

Economic Profile of the Ontario Oil, Gas, and Salt Resources Industry

**Prepared for the
Ontario Petroleum Institute**

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I Executive Summary

This economic profile examines the Ontario oil, gas, and salt resources industry. This is a sector of the economy that dates back to before confederation and plays an important role in the southwestern region of the province. In fact, North America's first commercial development of oil was produced in Oil Springs, Ontario. Ontario has long life reserves, production of oil has gone on uninterrupted since 1858 and natural gas since the early 1900's. With demand in Ontario for oil and gas expected to grow by 15% and 23% respectively over the next two decades, there is clearly a role for in-province production given the reserves and our historical tie to the sector.

This profile identifies the key attributes of the sector, highlights changes that have occurred over the past two decades, and provides an in-depth analysis of its current and potential position within the Ontario economy. The analysis included in the profile is based on information from the Ontario Petroleum Institute, the Ontario Oil, Gas, & Salt Resources Library, the Canadian Association of Petroleum Producers, the National Energy Board, various surveys from Statistics Canada, the Ontario Ministry of Natural Resources, and Natural Resources Canada.

The profile demonstrates that the oil and gas exploration and production component of the sector has faced some serious challenges while salt solution mining and underground storage of natural gas and liquefied petroleum gas has withstood these pressures and realized significant growth. Nevertheless, the employment and productivity benefit that the sector, as a whole, could provide in a region of the economy that has faced recent obstacles to growth is evident.

The profile emphasizes how the reemergence of vibrant oil and gas exploration and development activities in Ontario could bring the sector back to its earlier success. The foundation for this return has already been laid given the combination of high quality labour and technology that is prevalent in the market. In addition, the potential reserves of oil and natural gas are significant as it is estimated that more than 30 million barrels of oil and 462 bcf of natural gas have yet to be discovered. However, further delay in the comeback of the sector may inhibit its future success, as demand for skilled labour in this sector is growing at a rapid pace in western Canada and the productive assets degrade over time. A growing oil and gas sector in Ontario would provide significant benefits to the province. These include well-paid, high productivity employment in southwestern Ontario where unemployment rates

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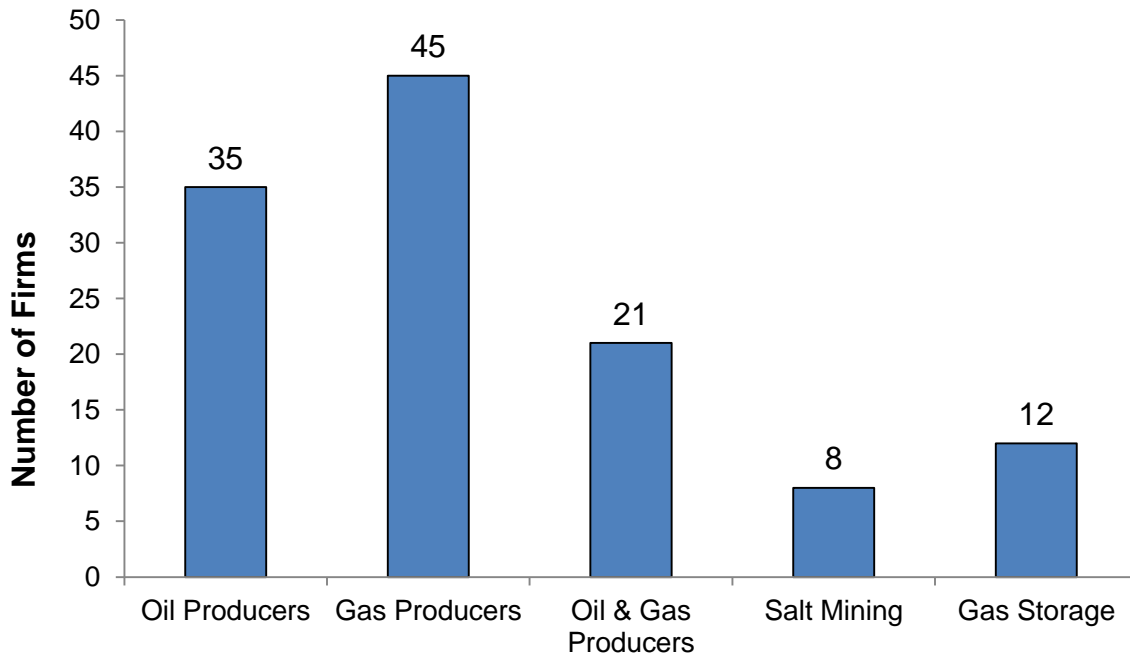
are well above the provincial and national averages and royalties for both public authorities and landowners.

