATES

**Ohio**
Painesville Manufacturing Site

**Pennsylvania**
Beaver Valley Manufacturing Site, Monaca
Beaver Valley Technology Center, Monaca
U.S. Commercial Center, Pittsburgh

**Louisiana**
Geismar Manufacturing Site

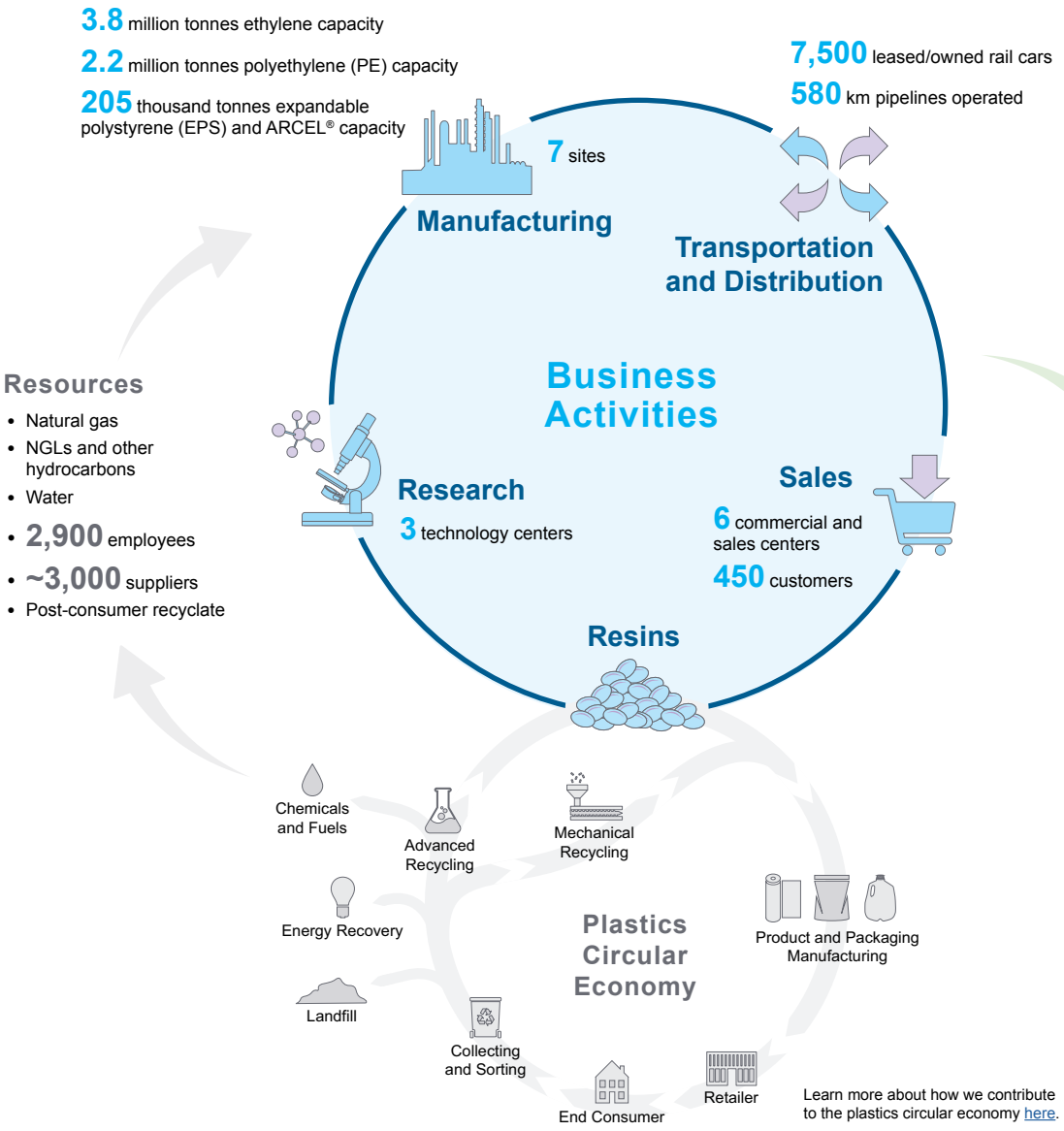
**Texas**
Ethylene Trading Hub, Mont Belvieu
Houston Commercial Office

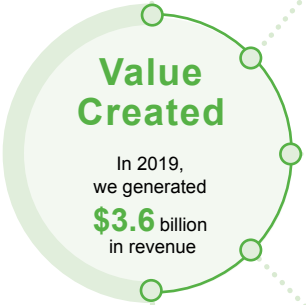
INTERNATIONAL

Asia Operating Center
Singapore Sales Office
European Operating Center, Fribourg

# HOW WE CREATE VALUE

NOVA Chemicals develops and manufactures chemicals and plastic resins, with a focus on research and development to enable plastic products that are better than they are today.




## For Employees

- Skills and opportunities for development
- Well-being
- Opportunity to make a difference
- **$473** million paid in salaries and benefits

## For Communities

- Safe operations
- Building and sustaining strong communities
- **$793** million in capital expenditures
- **$2.5** million invested in communities

## For The Environment

- Informing standards for recyclability
- Designing for recyclability and with post-consumer recycled content
- **4%** reduction in GHG intensity in the last five years

## For Industry Partners and Government

- Taking a leadership role in industry associations (ACC and CIAC)
- Collaborating in policy development

## For Society

- Enabling safer and better plastics products
- Contributing to food waste reduction
- Contributing to ending plastic waste through our global collaboration

# About This Report

This is our sixth annual sustainability report. It is our way of demonstrating transparency and accountability to our stakeholders. As society's expectations of companies evolve, and our internal sustainability practices grow, we are adjusting our reporting in response.

## Structure of this Report

To help readers focus on the most recent and impactful initiatives, we divided this report into three sections. The first section outlines 2019 progress in activities that significantly contributed to our sustainability strategy, as well as key activities to fulfill our responsibilities to our employees and communities. The second section covers our performance metrics and trends. The final section details systems, processes, and ongoing activities to manage our operations and impacts.

**2019 Progress**
Impactful activities that contribute to our sustainability strategy and to being a responsible business.

**Performance**
Sustainability metrics for the last five years.

**Management**
Systems and ongoing activities that allows us to foster ethical behavior, environmental protection, safe operations, employee wellbeing and positive relationships with communities.



### Sustainability Strategy

Our sustainability strategy captures our aspirations and guides our external and internal efforts. In this report, we describe our progress against our sustainability strategy in four key areas:

**Plastics Circular Economy:** We recognize the value in post-use plastics and work to extend the lifecycle of plastics to help reach established plastics industry goals to reuse, recycle or recover 100 percent of plastic packaging by 2040. Working together with a wide variety of stakeholders, we strive to create a world free of plastic pollution.

**Sustainability Citizenship:** As a responsible global citizen, NOVA Chemicals participates in and provides leadership to select challenges and opportunities that promote natural resource conservation and in particular ocean health.

**Climate Care:** NOVA Chemicals is committed to responsibly managing our greenhouse gas emissions.

**Sustainability in Operations:** We are committed to promoting sustainable practices in our operations, and to proactively and responsibly managing our operational impacts on air, water, land and biodiversity.

## Scope of this Report

- This report has been prepared in accordance with the Global Reporting Initiative (GRI®) Standards: Core option.
- This report outlines progress against four of the six elements of our sustainability strategy. The remaining two elements (Sustainability Collaborator and Sustainability Design and Integration) are used internally to inform resourcing and business processes.
- Unless otherwise noted, this report covers performance for the calendar year 2019, with historical data dating back to 2015.
- We report environmental data based on operating control (i.e., we report 100 percent of environmental impacts of our operated facilities regardless of ownership percent). Using this principle, we do not report our portion of environmental impacts for non-operated joint ventures.
- Data is based on permanent employees. When noted, safety data includes contractors.
- Techniques for data measurements and calculations, if not industry standard, are stated with the data.
- Financial data is in U.S. dollars and environmental data is in metric units.
- Senior management and relevant staff have reviewed all information and believe it is an accurate representation of our performance. Third-party assurance of our sustainability report was not conducted.
- This report covers performance for NOVA Chemicals and the subsidiaries covered in our consolidated financial statements. The terms NOVA Chemicals, our, we, the company, and the corporation refer to NOVA Chemicals Corporation and its subsidiaries as a whole.

*As global citizens, we direct our efforts towards solutions for global challenges.*

### Materiality Assessment

This report provides information based on our biannual materiality assessment. During this assessment, we prioritize our topics for reporting and the focus of our sustainability efforts.

**Material topics**
We define material topics as the environmental and social topics that are most relevant to our stakeholders and that can impact the success of our business. We have direct control over the management of our material topics. The environmental and social topics we report on have remained relatively unchanged from previous reports. We report on material topics in accordance with the GRI Standards.

**Strategic focus areas**
As global citizens, we also want to direct our efforts towards solutions for specific global challenges: plastics circular economy, plastics in the ocean, and climate change. We prioritized these global challenges through a strategic assessment conducted in 2018. We believe that, through collaboration, we can be a catalyst for change in these areas. These focus areas are aligned with the United Nations Sustainable Development Goals (UNSDGs) and are reflected in our sustainability strategy.


SUSTAINABILITY
STRATEGY

# Plastics Circular Economy

In a plastics circular economy, plastics are reused, recycled, and recovered as many times as possible, with the goal of reducing waste and preserving some of the energy and resources that went into making the original product. To achieve these goals, society must transform the linear consumption model of take-make-dispose into a circular economy that incorporates reduction, reuse, post-use collection, and recycling of plastic products.

A plastics circular economy that preserves the value of plastics is possible through collaboration among companies, non-profits, individuals, and governments. We are actively working with our customers to help them design and develop products that contribute to a plastics circular economy, including recyclable film structures and products that incorporate post-consumer recyclate (PCR).

## Sustainable Product Development

In 2019, we introduced a portfolio of seven new PE resins that are designed to help retain their key physical performance when repurposed multiple times through mechanical recycling. This enables reuse in applications such as stretch films, stand-up pouches, multipack collation shrink and heavy-duty sacks. Our new resins are also designed to be used with a high percentage of recyclate in performance film because they compensate for the often-degraded physical performance of recycled content.

Studies in our labs have demonstrated that plastics commonly perceived as single use, such as PE stretch film, can be repurposed into a similar product (e.g., food packaging) several times when the plastic is manufactured with our ready-to-recycle resins. After that, they can be converted into durable plastic products such as synthetic lumber for furniture or fencing.

*We are leveraging our expertise and working with stakeholders to create a plastics circular economy and a world free of plastic waste.*

Related UN Sustainability Development Goals

## Applications for Sustainable Packaging

To advance the circular economy, we have focused on helping customers replace typically non-recyclable packaging that combines different materials with recyclable packaging that uses polyethylene, and on creating end markets for post-use plastics. Some recent applications of our designs include:

- We collaborated with a customer to help Anita's Organic Mill switch all of their retail products to recyclable packaging in 2019.
- We designed a new film structure that can be used in combination with the machine direction orientation (MDO) process. The MDO process can be used to improve film strength and visual appearance, thereby increasing the types of packaging that can be made from all-polyethylene recyclable materials. Applications include food packaging for crackers, frozen foods, bakery items, and fresh produce, as well as pet food. In 2019, we designed a prototype MDO polyethylene film that can be used to package cheese and other foods that require a moisture and oxygen barrier.
- In collaboration with customers, we created beverage bottle caps that contain up to 30 percent PCR.
- We also designed a packaging film structure that combines virgin PE resins and up to 40 percent PCR.

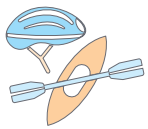
### Value of Plastics

Plastic products have great value, and improve many aspects of everyday life. Some examples of valuable plastic products made from polyethylene or expandable polystyrene are:

**Food:** Plastic food packaging helps to ensure package integrity, prevent contamination, and extend product shelf life, contributing to the reduction of food waste. Plastic packaging also has a lower lifecycle environmental impact than other forms of packaging due to its light weight.[1]

**E-commerce:** Shrink and stretch film, bubble wrap, and protective foam packaging are widely used to ensure goods are delivered safely and securely through e-commerce channels.

**Health Care:** Plastic products used in health care settings for test kits, medical coolers, biohazardous waste disposal and many other products help to keep people safe and limit the spread of infectious disease.



**Lifestyle and Sports:** Kayaks, surfboards, protective foam in helmets, playgrounds and other sports equipment made from plastic enable healthy lifestyles. State-of-the-art artificial turf fields enable year-round use along with decreased operating costs and water consumption.

