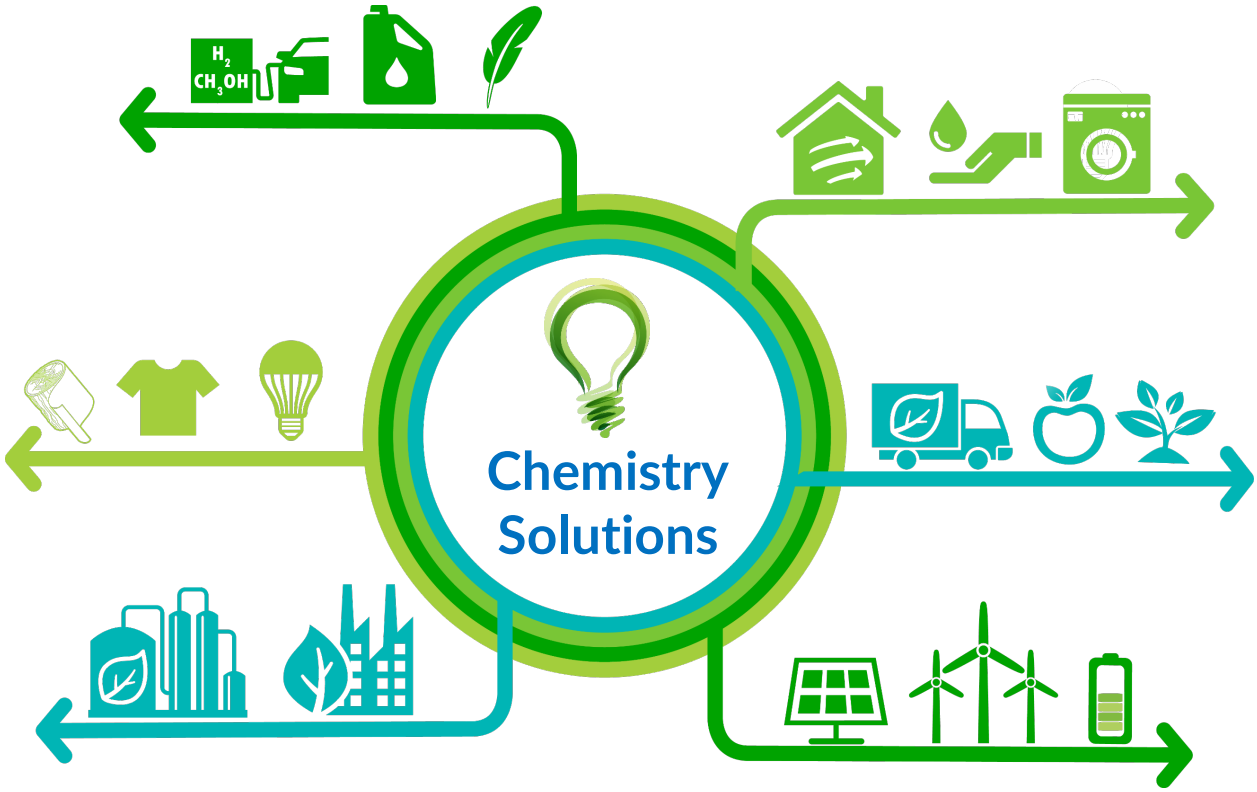
Submission from the Chemistry Industry Association of Canada

› CLEAN RESOURCES TODAY & ENERGY INNOVATION FOR TOMORROW



Responsible Care®
Our commitment to sustainability.

CHEMISTRY INDUSTRY
ASSOCIATION OF CANADA

The Canadian Chemistry Sector – An overview

Canada's chemistry industry uses raw materials such as natural gas liquids, oil, electricity, minerals and biomass to manufacture the building blocks for more than 70,000 value-added products, many of which are critical to the country's economy.

Worldwide, the chemical and petrochemical industries are by far the largest industrial energy users, accounting for 30 percent of energy demand. For more than 30 years, Canada's chemistry sector has been at the forefront of the journey towards responsible and sustainable chemical production. Founded in Canada in 1985, Responsible Care®, the Chemistry Industry Association of Canada's U.N. recognized sustainability initiative, is now practiced in more than 60 countries. Through Responsible Care, CIAC member-companies have committed to continuously improving their products and processes, and their efforts have payed off.