II Industry Overview

The oil and gas sector in Ontario consists of a series of major activities that OPI members partake in. These include exploration and development of new wells, the production of energy products, and storage. These activities are central to the Canadian economy and an important part of the Ontario economy. The membership represents a diverse set of constituents that are active in each of these economic activities. These include developers, producers, service companies, financial and legal professionals, utilities, educational institutions, government agencies, and consultants.

At the core of the sector's activities is the production and storage of energy and the mining of salt products. The OPI represents the vast majority of those firms actively engaged in these activities in the province. Figure 1 depicts those firms active in the production in 2012.

Figure 1: Number of Active Firms - 2012



Source: 2012 Form 3 – Well Status Report

The membership of the OPI extends well beyond those firms that are most closely connected to the economic activities of the industry. This includes firms that

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provide the requisite support activities for a productive sector. Figure 2 depicts the number of diverse support firms that are members of OPI. Beyond those firms listed as members of the OPI, there are firms, educational institutions, government agencies, and various other organizations that are active in the sector. Those firms active on the ground that provide support in drilling and operations make up a large portion of the firms in a supporting role. The industry is well served with the high value added activities that include finance, accounting and legal support.

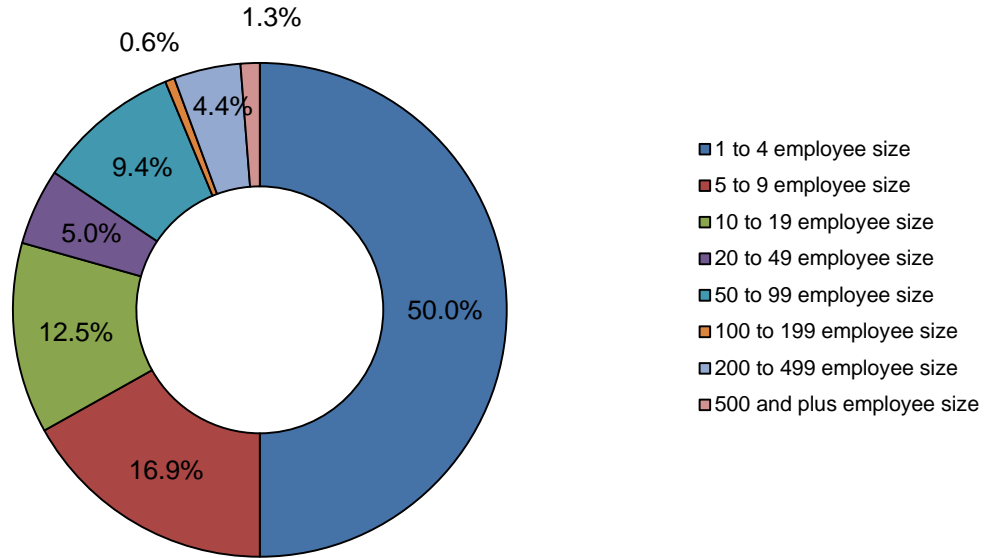
Figure 2: Number of Support Firms - 2012



Source: OPI Website

The composition of the firms active in the sector vary considerably in the size of the operations with the vast majority considered as small enterprises. Figure 3 depicts the breakdown of the firms active in the sector by size cohort. Of particular note, is that nearly half the firms have four or fewer employees. The larger firms are mainly those involved in salt mining, oil refining, and providing services to oil and gas extraction.