1. Source https://plastics.americanchemistry.com/Study-from-Trucost-Finds-Plastics-Reduce-Environmental-Costs/

## Tools to Advance Sustainable Packaging

We can amplify our impact on the plastics circular economy by making it easier and faster for customers to develop sustainable packaging. Our BONFIRE® Film Development Platform is a web-based suite of tools that enable packaging designers to virtually build complex multilayer film structures and evaluate them based on their predicted performance properties. With the BONFIRE platform, customers can design “downgauged” packaging, reducing the material required per unit while meeting the same performance requirements. They can also design packaging that eliminates the need for multi-material structures, enabling the package to be recyclable.

The platform also enables waste reduction during the product development process. By helping designers narrow their options for a new film design, it can reduce the number of physical trials required and the associated material and energy consumption.

The BONFIRE platform is used by designers and engineers to accelerate their work to improve packaging sustainability. There are approximately 500 registered users on the platform.

### Reimagining e-commerce packaging

E-commerce is increasingly taking market share from brick and mortar stores, and the COVID-19 pandemic in 2020 is accelerating this trend exponentially. Although consumers value the convenience and safety of delivered goods, they are frustrated by excess packaging and damaged shipments.

Our e-commerce team is supporting our customers in developing sustainable e-commerce packaging solutions that optimize the protection of goods, reduce the amount of material used and ensure packaging is recyclable. Through our product offerings and technical expertise, we are working to rethink and reimagine packaging for the e-commerce supply chain with sustainability in mind.

As an example, we worked with a leading meal kit delivery company to package their pizza dough in an all-polyethylene, recyclable film. The company has since converted most of their ingredient packaging and shipping materials to recyclable materials.

*We support plastics industry goals:*

- *100% of plastic packaging is recyclable or recoverable by 2030*
- *100% of plastic packaging is reused, recycled, or recovered by 2040*

# OUR CONTRIBUTIONS TO THE PLASTICS CIRCULAR ECONOMY

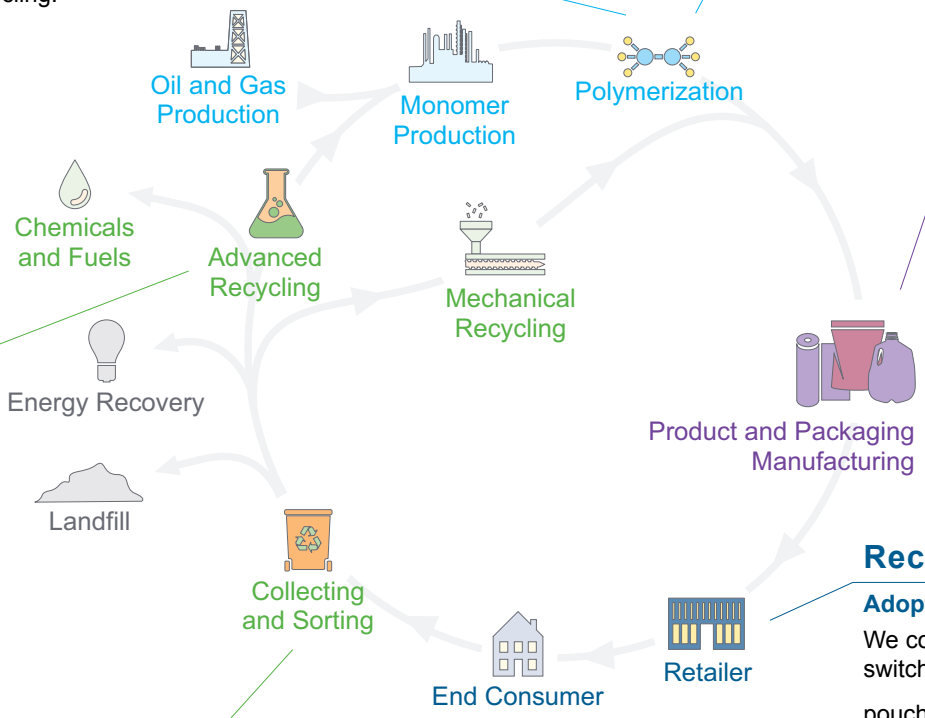
We are building on our expertise and developing new products and solutions that contribute to plastics being reused, recycled, and recovered as many times as possible.

## PCR Incorporated Into Our Resins

We are researching opportunities to incorporate post-consumer recyclate (PCR) directly into resins, in order to increase the supply of PCR and further drive demand for recycled plastic.

## Ready-to-recycle Resins

In 2019, we released seven new resins that retain their key physical performance when repurposed multiple times through mechanical recycling.




## Structures With High PCR Percentage

### Recyclable pouch with 40% PCR

We designed a packaging film structure for a recyclable pouch that contains 40% PCR.

The design combines virgin resins, including our ready-to-recycle resins, and PCR. The film design can be used in packaging for most food and non-food applications.

### Bottle closures with PCR content

In collaboration with customers, we developed bottle caps that contain up to 30% PCR content. These caps are suitable for bottled water, carbonated soft drinks, and other beverages.

## Advanced Recycling

We are researching technologies and improvements for advanced recycling of plastic waste to create new, value-added feedstocks for resin production.

## Recyclable Packaging

### Adoption of the fully recyclable stand-up pouch

We collaborated with a customer to help Anita's Organic Mill switch all of their ~70 retail products to recyclable plastic box pouches. Through this switch, approximately **300,000** bags are diverted from landfill every year.

### Innovative film prototype

We designed a film that can be used with the MDO process (details on page 12). This film can then be used in cheese and other applications that require a moisture and oxygen barrier.

## Post-consumer Collection

We continue to support collection of hard-to-recycle items in our communities and promote collection and recycling actions at our sites and office location.

Since 2013, we have supported the collection of approximately **16,000** kg of expandable polystyrene material, enough to fill 25 moving trucks.

# Sustainability Citizenship

NOVA Chemicals embraces global approaches to sustainability that recognize the role of business as a positive catalyst for change. We continue to provide leadership and resources to help solve challenges and create opportunities to promote natural resource conservation, particularly ocean health.

We are working with others in the global community to proactively prevent plastic waste from reaching the oceans, and to clean up plastic waste that is already in the environment. This is a complex undertaking that requires innovative leadership, investment, research, and technology to create effective social, economic, and environmental solutions.

We focus our efforts on two global programs: the Alliance to End Plastic Waste and Project STOP.

## Alliance to End Plastic Waste

In 2019, NOVA Chemicals became a founding member of the Alliance to End Plastic Waste (AEPW). In its first year, the AEPW gathered the support of more than 40 global companies that make, use, sell, process, collect, and recycle plastics across the plastics and consumer goods value chain. The AEPW's goal is to advance solutions to prevent the leakage of plastic waste into our rivers, seas and oceans.

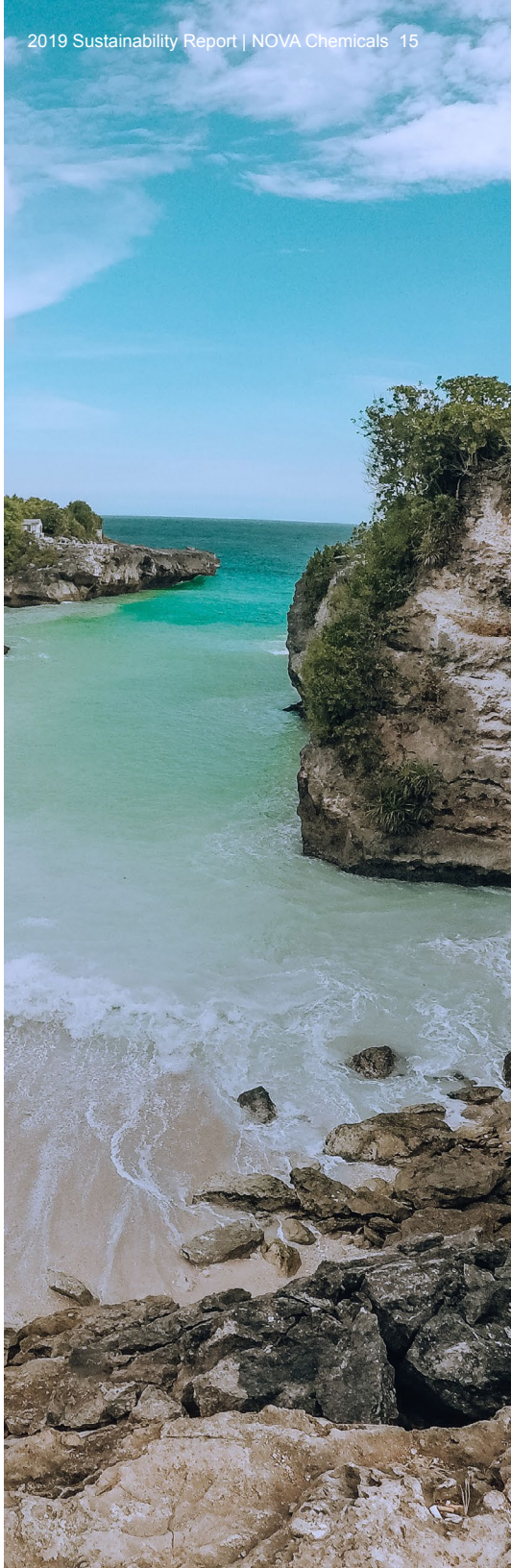
As part of the AEPW, we provide guidance, expertise, and financial resources. Our contribution supports the AEPW's commitment to invest $1.5 billion in projects over five years. The AEPW strategy is built on three pillars: plastic is a valuable resource that should not be waste, ending plastic waste can enable economic opportunity, and collaboration is essential to success.

In its first year, the AEPW approved support for more than ten major projects. One of those projects is a partnership with Renew Oceans, a non-profit organization currently working to stop the flow of plastic into the Ganges River. Learn more about their progress in the AEPW's first year report that can be found here.

*In 2019, we became founding members of the Alliance to End Plastic Waste and continued our support to Project STOP.*

ALLIANCE TO END PLASTIC WASTE

STOP
WWW.STOPOCEANPLASTICS.COM



# Project STOP

Project STOP is a global initiative with a mission to design, implement, and scale circular economy solutions to marine plastic pollution in Southeast Asia. Their team provides expertise in waste management, recycling, finance and education to help cities and towns design and implement waste management systems that are owned by the local community.

We have been a strategic partner with Project STOP since 2018, and have pledged nearly $2 million over three years. We also provide guidance and expertise to support decision making by being part of Project STOP's steering committee.

Project STOP's objectives are to: achieve zero leakage of waste into the environment by ensuring collection services are available to households and businesses; create more circular systems that increase the value generated from waste; achieve economic sustainability of the waste collection system; and to benefit the local community by creating new jobs and reducing the impacts of waste on public health, tourism and fisheries.

Project STOP currently has three projects in the municipalities of Muncar, Pasuruan, and Jembrana in Indonesia. The Project STOP team is currently designing the waste management system for Jembrana and has launched the first pilot in Pasuaran. In Muncar, the first city to receive support, the waste management system is fully operational, and we are beginning to see measurable impacts for the municipality and the local environment.

Thanks to Project STOP's support, the coastal fishing community of Muncar now has a working waste management system that is owned and operated by the city government. This provides tangible environmental benefits, and supports resilience and sustainable development through employment and income generation for the community. In 2019, the project achieved the following results:

- **~2,900** tonnes (~360 tonnes of plastic) of total waste collected (through waste management system)
- **~76** tonnes of waste (including ~20 tonnes of plastic) removed though beach clean-ups
- **~380** tonnes of plastic prevented from reaching the environment
- **84** individuals employed full time, to manage the system
- **~47,500** residents served by the waste management system

Related UN Sustainability Development Goals

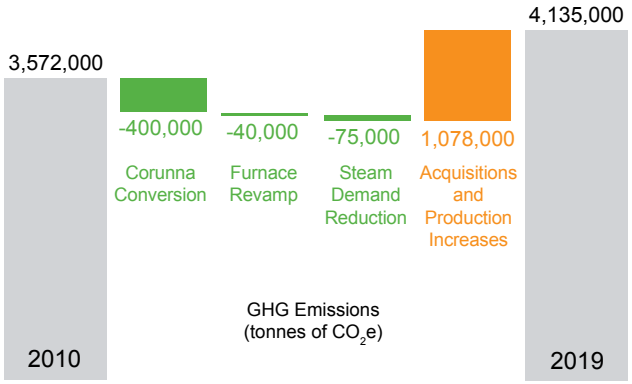
# Climate Care

At NOVA Chemicals, we recognize that the production of petrochemicals and plastics is energy intensive and generates significant GHG emissions. We are committed to reducing our impacts on climate by managing our greenhouse gas (GHG) emissions.

