This executive summary outlines the key findings of the research. For additional information, methodology and to contact us, please visit economicimpact.ca.
INTRODUCTION

In 2018, Aviseo Consulting studied the Southwest Ontario petroleum refining sector’s contribution to the provincial economy. Specifically, the study identified the economic impact generated by four refineries in Sarnia and Nanticoke, Ontario.

The study found that these four refineries alone generate significant economic benefits, not only in the communities in which they operate, but across the province and the country.

KEY TAKEAWAY

- The Sarnia industrial cluster is vital to Ontario’s economy.
- Petroleum fuels power Ontario’s economy—the largest in Canada.
- Ontario refineries are part of Canada’s critical infrastructure.
- Competitive pressures from a growing regulatory burden pose risks to the viability of Ontario refineries and Ontario’s long term energy security.

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The study found that these four refineries alone generate significant economic benefits, not only in the communities in which they operate, but across the province and the country.
Ontario’s petroleum refining industry comprises four major full-slate refineries in the province’s southwest: three refineries in Sarnia (Imperial, Shell and Suncor) and the one at Nanticoke (Imperial). These refineries process crude oil into the vital refined petroleum products (RPPs) that move Ontario, Canada’s largest economy.

**Canadian crude oil refining capacity by province 2016**

<table>
<thead>
<tr>
<th>Province</th>
<th>Capacity (Mb/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alberta</td>
<td>462</td>
</tr>
<tr>
<td>Quebec</td>
<td>402</td>
</tr>
<tr>
<td>Ontario</td>
<td>393</td>
</tr>
<tr>
<td>New Brunswick</td>
<td>300</td>
</tr>
<tr>
<td>Saskatchewan</td>
<td>154</td>
</tr>
<tr>
<td>Newfoundland and Labrador</td>
<td>115</td>
</tr>
<tr>
<td>British Columbia</td>
<td>67</td>
</tr>
</tbody>
</table>

Takes into account only full-slate refining capacity. References: Canadian Fuels Association, National Energy Board (NEB), NRCan, Aviseo Analysis

Sales of refined petroleum products in Ontario reflect the demands generated largely by transportation, industrial and agricultural use, commercial and public sector as well as residential needs.

In 2017, Ontario Refined Petroleum Product production topped 25 million cubic metres (m³) for a value of more than $13 billion. **Ontario is Canada’s largest market for Refined Petroleum Products** with more than 80% used to fuel personal transportation, on-road freight, transit and air travel.

**Production of Refined Petroleum Products in Ontario**

**Ontario, 2017; in %; in millions of cubic meters**

- Gasoline: 41.1%
- Aviation Fuel: 22%
- Diesel: 21.74%
- Naphtha: 5%
- Butane: 11%
- Other: 12%
- Petrochemical feedstocks: 13%
- Lubricating oils and greases: 10%
- Heavy fuel oil: 7%
- Bunker fuel: 6%
- Asphalt: 13%
- Other: 37%

Source: NEB, CFA, Statistics Canada, Aviseo Analysis

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**KEY TAKEAWAY**

The province’s refining capacity is approximately 62,000 m³/day (393 Mb/day), or **21% of Canada’s total capacity**. Around 80% of oil processed in Ontario is **western Canadian crude**.

**KEY TAKEAWAY**

According to U.S. Energy Information Administration (EIA) forecasts, refined petroleum liquids consumption in Canada and the US will increase slightly by 2024.
The economic impact from Ontario’s refining industry is the result of a highly skilled workforce, an integrated supply chain and closely linked petrochemical sector. It generates significant GDP contributions, provincial and federal tax revenues, and community contributions.

| **Over 12,000** direct, indirect and induced jobs in the province |
| **$1.25 billion** Annual operating expenditures |
| **1,600** Suppliers in an integrated supply chain |
| **$4.7 billion** GDP contribution |
| **$320 million** Federal and provincial tax revenues |
| **$550 million** in feedstock for the chemical, plastic and rubber industries |

All numbers are for 2017.
The industry supports close to 6,500 indirect jobs outside the communities where the refineries are located.

This broad distribution of companies and jobs underscores the importance of the industry to the province as a whole.

Ontario’s petroleum refining industry is a key source of highly skilled, high-paying jobs. The industry’s operational and investment activities sustain 12,000 jobs located throughout the province; 1,400 jobs directly within the refining sector and thousands of jobs spread among a wide range of goods and services suppliers.

Indirect Jobs supported by the Refining Industry
Ontario, 2017; in %, in number of full time equivalent jobs

Source: Canadian Fuels Association, Aviseo Analysis

Indirect Jobs

- Wholesale and retail trade: 15.8%
- Business support services (buildings, security, administrative, Legal, Accounting, Banking, Real estate, holding and Broking): 32.7%
- Repair and maintenance (construction and machinery), Architectural, engineering, Non-residential building construction: 14.1%
- Manufacturing (Industrial and general-purpose machinery, Hardware, Architectural material, Boiler, tank and containers): 12.0%
- Transportation (Crude oil and natural gas pipeline transportation, Truck, Rail, Water, Support activities for transportation): 6.9%
- Electric power generation, transmission and distribution, natural gas, water and sewer: 4.0%
- Other sectors: 14.5%

Source: Canadian Fuels Association, Aviseo Analysis
In addition to the 4,758 direct and indirect jobs supported in Lambton and Haldimand-Norfolk where refinery operations are located, nearly 6,500 jobs are supported in other counties.

**Refinery employees concentration across southwestern Ontario**

*South West Ontario, 2017*

Ontario’s refineries have developed and sustain an **integrated network of nearly 1,600 suppliers across Canada**. Almost 1,000 of these suppliers are located in Ontario; 25% serve more than one refinery, highlighting the integrated nature of the system.