Figure 3: Composition of Firms in Ontario Oil, Gas, and Salt Resources Industry - 2012

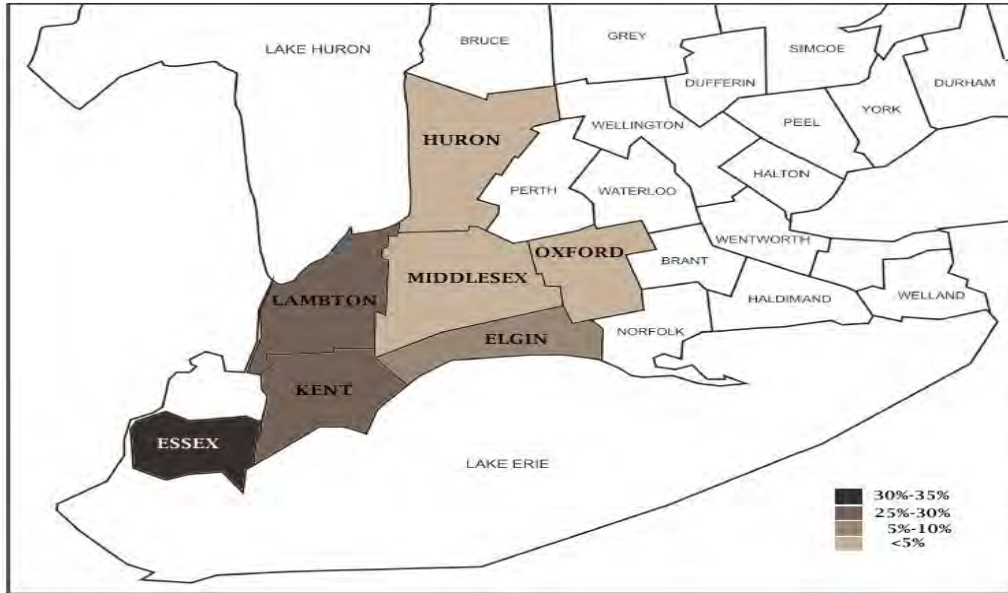


Source: Statistics Canada (Canadian Business Patterns, 2012)

All economic activity of these firms occurs in southwestern and midwestern Ontario. Firms have been active in a number of geological formations: the Cambrian play, the Odovician play, the Silurian Sandstone play, the Silurian Carbonate play, and the Devonian play. Twelve counties are represented in the direct economic activities; however, the support activities are conducted throughout the province.

Figure 4 depicts the location of oil production by county in 2012. The bulk of oil production had come from Essex County with Lambton and Kent Counties following.

Figure 4: Proportion of Oil Production by County – 2012



Source: Ontario Oil, Gas, & Salt Resources Library

The production of natural gas follows a similar geographic pattern, however the vast majority (>65%) of natural gas production is sourced from Lake Erie. Figure 5 depicts the location of natural gas production by county in 2012.