## Major Projects

Significant GHG reduction projects at our manufacturing facilities often require major capital investment and a plant shutdown to implement the changes. Our production facilities plan major plant turnaround events every five to eight years, and this schedule influences timing of major projects. In the last decade, we completed three major projects that have reduced our GHG emissions: one at our Corunna site, and two at our Joffre site. The Corunna project was a multi-phased conversion of the ethylene cracker to use lower carbon feedstocks resulting in cleaner-burning fuel. The two Joffre projects include upgrading six furnaces to improve combustion efficiency, and improving the efficiency of a refrigeration compressor reducing our use of steam from the plant boilers and cogeneration plant.

### GHG Reduction Projects




## Future GHG Reduction Strategy

We have a multi-faceted strategic approach to GHG management that uses a GHG decision-making framework to prioritize GHG reduction projects and integrates GHG considerations in our capital improvement program. In 2019, we used this framework to develop an updated portfolio of GHG management options for our Canadian sites. Some of the options include energy efficiency, GHG offsets, carbon capture, collaboration, and commercial partnerships to help manage our emissions.

# Climate-related Risks

At NOVA Chemicals, we recognize that changes in climate pose risks to businesses and society, and we are working to understand and mitigate those risks. Climate-related risks have two dimensions: physical and transitional. Physical risks include extreme weather events and changing temperatures that can impact our sites. Transitional risks include regulatory, legal, and societal changes related to the transition to a lower carbon economy.

## Physical Risks

As changes in climate are linked to an increase in number and severity of extreme weather events, we have adjusted our corporate risk register to reflect the increased level of risk. All of our sites have emergency preparedness plans that include severe weather events and they conduct drills regularly. We are further assessing climate-related risks at our sites that may be at risk of floods, severe weather storms, and drought conditions. We will share our findings in future reports.

## Regulatory Changes

In 2018, Canada's federal *Greenhouse Gas Pollution Pricing Act* came into effect. The act has two parts: a federal fuel charge and a carbon pricing and trading system for large industrial emitters (known as the Output-Based Pricing System, or OBPS). While all of our Canadian manufacturing facilities are regulated as larger final emitters, the regulations vary between provinces where we have operations:

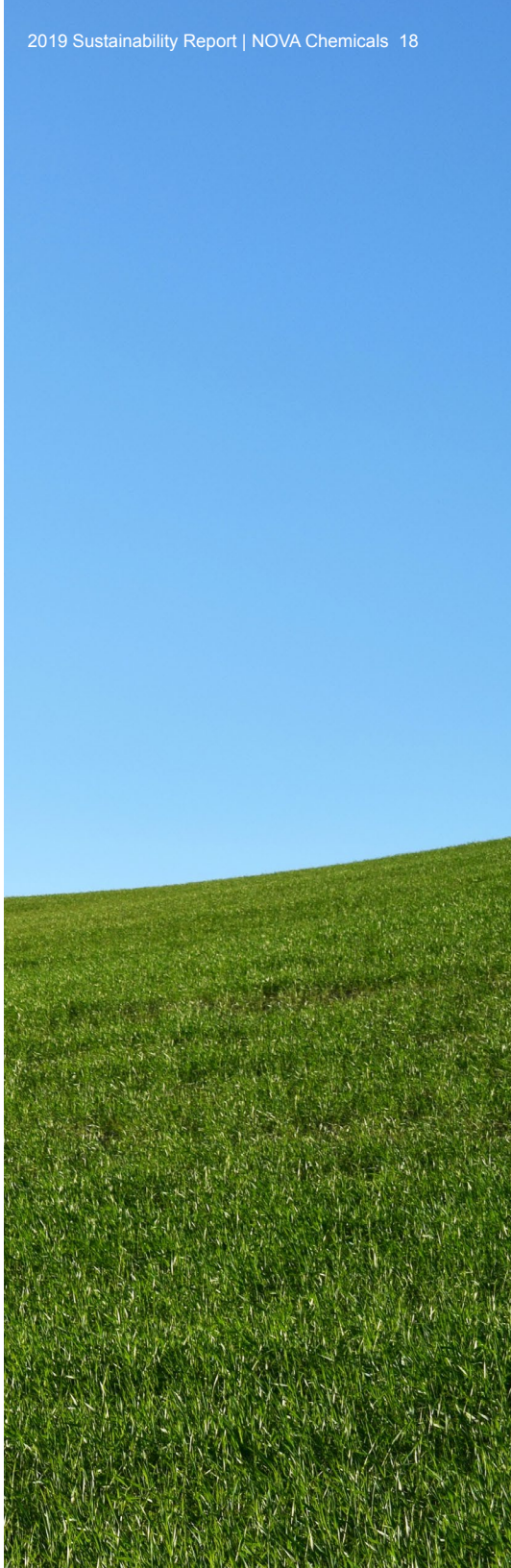
**Ontario:** Facilities in Ontario are regulated by the federal OBPS program. Under the OBPS program, we must meet product-specific benchmarks for GHG intensity per tonne of product. Compliance options to meet the product benchmarks include on-site emission reductions, surplus credits generated from previous years or from external companies, or payment into a compliance fund. Offsets are included as an option in the regulation but will not be available until the federal program is finalized.

**Alberta:** In 2019, the Canadian federal government announced that Alberta's Technology Innovation and Emissions Reduction (TIER) regulation meets its stringency criteria. Therefore, facilities in Alberta must comply with the provincial TIER program, not the federal OBPS regulation. Since 2007, our Joffre facility has been subject to emissions reporting and carbon pricing under provincial programs that apply to facilities emitting more than 100,000 tonnes of $CO_2e$. Similar to the OBPS program, we can meet our compliance obligation through on-site reductions, emission performance credits, offsets or paying into a compliance fund. Alberta has an active and well-established offset program in which we participate.

**U.S.:** The Environmental Protection Agency (EPA) has a GHG emissions reporting program for emissions of $CO_2$, methane and other GHGs, as well as a permitting program for certain large GHG emissions sources. This reporting program applies to our U.S. facilities. However, there is uncertainty about when and how carbon pricing regulations will be introduced in the future.

To account for the cost of carbon in our project decision making, regardless of location, we have set an internal price on carbon that allows us to choose projects that meet our operational and financial needs, while taking into account potential future carbon constraints.

Related UN Sustainability Development Goals

# Sustainability in Operations

We are committed to promoting sustainable practices in our operations, and to proactively and responsibly managing our operational impacts on water, air and land.

## Water

Water plays an important role in our manufacturing processes, especially for cooling and for generating steam. In 2019, we began developing a company-wide water strategy to identify opportunities to improve water use in alignment with our sustainability strategy. We also completed a project to improve the efficiency of a refrigeration compressor at our Joffre site in 2019. This project reduced the facility's steam use and associated water consumption.

## Air Quality

Preserving regional air quality is essential to being a good neighbor and protecting the health of our employees and community members. We focus our efforts and improvements on combustion processes at our plants, which are the source of most of our air emissions. For example, in 2019 we completed the first phase of the furnace refurbishment project at the Joffre site. Design improvements to upgrade and modernize the furnaces and burners have reduced $NO_x$ emissions from each furnace by about 30 percent, for a total reduction of approximately 120 tonnes of $NO_x$ per year. In 2019, we also saw a 30 percent reduction in Volatile Organic Compound (VOC) emissions from 2018 levels at the Moore site related to improvements at the site level.

## Waste from Operations

We are committed to reducing the amount of waste that we produce, minimizing what we send to landfill for disposal, and finding new value streams. In 2019, we diverted more than 18,000 tonnes of waste from landfill, which represents 54 percent of our company-wide waste. This includes recycling of concrete and waste polymer, energy recovery for waste streams with a high energy value, and reusing lime sludge as a soil amendment by local farmers. In 2019, we found two new opportunities to divert waste from operations into value added streams: alumina and phosphate (see infographic on page 20).

In our manufacturing facilities, we occasionally produce scrap polyethylene (PE), which is fully recyclable and can be used to manufacture plastic products. In 2019, we diverted more than 6,700 tonnes of PE from landfills through recycling programs across our locations (see infographic on page 20).

## Championing Zero Pellet Loss

As a Responsible Care company and resin producer, NOVA Chemicals shares the view that pellets do not belong in the environment. Keeping plastic products out of the environment, starting with preventing pellet loss, is a top priority.

In 2019, NOVA Chemicals became the first Canadian resin company to pledge support to OCS Blue, a campaign to prevent plastic pellet loss at plastic-handling facilities and during transportation.

*As a Responsible Care company, keeping plastic waste out of the environment is a top priority.*


### Taking Care in Action Teams

Taking Care in Action (TCIA) teams are composed of employee volunteers who are passionate about sustainability and champion sustainable behaviors at work and at home. TCIA teams plan and implement activities to raise awareness of the opportunities that we have as individuals to contribute to positive change and to reduce our individual environmental impacts.

Our TCIA teams, which include leadership representation, work actively with different parts of the business, service providers, and regional or national nonprofits to undertake activities that demonstrate NOVA Chemicals' commitment to Responsible Care and sustainability. TCIA activities include enhanced recycling initiatives and carpooling to reduce individual environmental impacts. They also undertake activities that contribute to making our communities a better place to live such as tree planting and river and roadway clean up.

For more details, see page 28 for examples of initiatives, many of which are led by TCIA teams at our sites.

# A CIRCULAR MINDSET AT OPERATIONS

We are continually finding ways to recycle all scrap polyethylene (PE) we produce.

**81**
tonnes diverted from landfill in 2019

## Lumps and Strands

St. Clair and Moore, ON

At some of our sites, we generate PE waste (composed of lumps and strands) during production changeovers. A plastics company safely processes the lumps and strands from our St. Clair River and Moore sites, and recycles them into lawn furniture and plastic pots.

**2,900**
approx. tonnes diverted from landfill in 2019

## Spent Alumina

St. Clair, ON

Alumina (aluminum oxide) is used in our operations. Although the alumina is reused in our operations, over time it loses its properties. We investigated alternatives to landfill, and in 2018, we started sending spent alumina to an industrial company to be used in making cement. Alumina has rapid hardening properties and enhances cement for marine construction, sewer infrastructure and structural concrete applications.

**6,700**
tonnes diverted from landfill in 2019

## Scrap PE

All Manufacturing and Technology sites in Canada

All scrap PE is sent to a processor of post-industrial plastics where the resin is turned into recycled pellets for manufacturing.

**ALL**
packaging sites

## Resin Shipping Sacks

All of the bags used to package our polyethylene pellets are also made out of polyethylene and recyclable. We are developing thinner bags with the same toughness and bags that contain post-consumer recyclate (PCR).

**ALL**
sites handling plastic

## OCS Blue

OCS Blue is an international product stewardship program aimed at the prevention of plastic pellet, flake and powder leakage to the environment.

The program requires us to measure and report plastic loss and to submit our operations to a third-party audit. We will verify compliance within all program parameters by January 1, 2020 for all sites handling plastic.

**Up to 2,200**
tonnes per year potentially diverted from landfill

## Phosphate as Fertilizer

Beaver Valley, PA and Painesville, OH

Our sites that produce expanded polystyrene generate phosphate sludge as a by-product. We are exploring options to reduce sludge volumes sent to disposal by dewatering the waste stream and identifying alternate uses, including fertilizer applications. We will share our findings in future reports.

# RESPONSIBLE BUSINESS PRACTICES

# Governance For Sustainability

Our Board of Directors and Management Board provide oversight of our sustainability efforts, which are embedded throughout all layers of our organization. We continually improve our structures and systems to enable progress in sustainability and ensure efficient use of resources.

## Changes in Governance for Sustainability

Until recently, Responsible Care (RC) Councils supplemented and supported the specific teams within the company that carried out the day to day management of our RC activities (safety, health and environmental performance). As part of our work to reduce complexity across the organization, we integrated multiple RC Councils into eight functional Strategy Teams.

Each RC Strategy Team is responsible for a specific area: environment, health and wellness, hygiene, occupational safety, contractor safety, emergency preparedness, process safety, and product safety. The new teams are integrated across all locations and focus on implementing data-based decision making and sharing of learnings across the organization. Each team is responsible for developing a five- to ten-year plan that focuses on continuous performance improvement in their respective areas.

## Changes in Management System (RC14001)

All our facilities have management systems that govern all facets of Responsible Care and align with the requirements of the American Chemistry Council or the Chemistry Industry Association of Canada.

In 2019, we began transitioning all of our facilities to a new management system RC14001. RC14001 is an international standard that combines elements of Responsible Care and ISO® 14001, and includes standards for managing safety, environment, health, and security. Two of our U.S. facilities have been RC14001 certified since 2015 and our newly acquired Geismar site will complete its third-party certification audit in 2020. Our Canadian facilities will be ready for certification by 2022.