In fact, the industry has always had energy efficiency as a core element of its business practices. Canada's chemistry industry is already a world leader in low-intensity carbon chemical production due to: the abundance of low-carbon feedstock; relatively new plants; upgraded equipment; process and product re-engineering; access to, on average, one of the lowest GHG-intensive national electricity grids; and energy conservation measures. These reductions are the result of significant new investments, including more than $12 billion in the last decade alone.

> **To date, ahead of national GHG regulations and policies, CIAC members-companies have reduced their absolute GHG emissions by 69 per cent from 1992 levels.**[1]

Today, production of chemistry products is the fastest growing industrial sector in North America, with investments approaching $US 200 billion representing more than 250 projects. So far, Canada, has not been able to capture its fair share of new investments that would create sustainable jobs, environmental improvements and build the foundation for the development

[1] These reductions are in addition to those associated with the use, by other industries, of chemically-derived products and technologies which have been shown to deliver emission savings of more than 2 units for each unit of direct and indirect emissions coming from the chemistry sector.

of made in Canada chemistry products and solutions necessary to meet our countries clean energy challenge.

> **Research shows that for every unit of GHG emitted as part of chemical production, the industry's products and technologies result in a net reduction of 2.6 units of emissions during a product's lifecycle. Using emerging technologies, this ratio increases to more than 4:1.**

Chemistry is such an integral part of the solution to address the global challenges of the future that it will likely require a tripling of chemical production volumes by 2050.

Chemistry Solutions – ideas, technology, and innovation

1. Emission Abatement Technologies For Chemical Production

Current International Energy Agency's worldwide energy benchmarking data shows that chemical producers in Canada clearly stand with the leaders. Canada has an energy intensity less than one third that of Asian producers, which represent nearly 50 per cent of worldwide production, and Canada is on par with the best producers in Europe.

Decades of innovation, energy integration and rising energy costs have captured most of the easily achieved energy intensity improvements in the production of chemicals in Canada.

Looking forward, the most cost-effective way to implement best technology practices and deliver step-change in energy efficiency improvements will require new capital investments. For example, in the production of olefins, investments made by Canadian producers in leading-edge natural gas crackers have resulted in an 8 to 10-fold energy-savings and proportional GHG emissions reductions versus naphtha or coal based processes used in Asia today.

> ***Recommendation 1:*** *Recognize that technological innovation and step-change energy efficiency improvements are completely dependent on new capital investment. Energy policies must be designed in a manner that encourages rather than discourages future investment and economic growth through new energy efficient builds.*

At the same time, breakthroughs in energy consumption will require the development of game changing technologies, many of which have not reached commercial maturity. For example, the chemistry industry is working on developing innovative ways of using biomass feedstocks and on generating hydrogen from renewable sources.

> ***Recommendation 2:*** *Provide financial support for the development and deployment of new and yet commercially unproven emission reduction technologies in chemical production to mitigate investment risks and uncertainty, keeping in mind that transformative solutions can deliver reductions over decades of use.*

2. Energy Conservation - The Lowest Hanging Fruit

In its efforts to combat climate change, increase energy efficiency and improve overall quality of life, Canada has to optimize its options around resource extraction. In doing so it can:

a) leave its resources in the ground, untouched, reducing the environmental footprint of a declining national economy;

b) extract and export its resources in the most energy-efficient way possible; and/or

c) develop and transform its resources, here, to take us towards a more efficient and sustainable world, at the same time reducing emission leakage and job losses.

> ***Recommendation 3:*** *Choose a smart growth approach that focuses on adding-value to domestic natural resources by transforming them into the chemistry-based solutions Canada and the world will need for decades to come.*

CIAC recognizes that this may result in an increase in emissions in Canada, but these can be greatly offset by the avoided emissions generated through the deployment of clean energy innovations coming from the chemistry sector.

The solution then becomes for Canada to optimize the ratio of manufacturing emissions to avoided emissions throughout its economy, encouraging smart energy efficient

growth, greenhouse gas emissions reductions and job creation. Canada therefore would move from a model where production and energy costs increase steeply, hoping to change consumer behavior, toward a solutions-oriented model where companies are encouraged to innovate and grow wherever they can demonstrate net sustainable benefits.

While chemical manufacturing is a carbon-intensive industry, the sector is unique in its ability to enable other industries and society to save energy and reduce emissions. By far, avoided emissions, in the use phase of chemistry-derived products, represents the greatest contribution that the sector continues to make in reducing GHG emissions and energy demand economy-wide.