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**Source:** Canadian Fuels Association, Aviseo Analysis

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**Direct and indirect Jobs supported by the Ontario Refining Industry by county**

*Ontario, 2017; in number of full time equivalent jobs*

<table>
<thead>
<tr>
<th>County</th>
<th>Jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lambton</td>
<td>3,618</td>
</tr>
<tr>
<td>Haldimand-Norfolk</td>
<td>1,140</td>
</tr>
<tr>
<td>Other counties</td>
<td>3,529</td>
</tr>
<tr>
<td>Halton</td>
<td>1,305</td>
</tr>
<tr>
<td>Hamilton</td>
<td>957</td>
</tr>
<tr>
<td>Lennox and Addington</td>
<td>359</td>
</tr>
<tr>
<td>Bruce</td>
<td>325</td>
</tr>
</tbody>
</table>

Source: Canadian Fuels Association, Aviseo Analysis
Ontario refineries supply essential feedstocks to the petrochemical sector. In a number of cases petrochemical manufacturing facilities are closely integrated with adjacent refineries. Petrochemical companies rank among Ontario’s largest manufacturers. For example, chemical, plastic and rubber product manufacturers employ nearly 80,000 people and account for more than $10 billion of Ontario’s GDP.

Refineries in the Sarnia area have had a profound impact on the structure of Ontario’s economy for decades, making the region one of Canada’s foremost industrial clusters and a strong wealth generating cluster in the province.

**KEY TAKEAWAY**
Refinery by-products are essential for companies downstream in the petrochemical value chain.

**KEY TAKEAWAY**
Sarnia hosts 70% of the province’s refining capacity and six of the world’s top 15 chemical producers.
KEY TAKEAWAY
Ontario’s refining sector contributed more than $320 million in tax revenues.

Over the last 10 years, the province’s refining industry has invested nearly $2 billion in capital expenditures in Ontario alone. The four refineries expect to increase these expenditures to a total of $2.4 billion over the next 10 years (2018 to 2027).

Excluding crude oil purchases, which constitute 83.4% of expenses, Ontario’s refining industry made operational expenditures of more than $1.5 billion in 2017—including more than $320 million on wages, salaries and training of Ontario workers.

Direct and Indirect GDP Generated by the Refining Industry
Ontario, 2017; in $ million

<table>
<thead>
<tr>
<th></th>
<th>Direct</th>
<th>Indirect</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3,658.6</td>
<td>1,059.1</td>
<td>4,717.7</td>
</tr>
</tbody>
</table>

Source: Canadian Fuels Association, Statistics Canada, Aviseo Analysis

Federal, provincial and municipal governments all benefit from refinery related tax revenues. In 2017, the Ontario government raised nearly $160 million.

- $98.9 million came directly from refineries.
- $45.4 million from supplier activities.
- $13.9 million from induced revenue, which is generated as a result of consumption by direct and indirect employees.
Ontario refineries are highly regulated and are continuously improving their environmental performance. Air quality in the province has improved significantly over the past ten years due to a substantial decrease in emissions, such as nitrogen dioxide, sulphur dioxide and carbon monoxide.

Ontario refinery emissions of conventional air pollutants have markedly decreased since 2007:

- SOx $\downarrow$ 50%,
- NOx $\downarrow$ 24%,
- VOCs $\downarrow$ 23%,
- PM2.5 $\downarrow$ 40%,
- CO $\downarrow$ 40%,
- Benzene $\downarrow$ 15%

In Sarnia-Lambton:

- Total emissions of NOx and SO2 are down 25% and 70% respectively since 2007.
- A study by the Sarnia Lambton Environmental Association found that emissions of 1,3 butadiene declined 83% from 2002 to 2015, and are now way below (only 30%) of the US EPA cancer risk threshold.

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i Environment and Climate Change Canada NPRI (2017)
ii The Air Quality in Ontario – 2016 Report
**What if Ontario refineries shut down?**

To find out, we ran a simulation model* to assess the impact that the closure of the four South West refineries would have on the Ontario economy.

The results are compelling:

- As production of the refineries stops, the operations and investment contributions would be reflected on GDP almost **instantly**. The economy would be stunted indefinitely by the loss of petroleum activities and investments.
- GDP would quickly decline by almost $4 billion following refinery closures. Fifty per cent of GDP would be lost due to increased imports of refined petroleum products from other jurisdictions into Ontario.
- Even after relocation of workers to other sectors, closures would result in the permanent loss of more than 2,000 jobs. This would be felt most by service industry businesses which are dependent on well-paid refinery employees for their customer base. In short, the negative impact would be structural and would continue in the medium to long term.
- The Ontario and Federal Government would collect $400 million less in annual tax revenues. Forty per cent of this reflects lost corporate tax revenues from refiners and suppliers.
- The import of additional RPPs, such as gasoline, diesel and jet fuel, would increase transportation and production costs for consumers and businesses which would translate into higher prices for fuels, goods and services. Increased reliance on fuel imports also undermines our energy security.

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*Aviseo used the Navius model, a dynamic CGE model for North America:

- The Navius model includes fully specified models that schematize all industries and production factors of a region.
- It includes dynamic modeling of all markets by simulating the decisions of agents (consumers, firms, governments) following price changes and reconciling the impacts on the supply and demand of the decisions of these agents.
- The model combines a technologically-detailed and behaviourally-realistic model of how agents utilize energy with a comprehensive representation of economic interrelationships between sectors and regions in North America.
- The dynamic aspect makes it possible to incorporate the induced effects (i.e. resulting from the consumption of the paid workforce) and structuring effects like technology changes.