Benefits of the unified management system include a risk-based approach, enhancing transparency and accountability, improving clarity on value chain influence and responsibility, reducing variation across the organization, and aligning with international standards.

Learn more about our policies, systems and responsibilities here.

*Our unified management system will enhance transparency and accountability, and improve clarity on value chain influence and responsibility.*

# Ethics and Compliance

Our commitment to ethical conduct is summarized in one simple sentence: Do what is right. Our hard work, dedication and integrity are essential to both maintaining our reputation and the future growth of our organization.

## 2019 Training

Our Ethics & Compliance program includes mandatory ethics-related training for all employees. We also provide training on specific ethics and compliance topics as they become relevant. For instance, in 2019, we provided online training on Responsible Business Communication to all active employees. The goal of the training was to help employees communicate in a way that protects NOVA Chemicals' reputation, information, and privileged documents. Through this course, employees learned how to craft effective documents and emails, limit conversations to facts, and not sacrifice thoughtfulness for speed. This training supports adherence to our newly implemented Responsible Business Communication policy.

In addition, employees involved with commercial facing activities were required to complete Incoterms® training. This training provides employees with the opportunity to gain more knowledge on rules and regulations related to domestic and international trade.

## Incident Management System

In 2019, we implemented a new ethics and compliance incident management system which improved our efficiency in processing cases. The new system includes built-in reporting metrics, automatic notification, and reminders.

Learn more about how we manage ethics in our Management Approach.

*Our commitment to ethical conduct is summarized in one simple sentence: Do what is right.*

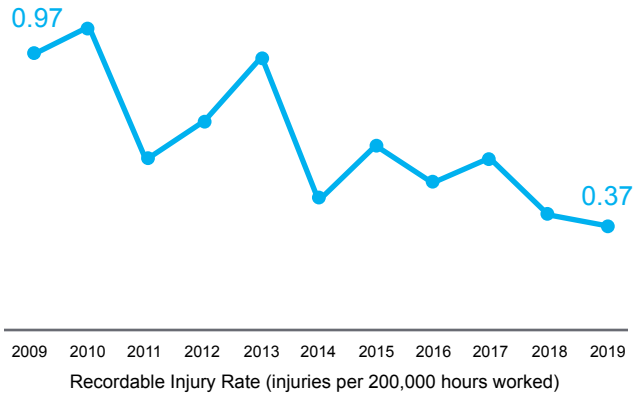
# Safety

We have a responsibility to ensure the safety of our employees, contractors and visitors, customers who handle and use our products, and communities near our operations.

## Occupational Safety

In 2019, we achieved our lowest injury rate in the last 10 years, and we continue to push ourselves towards Goal ZERO (zero injuries and incidents in the workplace). To help prevent serious injuries and fatalities, we launched six Life Saving Rules in 2019. The rules are concise reminders for situations where failure to comply has the highest risk potential for serious injury, death or catastrophic events. Consistent adherence is key to achieving Goal ZERO.

The first three rules highlight requirements that apply in a variety of situations: always work with a valid work permit, ensure you are fit for work, and never disable safety critical equipment. The other three rules outline requirements for specific hazardous situations: obtain authorization before entering a confined space, verify zero energy state when working with energized equipment, and protect yourself when working from heights. These rules support our existing procedures to conduct work in these situations. Training on the rules is mandatory for employees. To ensure broad implementation, we provide virtual and site-level training to all employees in 2019, and contractors and visitors receive the information during site orientation. We also discuss the rules with our contractors during our annual Safety Day.



Recordable Injury Rate (injuries per 200,000 hours worked)

## Process Safety

As a petrochemical company, our focus on process safety is critical for protecting our people, assets, and communities. In 2019, our initiatives were aimed at reducing process fires. We continue working to drive these events to zero while also monitoring and preventing the events that precede process fires, particularly flammable loss of containment (FLOC). FLOCs are incidents that involve an unanticipated leak or spill of flammable material. Our 2019 performance indicates a slight improvement from 2018, consistent with a multi-year downward trend.

Learn more about how we manage employee and contractor safety, and process safety.

*In 2019, we achieved our lowest injury rate in the last 10 years, and we continue to push ourselves towards Goal ZERO.*

### Life Saving Rules

**Alcohol and Drugs**
All workers must be fit for work at all times: Alcohol and drug use and possession are prohibited.

**Confined Space Entry**
Obtain authorization before entering a confined space.

**Hazardous Energy Control**
Verify isolation and zero energy state before work begins.

**Safety Critical Equipment**
Do not override or disable safety critical equipment without written authorization.

**Work Permits**
Work with a valid permit when required.

**Working from Heights**
Protect yourself when exposed to the risk of falling from heights.

# CASE STUDY: CONTINUOUS IMPROVEMENT IN ACTION

During a turnaround, an industrial plant (or a portion) is taken offline so that maintenance or improvements can be performed. In September 2019, we stopped production at one of the polyethylene units (PE2) at our Joffre site in order to clean equipment, conduct inspections and preventative maintenance, and implement process optimizations and improvements.

## The Challenge

Turnarounds are complex and involve careful coordination of numerous people working within a defined space and timeframe.

**950** contractors were employed during the turnaround, in addition to the plant's 250 permanent employees.

The turnaround lasted **33** days.

As with all of our projects, the safety of our employees and contractors was paramount.

## What We Did

Continuous improvement (CI) is a mindset and a set of principles and practices to create value by eliminating waste, variation, and complexity in different areas across our organization. These principles and practices are how we get better at getting better. CI can be applied to a facility, process or situation. Our Joffre site has been using CI since 2018 and we saw positive results when we applied CI during the 2019 turnaround.




### Respect and develop people

We encouraged safety interactions between our contractors and employees.

Safety interactions are peer-to-peer positive observations or corrections of safety-related behaviors. We believe these interactions were a key factor in good safety performance during the turnaround.

### Make performance visible

Our communication plan included a daily turnaround newsletter, Responsible Care Today, which communicated safety performance statistics and a daily safety focus such as fatigue or preventing falls.

This newsletter, which was posted around the work site and emailed to all site employees and contractors, increased the visibility of our performance and allowed us to quickly identify, escalate, and communicate issues as needed.

### Ensure standards are the basis for improvement

To ensure all employees and contract workers align their behaviors to NOVA Chemicals' safety standards, we held orientations, daily meetings and toolbox talks. These different meetings were attended by our employees, lead contractors and safety professionals from contracted companies, as appropriate. Meetings were used to discuss Responsible Care performance and clarify expectations.

### Be deliberate in how we improve

We scheduled daily meetings led by site leadership and including representatives from our operations, contractors, and Responsible Care teams.

At these meetings we reviewed and discussed our progress and delays, as well as our safety, health and environmental performance.

## Results

**0** recordable injuries during the turnaround.

More than **6,000** safety interactions were recorded by employees and contractors from September 9 to October 15, 2019, exceeding our target of 2,000.

## Transportation Safety

We are committed to protecting people and the environment while transporting products to and from our facilities. We use pipelines, rail, truck and marine vessels to transport inputs to our sites and finished products to customers.

### Pellet Spill Response Checklist

In 2019, we focused on strengthening our incident response procedures, and demonstrated our commitment to avoiding plastic loss to the environment through the development of a pellet spill response checklist. To date, there have been no industry standards for cleaning polyethylene (PE) spills. Our team applied hazardous material response principles (often applied to chemicals) to create a PE spill response checklist, following a transportation incident. The checklist covers initial response, containment, ground and water clean up and remediation activities. We have shared the checklist with our transportation carriers to ensure they have clear proactive guidelines for use in the unlikely event of a pellet release.

### ZERO NARs for 6 consecutive years

Rail cars transport our finished products (pellets) and intermediate chemicals (such as butadiene and propylene). Many of our transportation safety activities are aimed at preventing routine leaks (i.e., non-accidental releases or NARs). In 2019, we achieved six consecutive years of zero NARs. This achievement is the result of our dedicated team, employee training, and rail car inspection and maintenance program that includes a strict fluid-sealing management program.

## Product Safety

Our product safety program is designed to understand and communicate safety impacts of our products, address product regulations and manage risks. To ensure timely access to the most accurate product safety information, we implemented automatic distribution of Safety Data Sheets (SDS) to our U.S. and Canadian customers in 2019. Customers now automatically receive an SDS when they purchase a new product for the first time, or when there has been a relevant change to a product they have already purchased. When required by law, an SDS is sent to customers at other frequencies. By implementing this change, we create internal efficiencies and ensure customers always have the most up to date information.

Learn more about how we manage transportation safety and product safety.

*In 2019, we achieved six consecutive years of zero non-accidental releases during loading and transportation.*

# Employee Engagement and Well-Being

To achieve our company's purpose, our employees and leaders need to be inspired to do their best. We want to have engaged and healthy employees who believe in our company, share our values, and want their work to make a difference.

## Inclusion and Diversity Strategy

In 2019, we developed a new Inclusion and Diversity Strategy and a roadmap to guide our progress. Our overarching goal is to ensure all employees feel valued (regardless of their race, gender, or other characteristics) and are aligned with our organizational goals. We also want to attract and retain top-performing employees who feel that they are contributing and belong at NOVA Chemicals. In 2020, we plan to share our strategy with all employees and further develop our inclusion and diversity programs.

## Promoting Healthy Habits

Through our Total Well-Being digital platform, we support employees' physical, emotional, financial, social, and environmental well-being. The majority of our employees (80 percent) are enrolled in this platform and 70 percent of registered employees are active on a monthly basis.

In 2019, we expanded the platform content to include suggested activities and tips to embrace diversity, act sustainably, be effective, and stay safe. This information can be used to support employees in building and maintaining healthy habits. If employees choose to participate in the Journeys Digital Coaching, they receive up to 18 days of tips to fully develop one specific habit, such as smart snacking, quitting smoking or developing better spending habits.

## Shaping Success

We believe that everyone at NOVA Chemicals should learn, grow and develop. Our employees are encouraged to think about their development in terms of our philosophy of 70/20/10. Seventy percent of one's development happens on the job, twenty percent is from coaching from their leader and other social interactions with their network, and ten percent is during formal learning, either in person or virtually.

In addition to ongoing development, in 2019 we identified two important company-wide focus areas for employee success: performance and accountability, and people leadership capabilities.

Leaders are accountable for setting clear expectations and objectives for themselves and employees, and for having regular quality conversations with employees to create mutual accountability for performance and results. We also increased leaders' focus on enhancing access and visibility for development opportunities for all employees.

To create a strong leadership pipeline and develop leaders at all levels, we began providing training to emerging leaders in 2019. Emerging leaders are individuals who demonstrate key leadership characteristics and have expressed a desire to learn more about leadership. To date, 48 individuals have received this training and learned about career development, building a network of colleagues, and developing a broader perspective of the business and required leadership skills.

Learn more about how we manage employee and leader development, inclusion and diversity, and health and wellness.



### International Women's Day

More than 300 NOVA employees attended our first International Women's Day, an in-person event held in multiple locations. The goal of the event was to connect and inspire each other to broaden perceptions and accelerate change.

*80% of our employees are enrolled in our Total Well-Being digital platform.*

# ENGAGING EMPLOYEES IN MAKING A DIFFERENCE

Across our operations, our employees are rethinking daily habits and volunteering, proving that little things can make a big difference.




**~630**
garbage bags avoided

**~2,500**
kg of waste diverted

**~8,400**
kg of materials diverted

**~3,600**
kg of expandable polystyrene (EPS) recycled

**>100**
employees and family members

## Garbage-Can-Free Challenge

Calgary, AB

**30** employees volunteered to spend one month without their office garbage can to raise awareness of recycling and composting availability.

Participants said they are now more aware of alternative options for what they used to consider “garbage”, they have expanded their interest in finding more sustainable reusable options, and will continue to adopt a garbage-can free workspace moving forward.

## ReThink Recycling

Joffre, AB

**300** employees participated in a 4-month pilot to expand the site’s existing recycling initiatives. Bins for refundables, recyclables, compost and garbage were used by employees to divert recyclables and organics from the landfill, as part of the awareness-raising initiative.

## Surplus program

Joffre, AB

We have donated hundreds of surplus items to Habitat for Humanity® ReStore®. This organization acts as a broker, reselling donated surplus materials from our offices and using the revenue to build new homes for families in need.

Materials include larger items such as welding machines as well as industrial stock (e.g., large totes, pallets of plastic rolls). For every $1 donated, Habitat yields a $4 return in societal benefits.