Figure 5: Proportion of Natural Gas Production by County – 2012

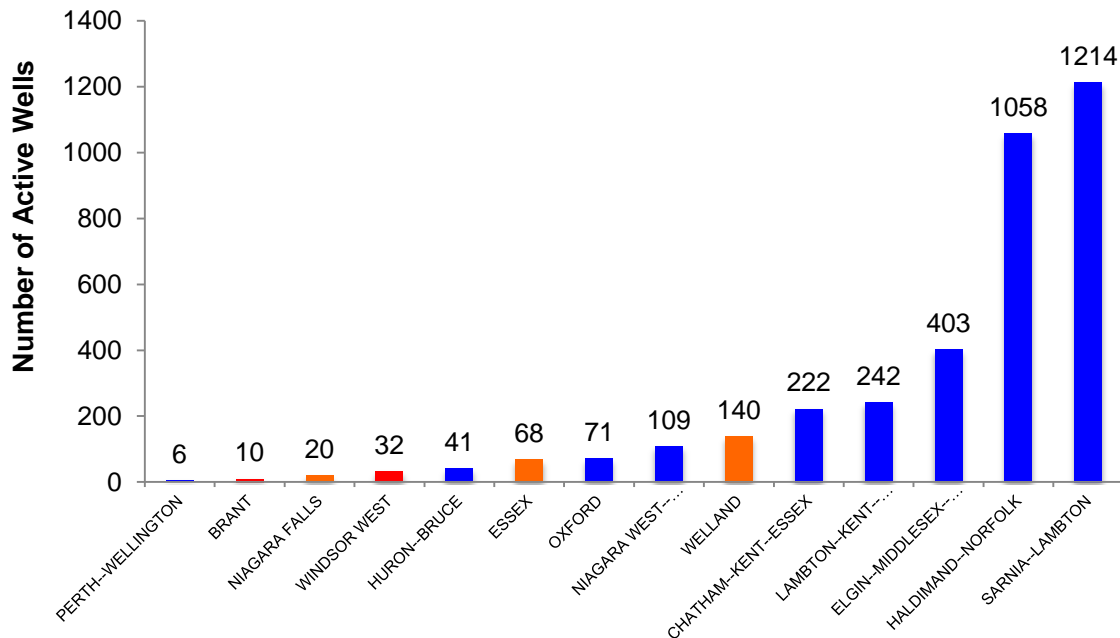


Source: Ontario Oil, Gas, & Salt Resources Library

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The location of the oil and natural gas producing wells in Ontario fall into eighteen separate electoral districts. The majority of the natural gas producing wells in the province fall within the district of Haldimand-Norfolk and oil production in Sarnia-Lambton. Figure 6 depicts the location of wells in the province by electoral district. The columns have been coloured to represent the political party that represents that district in the Ontario Provincial Parliament in 2013. As demonstrated in the figure, the location of the active wells in the province are primarily (92.4%) located in districts represented by the Progressive Conservative party of Ontario, which is the Official Opposition in the 40th Ontario Legislature.

Figure 6: Location of Active Wells by Electoral District - 2014



Source: Wells by District from OPI

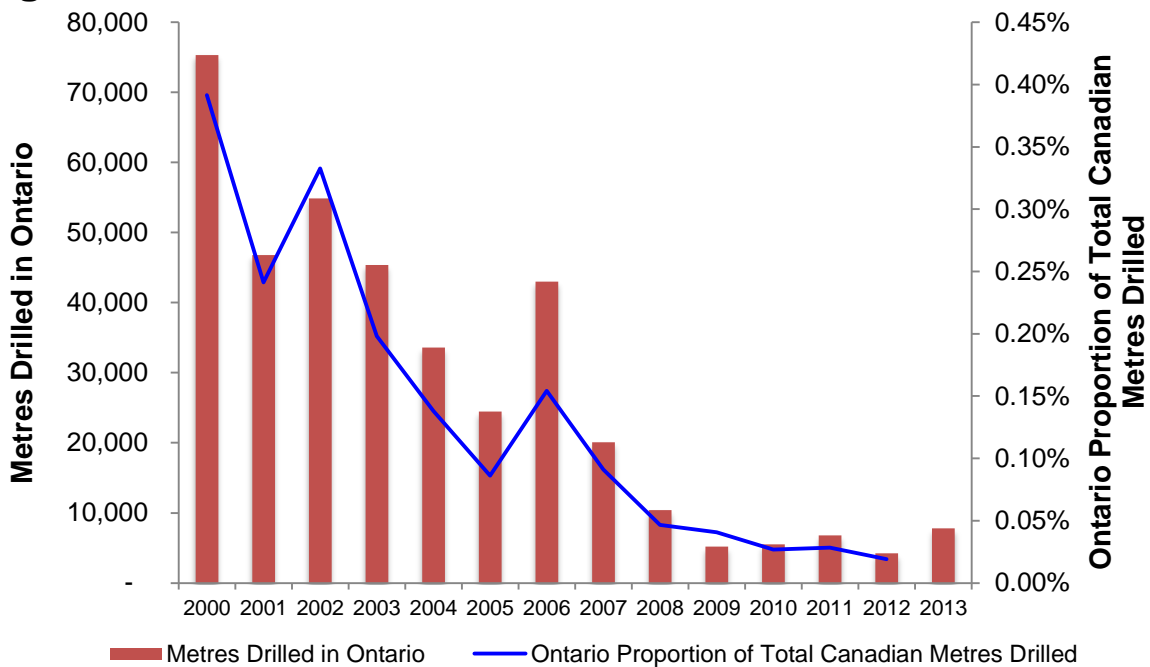
Note: Blue=Progressive Conservative; Orange=New Democratic; Red=Liberal.