Based on a 2009 study done by the International Council of Chemical Associations (ICCA), the most effective energy conservation opportunities enabled by chemistry include:

a. Building Sector

Insulation - of all the energy consumed around the world, one third is used for heating and cooling buildings. With a combination of better energy efficiency standards and applied chemistry solutions, energy savings of more than 25 per cents are achievable. For example, three key foam insulation materials - expanded polystyrene, extruded polystyrene and polyurethane - have been shown to result in up to 233 (in use savings) to 1 (manufacturing) energy reductions over the life of buildings.

Illumination - advances in light-emitting diode (LED) bulbs, which have four times greater life expectancy, have led to a nearly 40 percent greater energy efficacy (lumens per watt).

Reflective roofs - made with latex-based coatings reflect the sun's energy from the roof surface which allows buildings to retain cool air reducing the demand for air conditioning and thus energy.

b. Transport

Since 1992, GHG emissions from Canada's transportation sector have increased by 33 per cent. Producing lighter vehicles, developing alternative fuels, and moving to electric private

and public transportation vehicles will depend upon advances in materials, fuel, and energy storage alternatives developed through chemistry solutions.

Lightweighting - reducing a vehicle's weight by 100 Kg cuts its GHG emissions by 10 g/Km due to improved fuel efficiency. New polymers and high-tech plastics-based solutions, such as glass or carbon fiber, are designed to replace metal effectively in cars and airplanes without compromising performance, comfort or safety.

Fuel additives and synthetic lubricants – can improve the efficiency of both gasoline and diesel engines by 2 per cent and 5 per cent respectively.

Green tires - reduce fuel consumption by 5 to 7 per cent as they reduce rolling resistance by up to 30 per cent. For the average person green tires bring a savings of around $100/yr in fuel costs.

C. Renewable Energy

Chemistry enables nearly every renewable power generation source such as the composite materials in wind turbine blades, solar panels, and even nuclear and hydro-power.

Solar power – solar system installations are expected to grow at an average rate of 15 per cent over the next five years. Recent advances in chemistry have transformed solar into a viable commercial energy source. Power output has improved by more than 30 per cent in the past 10 years with PV panels failure rates falling dramatically with new materials innovations. Today the same power can be generated with fewer panels and less panel space.

Wind Power - chemistry allows energy producers to use wind power blade components that are lighter, stronger, longer and more cost-effective. For example, blades require coating because they are constantly exposed to the weather and moving in air. Blade coatings reduce wind erosion, ensure long-lasting performance, and decrease maintenance and repair costs.

d. Energy Storage

Batteries - reliable and efficient energy storage is the missing link in renewable power and the electrification of transport. Using storage batteries, power can be available 24 hours a day, regardless of weather. Batteries smooth out the variability of flow and store excess energy when demand is low to release it when demand is high.

e. Packaging

Plastics - Due to its lighter weight, plastic packaging is bringing major energy reductions (2 to 8 times lower) versus traditional packaging materials such as glass, paper, steel and aluminum. In addition, plastics reduce food wastes by extending food freshness, reducing packaging weight, enhancing barrier properties and providing product protection. Because of reduced weight and size, packaging increases the capacity of every container resulting in less trucks on the road and reduced fuel emissions.

Recommendation 4: *Leverage the efforts made by industry and support public and private programs designed to mitigate the high capital costs associated with low carbon products, technology, equipment, infrastructure replacement, new builds or retrofits.*

Conclusion

CIAC members are well-positioned to continue to take a proactive approach to environmental protection, to resource conservation and to product development. They will do so in manner that is consistent with the Responsible Care® Ethic and Principles for Sustainability so they can continue to make a significant contribution to improving the life of all Canadians.

Canada's chemistry sector is eager to work with both Federal and Provincial governments and stakeholders to develop well aligned policy frameworks that address energy conservation efforts and preserve the benefits of an efficient, modern and responsible Canadian chemistry manufacturing industry.

CHEMISTRY-BASED CLEAN ENERGY INNOVATION

The Association supports evidence-based policy making that seeks to balance effective energy conservation measures with the need to meet society's growing expectations for sustainable products and services.

Today, Canada's chemistry sector is poised for growth, thanks to new shale gas and biomass feedstocks and a growing market for chemistry-based solutions. At the same time, the chemistry sector represents one of the best opportunity for Canada to develop its abundant resources in a way that creates jobs, improves quality of life for all, grow the economy and most importantly delivers net sustainable environmental benefits for decades to come. By taking a more holistic view around its natural resource development, the Canadian Government can ensure that its chemistry sector becomes a hotbed for clean energy innovation.

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