## Hard to Recycle Events

Pennsylvania Resources Council (PRC)

Our employees and their families volunteered more than **180** hours of service during six Hard to Recycle events and one Household Chemical Collection event.

During these events we collect, densify and reuse expandable polystyrene and also collect other items that are not eligible for curbside recycling. Those items include cell phones, compact fluorescent bulbs, alkaline batteries, freon-containing appliances, and tires.

## Community Cleanup Efforts

Various sites

Employees and their families volunteered more than **250** hours in support of regional cleanups efforts across our Canadian operations, including the national Great Canadian Shoreline Cleanup®.

# Communities

Our goal is to be a responsible neighbor, engage with communities around our operations, and invest in organizations dedicated to making a difference and improving quality of life.

## Engaging Through Growth Projects

In 2019, we continued to advance two large-scale construction projects in Ontario. The projects include a 50 percent capacity expansion of our existing Corunna site ethylene cracker and construction of a new polyethylene facility. As part of our commitment to being a good neighbor, we engage extensively with surrounding communities during these projects. We, and our contractors, are committed to proactively considering impacts and opportunities for stakeholders and to building positive community relations. We also make concerted efforts to understand and respond to concerns and seek input about our plans and operations through public consultation and communication.

## Engaging with Indigenous Communities

For the last two years, NOVA Chemicals, along with other member companies of the Chemistry Industry Association of Canada (CIAC), has participated in a working group to develop a new Indigenous Communities Code to guide engagement with nearby Indigenous Communities impacted by company operations. The new code is part of the Responsible Care Accountability Code, and requires CIAC member companies to engage with Indigenous People in a manner that respects their unique history, culture and rights.

We foster long-term positive relationships with Indigenous Communities and engage regularly. We are reviewing the current state of our activities with Indigenous Communities in order to develop next steps in the spirit of continuous improvement.

## Community Investment

NOVA Chemicals embraces the United Way® as our charity of choice and the principal way we support community needs across our regions. Combined with our employees' generous contributions, we contribute close to $1.5 million annually to help address urgent needs in vulnerable populations.

The success of our annual United Way fundraising campaign is the direct result of our employees' and retirees' energy and dedication to supporting our neighbors. Our employees volunteer close to 6,000 hours in active service annually, with most of this time invested in various United Way-supported organizations in our operating regions.

We also continue to invest significantly in science and education with a goal of inspiring youth to pursue careers in related STEM (science, technology, engineering and math) fields. Our ongoing investments provide funding to organizations such as Let's Talk Science® in Canada and the Carnegie Science Center in Pittsburgh, providing children and youth with access to hands-on STEM activities and programming.

Some of our notable community investments in the past two years include:

- $2 million investment as Platinum Sustainability Sponsor for the 2019 Canada Winter Games and Red Deer College. This investment contributed to sustainable practices during the Winter Games and the construction of the *Gary W. Harris Canada Games Centre* at Red Deer College.
- $2 million investment in the *NOVA Chemicals Health & Research Centre* at Lambton College, the largest educational investment in our company's history. The centre opened in 2019 and is home to health sciences programming, interactive learning studios, and research space.

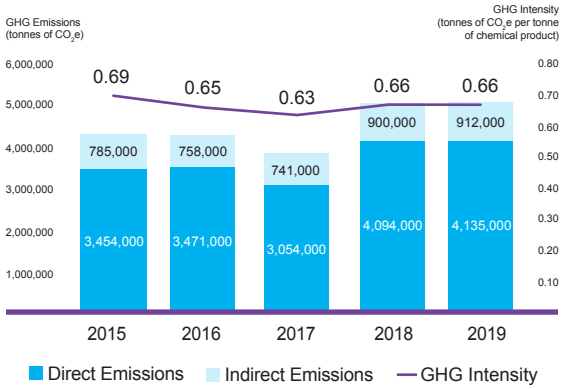
Learn more about how we manage community engagement and investment.


ANALYSIS
OVERVIEW
JAN
FEB
MAR
APR
MAY
JUN
PERFORMANCE

# Sustainability Performance

We use our sustainability report as a tool for accountability and share our performance on key sustainability topics. The following pages reflect our performance for the last five years.

## GHG Emissions

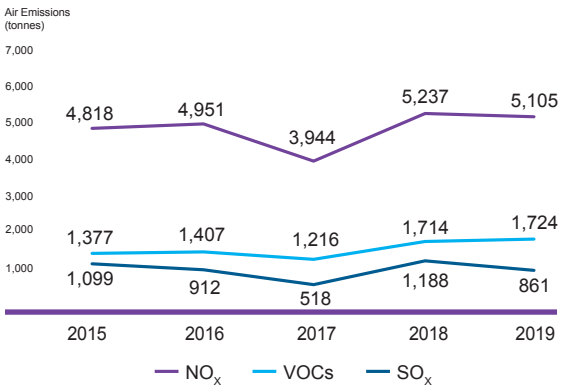



↓4% in intensity

↑19% in total absolute emissions

*Increases in absolute emissions in the last five years are the result of increased production at several of our facilities. With this growth, we still have been able to reduce our emission intensity by completing major projects that improve combustion processes and result in lower emissions.*

## Air Emissions



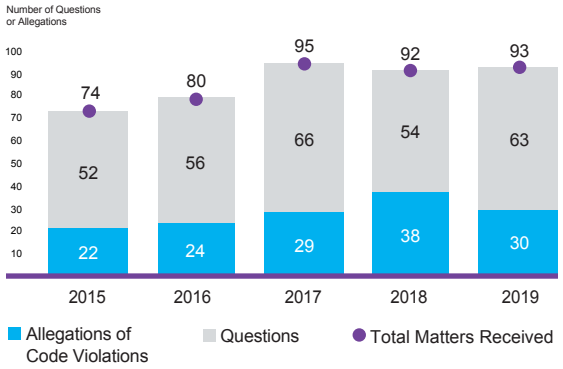

↑6% in $NO_x$

↑25% in VOC

↓22% in $SO_x$

*The increase in air emissions in the last five years is due to **a 32% increase in** company-wide production and the addition of our Geismar site in 2018.*

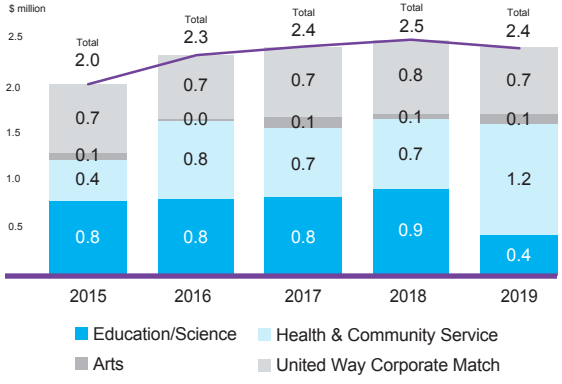
## Ethical Matters and Allegations




↑15% in matters received

*The continued high volume of matters received and addressed reflects the high level of interest shown by employees and leaders in "doing the right thing". Note that 68% of matters received are questions and that no issues remained open at the end of the year. We investigate all matters received. A substantiated allegation might result in employee education, coaching, discipline, or dismissal, where permitted by local law.*

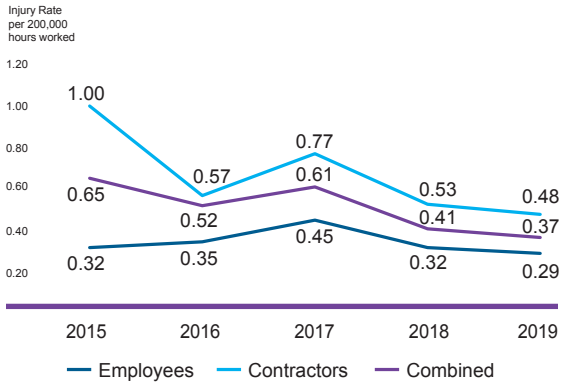
## Community Investment




↑20% in investment

*We continue to invest in organizations that improve quality of life. Some of our partners are United Way, Carnegie Science Center and Let's Talk Science.*

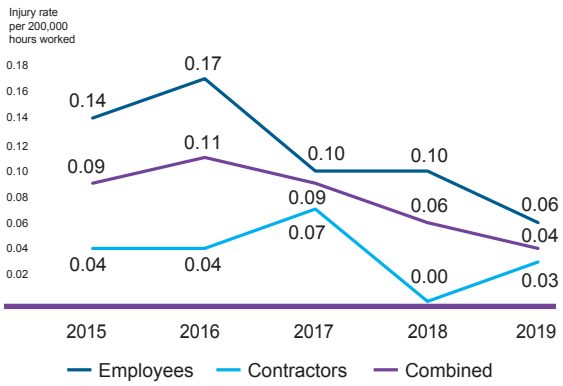
## Recordable Injury Rates




↓43% in combined recordable rate

*We achieved our lowest total recordable injury rate in the last ten years and continue to work towards Goal ZERO.*

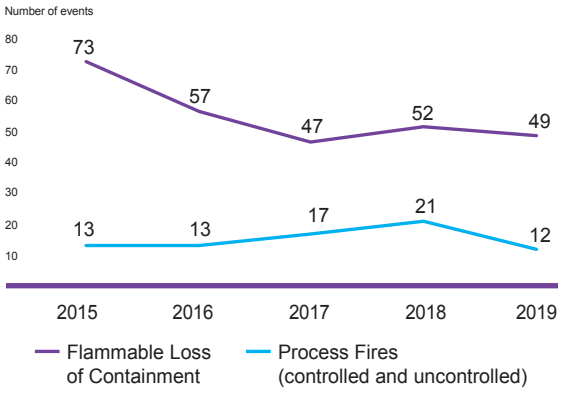
## Lost Time Injury Rates




↓56% in combined lost time rate

*We continue to focus on reducing significant injuries and have reduced our combined lost time injury rate by half in the last five years.*

## Process Safety Events

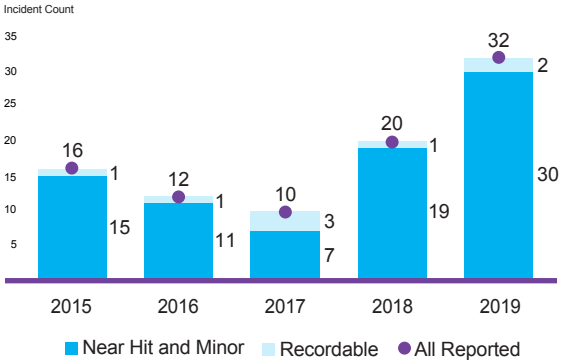



↓33% in FLOC

↓8% in process fires

*In the last five years, our process safety efforts have resulted in an improvement of both leading and lagging process safety indicators. Note that in 2018, the Geismar site was added to our reporting data.*

## Transportation Safety Incidents




↑100% in all reported incidents

*The significant increase in all reported incidents is a result of a change in reporting protocol to include incidents at vendor and customer facilities. Most of the incidents continue to be minor and near hit. Transportation incidents exclude vehicle incidents that do not involve products.*