The electoral districts of Bruce-Grey-Owen Sound, Mississauga-Streetsville, Thornhill, and Wellington-Halton Hills each have a single active well.

III Economic Contribution to Ontario

The industry’s primary contribution to the Ontario economy comes in the form of oil and gas production. The production of both energy products has seen a steady decline since the early 1990’s. This has been the result of reducing drilling and exploration for oil and the depressed price for natural gas. This drop in drilling is clearly depicted in Figure 7, which identifies the trend in metres drilled for oil and gas wells in Ontario. This an accurate indicator of longer-term activity levels for the sector. In fact, the total metres drilled in Canada now comprise less than 0.03% of the total for Canada.

Figure 7: Metres Drilled in the Ontario Oil and Gas Sector

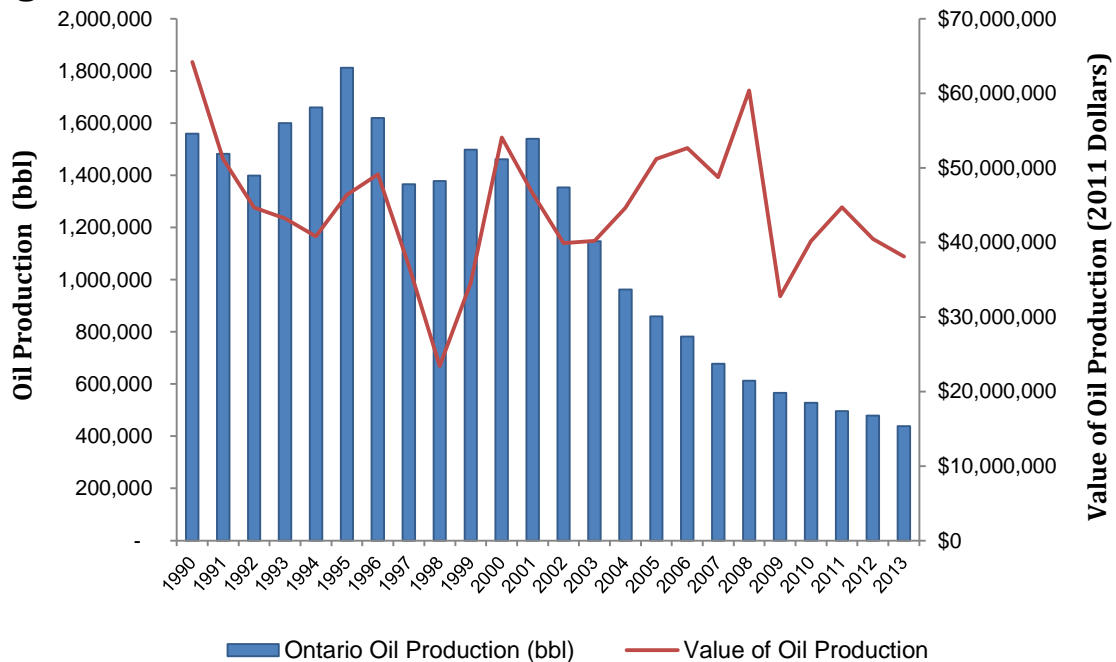


Source: Ontario Oil, Gas, & Salt Resources Library; Energy Information Administration