# Performance Table

| | Units | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|---|
| **ETHICS** | | | | | | |
| **Business Ethics** | | | | | | |
| Matters Received | count | 74 | 80 | 95 | 92 | 93 |
| Questions | count | 52 | 56 | 66 | 54 | 63 |
| Code Violation Allegations | count | 22 | 24 | 29 | 38 | 30 |
| Unsubstantiated | count | 12 | 10 | 19 | 17 | 14 |
| Substantiated | count | 6 | 8 | 10 | 16 | 16 |
| Remained Open at Year End | count | 4 | 6 | 0 | 5 | 0 |
| **SAFETY** | | | | | | |
| **Employee and Contractor Safety** | | | | | | |
| Recordable Injury Rate – Employees | count per 200,000 exposure hours | 0.32 | 0.35 | 0.45 | 0.32 | 0.29 |
| Recordable Injury Rate – Contractors | | 1.00 | 0.57 | 0.77 | 0.53 | 0.48 |
| Combined Recordable Injury Rate | | 0.65 | 0.52 | 0.61 | 0.41 | 0.37 |
| Lost Time Injury Rate – Employees | count per 200,000 exposure hours | 0.14 | 0.17 | 0.10 | 0.10 | 0.06 |
| Lost Time Injury Rate – Contractors | | 0.04 | 0.04 | 0.07 | 0.00 | 0.03 |
| Combined Lost Time Injury Rate | | 0.09 | 0.11 | 0.09 | 0.06 | 0.04 |
| Fatalities - Employees and Contractors | count | 0 | 1 | 0 | 0 | 0 |
| Vehicle Incidents | count | 149 | 76 | 122 | 106 | 127 |
| Near Misses | count | 572 | 502 | 563 | 551 | 544 |
| Hazardous Conditions Reporting | count | 1,032 | 1,164 | 2,240 | 1,020 | 672 |
| **Process Safety** | | | | | | |
| Total Process Fires | events | 13 | 13 | 17 | 21 | 12 |
| Flammable Loss of Containment | events | 73 | 57 | 47 | 52 | 49 |
| **Transportation Safety** | | | | | | |
| Non-Accidental Releases | count | 0 | 0 | 0 | 0 | 0 |
| All Reported Material Distribution Incidents | count | 16 | 12 | 10 | 20 | 32 |
| Recordable Distribution Incidents | count | 1 | 1 | 3 | 1 | 2 |
| **Product Safety** | | | | | | |
| High Priority Products with Product Risk Profile | percent | 100% | 100% | 100% | 100% | 100% |
| Incidents of Non-Compliance (e.g., Product Recalls and Allegations) Concerning the Health and Safety of Products | count | 0 | 0 | 0 | 0 | 0 |
| Products Subject to Information Requirements | percent | 100% | 100% | 100% | 100% | 100% |

| | Units | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|---|
| **ENVIRONMENT** | | | | | | |
| **Environmental Compliance** | | | | | | |
| Regulatory/Permit Exceedances[1] | count | 4 | 5 | 10 | 6 | 5 |
| **Air Quality** | | | | | | |
| Nitrogen Oxides ($NO_x$) | tonnes | 4,818 | 4,951 | 3,944 | 5,237 | 5,105 |
| Sulfur Oxides ($SO_x$) | tonnes | 1,099 | 912 | 518 | 1,188 | 861 |
| Volatile Organic Compounds (VOCs) | tonnes | 1,377 | 1,407 | 1,216 | 1,714 | 1,724 |
| **Climate Change and GHG Emissions** | | | | | | |
| Direct GHG Emissions (Scope 1) | tonnes $CO_2$ | 3,454,000 | 3,471,000 | 3,054,000 | 4,094,000 | 4,135,000 |
| Energy Indirect GHG Emissions (Scope 2) | tonnes $CO_2$ | 785,000 | 758,000 | 741,000 | 900,000 | 912,000 |
| Total GHG Emissions Intensity | tonnes $CO_2$/tonne of product | 0.69 | 0.65 | 0.63 | 0.66 | 0.66 |
| **EMPLOYEES AND COMMUNITIES** | | | | | | |
| **Employees** | | | | | | |
| Total Number of Employees | count | 2,663 | 2,724 | 2,857 | 2,885 | 2,906 |
| Full Time | count | 2,587 | 2,657 | 2,782 | 2,820 | 2,836 |
| Part Time | count | 76 | 67 | 75 | 65 | 70 |
| Female | count | 669 | 700 | 707 | 710 | 711 |
| Male | count | 1,994 | 2,024 | 2,150 | 2,175 | 2,195 |
| Employees in the US | count | 427 | 434 | 559 | 578 | 581 |
| Employees in Canada | count | 2,236 | 2,290 | 2,283 | 2,291 | 2,309 |
| Employees Covered by Collective Bargaining Agreements | percent | 12.1 | 12.0 | 12.0 | 11.0 | 11.0 |
| Total New Hires | count | 193 | 184 | 168 | 220 | 210 |
| Rate of New Hires | percent | 7.3 | 6.8 | 5.9 | 7.6 | 7.2 |
| Voluntary Turnover Rate | percent | 4.5 | 3.3 | 4.9 | 5.2 | 5.2 |
| **Community Investment and Volunteering** | | | | | | |
| Community Investment | $ Millions | 2.00 | 2.3 | 2.4 | 2.5 | 2.4 |
| Volunteerism | hours | 5,200 | 6,797 | 5,836 | 6,136 | 5,934 |
| **Economic Value Generated and Distributed** | | | | | | |
| Revenues | $ millions | 3,580 | 3,512 | 3,844 | 4,465 | 3,576 |
| Taxes Paid, Net of Refunds[2] (see additional information) | $ millions | 261 | 94 | 68 | (17) | (3) |
| Salaries and Benefits | $ millions | 439 | 441 | 464 | 465 | 473 |
| Capital Expenditures | $ millions | 490 | 518 | 531 | 449 | 793 |
| **Additional information on taxes** | | | | | | |
| Income and Property Taxes Paid[3] | $ millions | 264 | 98 | 72 | 14 | 119 |
| Income Tax Refunds Received[4] | $ millions | 3 | 4 | 4 | 31 | 122 |
| Taxes Paid, Net of Refunds[5] | $ millions | 261 | 94 | 68 | (17) | (3) |

*NOTES:*

1. *Regulatory/Permit Exceedance (RPE): includes reportable spills and other non-compliances with federal, provincial/state, or municipal approval, permit, or regulatory requirements with potential for adverse impact. This metric excludes administrative non-compliances and reports to the regulator related to minor issues such as instrument downtime, labeling and signage.*
2. *Includes only income and property tax. Excludes sales taxes (GST, HST, QST).*
3. *NOVA Chemicals is committed to transparency and responsible tax payments. We are guided by tax principles that follow the intent of the law in our tax calculations and payments. Although our revenues have not decreased significantly in the last five years, income tax paid has decreased, and in 2018 and 2019 we received refunds in excess of taxes paid. In 2017 and 2018, tax losses were created as a result of unfavorable litigation. The losses were carried back and applied against taxable income in prior years to recover cash tax previously paid. The refunds were received in 2018 and 2019. In 2019, our income tax rate decreased because the Alberta Job Creation Tax Cut bill came into effect reducing income tax rate for Alberta-based businesses to incentivize job creation.*
4. *We received tax refunds from tax authorities/governments after their assessment of our tax obligations.*
5. *This figure is our taxes paid minus tax refunds. In 2018 and 2019, the refunds exceeded the taxes we paid.*

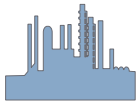

MANAGEMENT

# Management

In this part of the report, we detail the systems, processes, and ongoing activities to manage our operations and impacts. This report has been prepared in accordance with the GRI Standards: Core option. This section contains additional disclosures to fulfill GRI requirements that are not addressed elsewhere in this report. For more information on the GRI please visit the GRI website.

## Material Topic Boundaries

We report on the topics that are most relevant to our stakeholders and can impact the success of our business. We determined our material topics, and their boundaries, during our 2018 materiality assessment.



| | Suppliers/ Contractors | NOVA Chemicals' facilities and locations | Customers | Communities | Social interest |
|---|---|---|---|---|---|
| Plastics Sustainability | | ● | ● | | ● |
| GHG Emissions | ● | ● | ● | ● | ● |
| Air Quality | ● | ● | | ● | |
| Ethics and Compliance | ● | ● | ● | | |
| Occupational Safety | ● | ● | | | |
| Process Safety | | ● | ● | ● | |
| Transportation Safety | ● | ● | ● | ● | |
| Product Safety | ● | ● | ● | | ● |

# Stakeholder Engagement

Our continued success depends on understanding and respecting the needs and interests of stakeholders at every stage of our operations. We consider stakeholders to be people or groups who are directly or indirectly affected by our operations, as well as those who have the ability to influence outcomes. The table below illustrates the range of stakeholders with whom we interact, the concerns they have raised, and how we engage with them.

| Stakeholder Group | Topics And Concerns | | How We Engage | |
|---|---|---|---|---|
| Communities and Indigenous Communities | • Public safety<br>• Environmental and social impacts<br>• Employment<br>• Noise, light, traffic | • Support for community programs<br>• Cumulative effects of production<br>• Plastics sustainability | • Call out system and phone number<br>• Conversations<br>• Community advisory panels<br>• Neighbor events/Open houses | • Volunteer activities<br>• Newsletters<br>• Website community information<br>• Responsible Care verification |
| Employees | • Fair total compensation<br>• Safe work environment<br>• Career development | • Work/life balance<br>• Impact their work has on society<br>• Environmental and social impacts | • Newsletters<br>• Employee sessions<br>• Quality conversations between leaders and employees | • Engagement surveys<br>• Intranet and direct emails<br>• Volunteer opportunities |
| Customers | • Cost<br>• Quality<br>• On-time delivery<br>• Mutual development benefits | • Safety<br>• Lifecycle of products<br>• Plastic sustainability<br>• GHG emissions | • Sales and marketing calls<br>• Joint development programs<br>• Collaboration | • Product information<br>• Training/Technical support<br>• Innovation |
| Suppliers | • Stability<br>• Growth plans | • Fair treatment<br>• Mutual development benefits | • Meetings<br>• Joint development programs | • Training<br>• Technical support |
| Owner | • Return on investment<br>• Responsible Care performance<br>• Sustainability | • Strong governance and succession<br>• Strategic planning | • Board meetings<br>• Board site visits | • Regular correspondence<br>• Reports |
| Governments/Regulators | • Impact to communities<br>• Corporate responsibility<br>• Investment<br>• Compliance requirements | • Taxes<br>• Climate change and plastic pollution | • Reporting<br>• Periodic conversations | • Policy advocacy |
| Debt Investors | • Long-term success<br>• Return on investment | • Cash generation/Interest payments<br>• GHG emissions | • Conference calls<br>• Quarterly and annual reporting | • Conversations |

# Management Approach

This management approach and governance structure applies to our eight material topics: ethics and compliance, air quality, GHG emissions, employee and contractor safety, process safety, transportation safety, product safety and plastic sustainability. This approach section outlines our key policies, standards, responsibilities and the ways in which we improve our systems. The following section describes our activities to manage each of our relevant sustainability topics. Both sections together describe the “Plan”, “Check”, “Do” and “Adjust” categories used in ISO and Responsible Care standards.

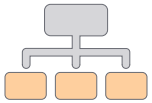
We continue to embed sustainability in all layers of our organization and develop structures and systems that enable progress in sustainability and efficient use of our resources.

## 1 Policies and Standards

**Code of Conduct:** Our Code is a resource designed to assist in making decisions with integrity and honesty. The Code includes references to our policies and guidelines that promote compliance with laws and regulations. Changes and developments are monitored, and up-to-date controls maintained. For example:

- We have anti-bribery and anti-corruption preventative controls in place to mitigate risks.
- We comply with applicable antitrust and competition laws and we do our part to promote fair competition.
- We conduct our business in compliance within economic sanctions and trade embargo laws where we do business.

**Management System:** All our facilities have an environmental, health, safety and security management system that aligns with the requirements of the American Chemistry Council and the Chemistry Industry Association of Canada. We are currently transitioning to a new management system, RC14001, which combines elements of Responsible Care and ISO 14001.



## 2 Responsibilities

**Board Oversight:** The Board of Directors, not a separate committee, is responsible for sustainability matters at the highest level of our organization. Their role is to protect the interests of the stakeholders, provide guidance to management, monitor the effectiveness of management's policies and decisions, and oversee the execution of the corporation's strategy. The Board meets on at least a quarterly basis and has established two standing committees: the Audit Committee and the Remuneration Committee.

**Executive Oversight:** The NOVA Management Board (NMB) is composed of members of senior management and reports directly to the Board of Directors. The role of the NMB is to directly oversee NOVA Chemicals' sustainability performance, including ensuring systems, people and processes are in place to achieve NOVA Chemicals' sustainability strategy, performance in Responsible Care, and to ensure compliance with all applicable laws and regulations.

**Team Responsibilities:**

Our **Ethics and Compliance Team** is responsible for developing, implementing, directing, reviewing and revising the Ethics and Compliance program to be consistent with our risk profile, business strategies, and to meet best practices. The team reports metrics quarterly to the NMB and the Audit Committee of the Board, and annually to the Board of Directors.

We have eight **RC Strategy Teams** that are responsible for developing strategies to improve our performance in the areas of environment, health and wellness, hygiene, occupational safety, contractor safety, emergency preparedness and security, process safety, and product safety. The RC Strategy Teams are integrated across locations and functions and are currently developing five- to- ten-year plans to improve performance on those areas.

In 2019 we established a new Sustainability function responsible for implementation of our sustainability strategy in collaboration with other areas of the company. In addition, different **functions across our company** have the responsibility to develop programs and support our business in adhering to the company-wide direction in sustainability. Our Environment, Health and Safety, Product Safety, Human Resources and Regional Public Affairs teams support our company-wide sustainability efforts in their areas of expertise. The RC Strategy Teams in collaboration with the functional teams are responsible for: setting long term strategies focused on achieving performance improvement, participating in risk assessments, setting annual performance objectives on leading and lagging indicators, and ensuring understanding of, and compliance with, legal and stakeholder requirements.

## 3 How We Improve

**Continuous improvement:** Continuous improvement (CI) refers to our formal process for the elimination of waste, variation and complexity across our organization. Implementation of the CI process is at different stages within our organization. Our Joffre site is the most advanced and we have already seen results from these efforts (see PE2 turnaround Case Study on page 25). Our Corunna site is in the middle of implementation and our Geismar site is in early stages. We hope to complete the implementation stage of CI at all of our sites by the end of 2021.

**Standardization:** Standardization of processes is a key element of continuous improvement. We are standardizing company-wide policies and procedures, prioritizing activities that are frequent sources of injury or have potential for severe consequences. To date, we have standardized processes for crane and hoisting (2017), rigging (2017), safe driving (2018), high potential incidents (2018), Life Saving Rules (2019) and workplace chemical labelling (2019). Standardization is an ongoing process.

**Other improvement activities:**

- We periodically review our policies and programs to ensure we are compliant with changing regulations, address societal expectations, and respond to sustainability risks and opportunities.
- We assess our risks and ensure they are eliminated or controlled to appropriate levels.
- Our operations undergo internal and external audits according to a schedule or based on the results of our risk assessments.
- We measure our performance, benchmark against our peers, and assess our improvement over time.
- We investigate ethics, environment, health, safety and security incidents and apply what we learn to prevent future incidents.
- We update our policies and standards in response to regulation changes, risks or learnings from internal review processes.

# Actions and Programs

The following pages outline our ongoing actions, initiatives and programs. These programs help us manage our material sustainability topics and address other environmental and social topics that we consider important.

## Material Topics

### 1 ETHICS AND COMPLIANCE

*Why is it important that we manage ethics and compliance?*

Robust ethics and compliance management helps ensure integrity in our performance, protects our reputation as a responsible business, reduces the risk of wrongdoing, and mitigates penalties imposed by regulatory and government bodies for violations, should they occur.

*What actions do we take to manage this topic?*

**Asking Questions and Reporting Concerns:** We maintain and monitor the Workplace Alert reporting system. The Workplace Alert reporting system is a 24-hour confidential and anonymous helpline and online reporting system for employees, contractors, or members of the public to ask questions about ethics matters, to request help in decision making, or to report possible violations of the Code. In addition to Workplace Alert, concerns or questions can also be raised through employees' leaders, the legal department or human resources staff. We investigate, document, and follow up on all questions or issues reported through all intake methods, and identify improvements and organizational learning opportunities to prevent re-occurrence. Retaliation against anyone who in good faith reports a suspected, potential, or actual violation is strictly prohibited.

**Communications and Training:** New employees are required to complete a specifically designed curriculum within their first two months at NOVA Chemicals, and annually after that. Most of the training is online learning modules, with some additional training sessions provided in person. In addition to Code of Conduct training, we provide in-person presentations related to the following topics: anti-bribery and corruption, antitrust and competition law, conflicts of interest, gifts and entertainment, interactions with suppliers and customers, and trade.

**Auditing, Monitoring and Remediation:** Our Ethics and Compliance Team oversees implementation of monitoring and remediation plans for ethics and compliance risks and violations.

### 2 GREENHOUSE GAS (GHG) EMISSIONS

*Why is it important that we manage our GHG emissions?*

By reducing GHG emissions from our operations, we can mitigate our contributions to climate change and corporate exposure to compliance costs. The large majority (95 percent) of our GHG emissions are a result of the ethylene manufacturing process. Ethylene is one of the most important raw materials in the petrochemical industry as it is a building block for many other chemical products. We produce ethylene by processing light hydrocarbons derived from natural gas.

*What actions do we take to manage this topic?*

For more than 20 years, we have measured and externally reported on our operational GHG emissions, to establish baselines for improvement and track our progress. We manage our GHG emissions through efficiency improvements, fuel switching at some of our facilities, and have reduced our emission intensity by 4 percent over the last five years. We are currently evaluating innovative technology solutions and updating our GHG strategy.

### 3 AIR QUALITY

*Why is it important that we manage air quality?*

Preserving regional air quality is an essential part of being a good neighbor and protecting the health of our employees and community members contributes to quality of life. Air quality is measured by the concentration of air pollutants, which include but are not limited to oxides of nitrogen ($NO_X$), sulphur dioxide ($SO_2$), volatile organic compounds (VOCs), and particulate matter (PM). In most cases, air emissions are regional issues, so we manage them at the facility level. We focus on improving our combustion processes since they are the source of most of our air emissions.

*What actions do we take to manage this topic?*

We operate in accordance with air emissions regulations in the regions where we operate. We also look for opportunities to make equipment upgrades or process improvements that would result in lower air emissions. Some examples of these improvements are converting our Corunna site to use lower carbon feedstock (2015), refurbishing six cracking furnaces at our Joffre site (2014-2019) and installing new equipment that reduces VOCs at our Moore site in 2018.

## 4 EMPLOYEE AND CONTRACTOR SAFETY

*Why is it important that we manage employee and contractor safety?*

Our employees and contractors make essential contributions to our company every day. It is critical that we create an environment that is free of illnesses and injuries, so that everyone stays safe every day.

*What actions do we take to manage this topic?*

We are committed to Goal ZERO (zero injuries or accidents) and our belief that all work-related illnesses and injuries can be prevented. In addition to our safety management systems, we foster a culture in which all workers feel responsible for maintaining the safety of their colleagues. This includes:

**Risk assessment:** Our *Am I Ready?* philosophy challenges employees to consider if they have the right training and equipment, are responsive to changing conditions, and are in the right mental and physical state to undertake the work.

**Hazard recognition:** Spotting and correcting hazards is an important part of creating a safe workplace. To engage employees in identifying workplace hazards, we provide hazard recognition training and learning opportunities using safety tools and processes like *Spot the Hazard*, *Am I Ready*, *Incident Bulletins* and *WHAT IF?*

**Safety interactions:** To establish and communicate safe behaviors, we promote Safety Interactions (peer-to-peer positive observations or corrections regarding safety behaviors). In 2019, we recorded more than 64,000 safety interactions across our company.

**Safety awareness:** We conduct regular Toolbox Talks (informal, job-specific safety meetings). We also host an annual Safety Day event at all locations, to help employees and contractors learn about safety hazards and incident prevention.

**Focus on reducing common injuries:** In the last two years, 30 percent of our company-wide recordable injuries have been related to slips, trips, and falls. The risk for these injuries is heightened during the winter, when conditions are snowy and icy. In 2019, we provided traction aids (cleats strapped onto work boots to provide traction in slippery conditions) to employees and contractors at our Joffre site to support our safety priority of preventing slips, trips and falls. Traction aids are now mandatory at our Joffre site.

**Working with safe contractors:** As contractors perform a significant amount of NOVA Chemicals' work, Goal ZERO is only achievable with their active participation. All of our contractors are required to abide by our safety policies and programs, and we monitor contractor safety statistics, written safety policies/programs and insurance information with ISNetworld®, a global contract management and safety qualification system.

## 5 PROCESS SAFETY

*Why is it important that we manage process safety?*

As a petrochemical company, we manage flammable liquids and gases. It is imperative that we focus on process safety to prevent significant incidents (such as explosions, fires, toxic releases) as well as minor accidents associated with the handling of chemicals.

*What actions do we take to manage this topic?*

To prevent process incidents that could harm people, property, or the environment, our management process includes:

**"Layers of protection" model:** "Layers of protection" is the engineering, operating, and maintenance management model we follow for preventing process safety incidents. This model is based on the concept of multiple lines of defense. It addresses safety risks in layers, starting with our facilities (to protect employees and contractors working on site) and extending to communities near our areas of operations.

**Process hazard assessment:** We actively monitor more than 60,000 potential hazard scenarios as part of our ongoing five-year Process Hazard and Risk Assessment Program. We assess the risk probability, frequency, and severity of these scenarios using methodologies consistent with the Center for Chemical Process Safety, and ensure we apply industry-leading approaches when making decisions.

## 6 TRANSPORTATION SAFETY

*Why is it important that we manage transportation safety?*

Safe transportation practices help prevent product spills and maintain the integrity of the environment. We use pipelines, rail, truck and marine vessels to transport inputs to our sites, and intermediate chemicals (butadiene and propylene) and finished products to customers.

*What actions do we take to manage this topic?*

Since we depend on third parties to transport our products, many of our activities are dedicated to ensuring we work with safe carriers. This work includes:

**Screening and onboarding of carriers:** We work with 28 carriers, 25 percent of which are Responsible Care partners. To further ensure safe practices, we screen carriers through self-assessments (on handling, routing, security, and other safety aspects) as well as third-party screening by industry-leading vendors, and audits. When onboarding new carriers, we discuss and mutually agree on expectations.

**Assessment and audits of carriers:** All carriers are audited, except for one-time shipments. Frequency of assessments is determined through the Responsible Care Outreach Program. Specifically, within the program, the risk review process determines the carrier's risk score (Low/Medium/High), which in turn designates their review frequency between 1 to 5 years.

**Securing and maintaining railcars:** To prevent NARs (non-accidental releases), we have strict processes in place to secure our railcars (RideTight® fluid-sealing management program), as well as a tank car maintenance program that exceeds regulatory requirements. We also provide a railcar inspection training program to all rail tank car loading and unloading personnel to ensure proper implementation of those processes.

**Pipeline integrity:** We maintain a rigorous pipeline integrity program for the 580 km of pipelines we operate. Our program includes right of-way inspections, flyovers, in-line inspections, and integrity or verification digs.

**Pellet loss prevention:** We are the first Canadian resin company to pledge support to OCS Blue, a campaign to prevent plastic pellet loss at facilities and during transportation. We also encourage our customers to take the OCS Blue pledge.

**Incident reporting:** We measure and monitor transportation incidents at all of our facilities, as well as incidents that involve our products at our vendor and customer facilities. Through our supplier outreach program, we engage suppliers and carriers to ensure they effectively report incidents and incorporate corrective actions.

**Transportation security:** All of our operating facilities have Facility Security Management Programs, which include measures to prevent dangerous goods from being stolen or otherwise interfered while being handled, transported or imported. Prior to departing, all trucks or rail cars carrying dangerous goods are inspected and secured. Security seals are attached and recorded for continuity.

**Emergencies during transport:** Our Emergency Response Assistance Plan (ERAP) has been approved by Transport Canada and incorporates industry standards and best practices. Our NOVA Logistics Emergency Response Team (NOVAlert) of technical advisors are supported by emergency response contractors stationed along major transportation corridors where our products and raw materials are shipped. We also work with TRANSCAER® (Transportation Community Awareness and Emergency Response) to ensure communities are informed about products being moved through their area, and to communicate measures in place to ensure safe transportation.

## 7 PRODUCT SAFETY

*Why is it important that we manage product safety?*

It is our responsibility to help protect public health and the environment, and to ensure the safety of our products.

*What actions do we take to manage this topic?*

**Ensuring quality raw materials:** We conduct raw material integrity checks at our manufacturing facilities and product development centers to ensure the products meet our standards for use.

**Assessing our products for effectiveness and risk:** We evaluate our products to ensure they deliver their intended benefits while protecting public health and the environment. We also conduct product risk assessments, both internally and in conjunction with trade associations, governments, and other industry groups.

**Improving our products:** We evaluate and improve the safety performance of our products by reducing hazardous components and substituting lower-hazard raw materials, in line with the American Chemistry Council's Product Safety Code and the Chemistry Industry Association of Canada's Stewardship Code.

**Communicating product safety information:** We communicate the safety impacts of our products through up-to-date product safety documents (safety data sheets) and product labeling. We also communicate product regulations to our customers (regulatory statements) to provide regulatory compliance information to our customers in the jurisdictions where the products are used and sold.

## 8 PLASTICS SUSTAINABILITY

*Why is plastics sustainability relevant to NOVA Chemicals?*

Plastic products and packaging must be designed upfront for circularity. Our role in the plastics value chain provides us the opportunity to drive sustainability projects in collaboration with our customers, brand owners, and others, and participate in global efforts to eliminate plastic waste.

*What is our approach to managing plastics sustainability?*

**Design for sustainability**
We focus on multiple sustainability factors in our research and development process for new products, including designing for recyclability and incorporating post-consumer recyclate (PCR).

**Plastics circular economy**
We work to develop solutions towards a plastics circular economy by:

- Creating demand for post-consumer recyclate (PCR) by designing resins that can be used with PCR and expanding the range of applications
- Collaborating with customers to develop products that address market demands and advance a plastic circular economy.
- Working with industry associations to reduce barriers to recycling and influence recycling standards.

**Ocean health and elimination of plastic waste**
We provide support and collaborate with others at a global scale to promote ocean health and the elimination of plastic waste by:

- Aligning with global initiatives that develop waste management solutions or support environmental cleaning efforts. Currently, we invest in the Alliance to End Plastic Waste and Project Stop.

# Other Topics

The following topics are not considered to be material based on our 2018 materiality assessment but are important to manage as part of our holistic approach to sustainability.

## 1 RESPONSIBLE VALUE CHAIN

*Why is it important that we foster a responsible supply chain?*

We seek to work with suppliers, customers and distributors who are committed to ethical and responsible business practices. Unethical behaviors by suppliers or parties who represent NOVA Chemicals or who can be perceived to do so can affect our reputation and potentially expose us to financial or legal issues. Managing our value chain according to Responsible Care values also allows us to positively influence our entire value chain, promoting safe, healthy, and environmentally friendly practices across the globe.

To carry out our manufacturing, construction and services, we work with more than 3,000 suppliers that provide feedstocks, raw materials, supplies for maintenance, repair and operations (MRO) and transportation services. We also partner with more than eight distributors of our products.

*What actions do we take to manage this topic?*

**Internal and third-party screening:** We use an internal screening process as well as a third-party service provider to screen suppliers, customers and distributors based on specific criteria (such as countries with which trade is prohibited or restricted, or denied party lists compiled by government agencies).

**RC Outreach:** Our Responsible Care Outreach Program encourages the adoption of Responsible Care principles, engaging customers, suppliers, carriers and other stakeholders and helping them understand our commitment to Responsible Care and our expectations for doing business with NOVA Chemicals.

**Supply Chain Risk Exposure Evaluation:** Our Supply Chain Risk Exposure Evaluation Network (SCREEN) is a cross-functional team that assists and supports our commercial and logistics functions in identifying and managing risks associated with the transportation and storage of products in the supply chain.

**Security, CTPAT™ and PIP programs:** To help ensure the security of our international supply chain, we are a registered partner in the U.S. Customs Trade Partnership Against Terrorism (CTPAT) and the Canada Border Services Agency Partners in Protection (PIP) program.

## 2 EMERGENCY PREPAREDNESS AND SECURITY

*Why is it important that we prepare for emergencies?*

Being prepared for emergencies is essential for mitigating the potential impacts of a major event (such as a natural disaster or security incident) and assisting our communities, employees, and contractors if an emergency occurs.

*What actions do we take to manage this topic?*

**Emergency response plans:** We maintain emergency response plans at all our manufacturing sites. These plans incorporate industry standards and best practices to help us consistently prepare for and respond to all types of incidents.

**Site security:** All of our operating facilities have Facility Security Management Programs, which include measures to prevent dangerous goods from being stolen or otherwise interfered with. In 2017, we conducted security vulnerability assessments to identify areas for security improvement at our sites.

**Strengthening response capabilities:** We periodically offer training to emergency response personnel and our corporate Crisis Management Team (CMT) to ensure our response capabilities reflect best practices and skills are kept up to date. We test our emergency plans by conducting regularly scheduled tabletop and live drill exercises throughout our operating areas. In many cases, these exercises include industry peers, local or regional emergency response organizations and community members. In 2019, we conducted more than 200 exercises within NOVA Chemicals and eight joint exercises with members of the community.

**Partnering for emergency response:** Through regional mutual aid agreements, we provide firefighting, rescue, and medical response to surrounding community and industry members. In Alberta, this is done through the Lacombe County Mutual Aid Agreement and in Ontario through a Sarnia-Lambton Community Awareness and Emergency Response organization. In Pennsylvania, Ohio and Louisiana, we are actively engaged and maintain relationships with community emergency responders.

## 3 WASTE FROM OPERATIONS

*Why is it important that we manage our waste?*

Embedding sustainability in our operations includes reducing the amount of waste that we produce, minimizing what we send to landfill, and finding new value streams for materials rather than disposing of them as waste.

NOVA Chemicals produces ethylene, polyethylene (PE), and expandable polystyrene (EPS). The chemical manufacturing processes can result in the production of unusable by-product waste streams, which must then be separated or treated as part of the safe disposal process. Focusing on waste elimination helps to improve the efficiency of our facilities, and reduces the costs and risks associated with waste handling, transportation and disposal.

In the operation of our PE facilities, we occasionally produce scrap PE, which is fully recyclable and is used by other companies to create final plastic products. Some of our more challenging waste streams consist of thick mixtures of solids and liquids (sludge) which contain chemical compounds that must be separated or treated before they can be safely disposed of.

*What actions do we take to manage this topic?*

**Waste prioritization:** To develop reduction strategies, we prioritize waste streams based on risks and opportunities. For example, volume is not the only consideration when prioritizing waste. We also include factors such as hazardous versus non-hazardous characteristics, transportation distance from our site to final disposal, and the current disposal method, as well as the potential for reuse, recycling or energy recovery.

**Waste management:** We developed a waste management hierarchy based on work by the U.S. Environmental Protection Agency as a tool to rank our options for managing waste. Our goal is to move as many waste streams, and as much volume as possible, towards the top of the waste hierarchy (prevent, reuse, recycle) and away from disposal of any kind.

**Waste prevention:** We are continually finding ways to recycle all scrap PE we produce to prevent it from becoming waste. In 2019, our Joffre, St. Clair River, and Moore sites diverted more than 6,7000 tonnes of PE from landfills for reuse through these programs.

**Waste reuse:** We look for opportunities to find value-added uses for some of our waste streams. For example, spent alumina from our St. Clair site is used as an additive for cement and we are evaluating fertilizer applications for the phosphate sludge from our Beaver Valley and Painesville sites.

## 4 WATER USE AND QUALITY

*Why is it important that we manage our water?*

Water is an important shared resource for NOVA Chemicals and the communities we serve. By minimizing water use and preserving water quality, we ensure the availability of this shared resource for years to come.

Water plays an important role in our manufacturing processes, especially for cooling and generating steam. We withdraw the water we require for our industrial processes from the St. Clair, Red Deer, Mississippi and Ohio rivers. Water availability varies across the different regions in which NOVA Chemicals' manufacturing facilities operate. This can create challenges in how we prioritize water use and conservation. We recognize the need to further understand water scarcity and advance our efforts related to water use.

*What actions do we take to manage this topic?*

**Water reuse:** When possible, our manufacturing sites reuse water multiple times. Many of our sites capture and use precipitation for manufacturing. At our Joffre site, we have four stormwater retention ponds, which effectively capture run-off from major storm events. Water from our retention pond is softened and clarified before being re-used in our operations.

**Water testing and treatment:** Most of the water we use is returned to the environment, often through evaporation from cooling towers. Before being returned to surface water bodies, it goes through testing and treatment, in alignment with regulatory requirements and environmental standards.

## 5 EMPLOYEE AND LEADERSHIP DEVELOPMENT

*Why is it important that we foster employee and leadership development?*

Employees and leaders who are engaged in work that is meaningful to them, and who have opportunities for personal and professional development, are better able to help us achieve our strategic goals.

*What actions do we take to manage this topic?*

**A learning culture:** We encourage everyday innovation through support for a learning culture. Up to 70 percent of our employee development occurs on the job, 20 percent consists of coaching from a leader and/or networking, and 10 percent is from formal learning (virtual or classroom).

**Informal development opportunities:** We support employee participation in two informal development networks: the NOVA Network (internal), and the Ellevate Network (external). The NOVA Network (TNN) is a volunteer network that provides development and interactive opportunities for our employees. Active since 2017, TNN offers events led by speakers from inside and outside our company, who cover topics focused on self-development. The Ellevate Network is a global networking and development community program for professional women. This WebEx-based community provides tailored content and events by industry, job function, and affinities, and covers topics such as negotiation, successful leadership, and conflict resolution.

**Formal leadership development:** Leaders receive training through a program called CONNECT The Neuroscience of Quality Conversation®. This program focuses on facilitating effective conversations between leaders and employees, which are critical to elevating individual performance and development. Training takes part in six virtual sessions led by NOVA Chemicals' leaders and trainers from the NeuroLeadership Institute. CONNECT training is supplemented with additional development workshops for various leader types.

## 6 EMPLOYEE HEALTH AND WELL-BEING

*Why is important that we foster employee health and well-being?*

Health and wellness is an integral part of our culture at NOVA Chemicals. We believe that a healthy workforce is a safer and more productive workforce.

*What actions do we take to manage this topic?*

**Occupational health:** Our occupational health departments are committed to implementing best practice solutions at all NOVA Chemicals sites through the standardization of key occupational health programs in compliance with applicable regulations, and company standards. We support employee health and well-being by minimizing the risk of adverse health impacts for all NOVA chemicals employees. An example of this is our leading-edge audiometric surveillance program where early warning changes in hearing are identified in employees exposed to noise so appropriate interventions can be taken to prevent hearing loss.

**Employee well-being:** NOVA Chemicals' Total Well-Being strategy supports employees' physical, emotional, financial, social, and environmental wellbeing. Resources include an employee family assistance program, influenza vaccinations, biometric screening and educational videos. It also includes a digital platform to track progress on personal goals and access tools that promote wellbeing.

## 7 INCLUSION AND DIVERSITY

*Why is it important that we foster inclusion and diversity?*

Fostering a workplace that embraces a variety of perspectives and experiences helps us learn from each other, leads to the most creative solutions, and attracts a diverse array of top-performing talent. We believe all employees should feel valued and have the right to work in a positive and welcoming environment.

*What actions do we take to manage this topic?*

**Awareness:** In 2019, more than 300 employees attended our inaugural International Women's Day event at multiple locations across the company, to celebrate the social, economic, cultural and political achievements of women around the globe and here at home. We plan to make this an annual event, and to encourage similar efforts in line with our new inclusion and diversity strategy.

**Respectful workplace:** Our Business Conduct Policy outlines our Code of Conduct including our expectations for respectful workplace behavior. Questions or concerns can be raised through Workplace Alert, a 24-hour confidential and anonymous helpline and online reporting system. Workplace Alert is managed by a third-party vendor and is available to all employees, contractors and others externally. Alternatively, employees and contractors can contact the Anti-Harassment Line which is managed by our human resources team.

**Mentorship:** Since 2012, our Pittsburgh office hosts a Mentoring Day event to promote inclusion and enhance internship and employment opportunities for people with disabilities. During the event, participants spend a full day at NOVA Chemicals shadowing employees to learn more about careers in our industry. Over the last eight years, more than 130 students and 20 faculty members from local schools have attended this event.

## 8 COMMUNITY ENGAGEMENT AND INVESTMENT

*Why is it important that we foster positive relations with communities?*

Collaborating with our communities and investing in projects that address their needs and concerns contribute to our goal to be sought after as an employer and neighbor.

*What actions do we take to manage this topic?*

**Being a good neighbor:** Our Good Neighbor Program outlines specific commitments and actions related to our construction activities. The program includes timely sharing of information related to project impacts, opportunities, news, and milestones. We also make efforts to mitigate our impacts on area roads, and noise, and to contribute to the local economy.

**Building and sustaining strong communities:** NOVA Chemicals is committed to investing in organizations dedicated to making a difference and improving the overall quality of life in the communities where we work and live. We support initiatives focused on three core areas that support our business strategy (Science and Education, Health and Community Services, and the Arts) and support multiple organizations dedicated to removing barriers for our communities' most vulnerable populations.

**Volunteering our time:** We believe in lending a hand through active service, supporting community and conservation initiatives through paid volunteer time, and on our own as individuals and families. Our employees volunteered almost 6,000 hours in 2019 for a variety of initiatives.

# GRI Index

This report has been prepared in accordance with the GRI Standards: Core option. We also provide information on additional topics and indicators, beyond the ones required to fulfill the requirements of the Core option.

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*NOTES:*

- *We provide the most complete information and data available for all the indicators required to report in accordance with GRI Standards: Core option. In some cases, data breakdown by country, gender or other specific categories, is not available or cannot be provided for privacy concerns.*
- *Note 1: Although NOVA Chemicals has not formally adopted the precautionary principle, our consistent implementation of Responsible Care demonstrates a commitment to proactively identify and prevent or mitigate negative impacts.*
- *Note 2: As a privately held company, NOVA Chemicals does not have publicly available financial statements.*
- *Note 3: Interpreted for application to NOVA Chemicals as: percentage of high priority products (based on our prioritization process) with a product risk profile available to the public.*
- *Note 4: Interpreted for application to NOVA Chemicals as: incidents of non-compliance specifically limited to US EPA TSCA allegations, US FDA product recalls and Canadian equivalents. Non-compliance with voluntary codes is not included.*

NOVA Chemicals®

To learn more about NOVA Chemicals, please visit:
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Responsible Care®
Our commitment to sustainability.