i. Oil Production

The production of oil in Ontario has declined steadily to its current level in 2013 of 438,956 barrels. This represents less 0.5% of the total amount of oil that is delivered to refineries in Ontario. The value of annual oil production in Ontario has averaged about \$40 million. Figure 8 presents the oil production from 1990 to present.

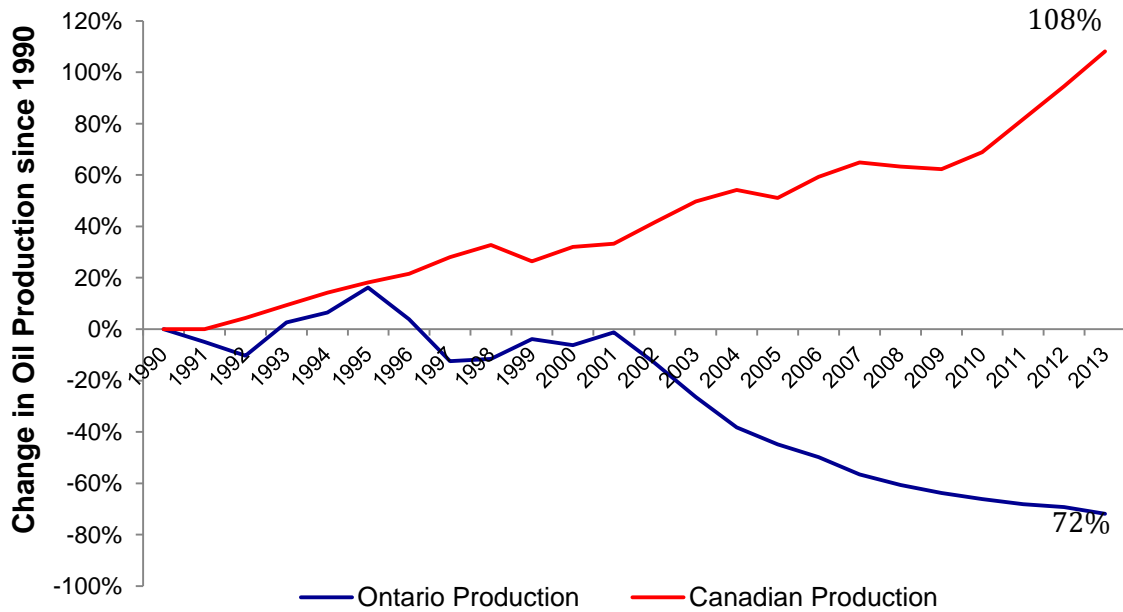
Figure 8: Oil Production in Ontario



Source: Ontario Oil, Gas, & Salt Resources Library; Prices from National Energy Board

Within the Canadian context, the decline in oil production that has been observed since 1990 appears to be an Ontario-specific phenomenon. Figure 9 presents the change in production levels since 1990 with production indexed to the level in that year. While Canadian-wide production has increased by over 90% since 1990, Ontario production has decreased by 70% over the same period. While these numbers are not surprising given the dramatic growth in heavy oil production in Alberta and Saskatchewan, a key implication from this dynamic is that Ontario’s decline may be temporary as their ability to return and potentially grow oil production beyond 1990 levels should be possible given greater exploration and development that should be possible with mobilization of resources and capital to the sector and investment in new technologies. This is especially true given the potential undiscovered reserves of 30 million barrels of oil in the most active geologies in the province.

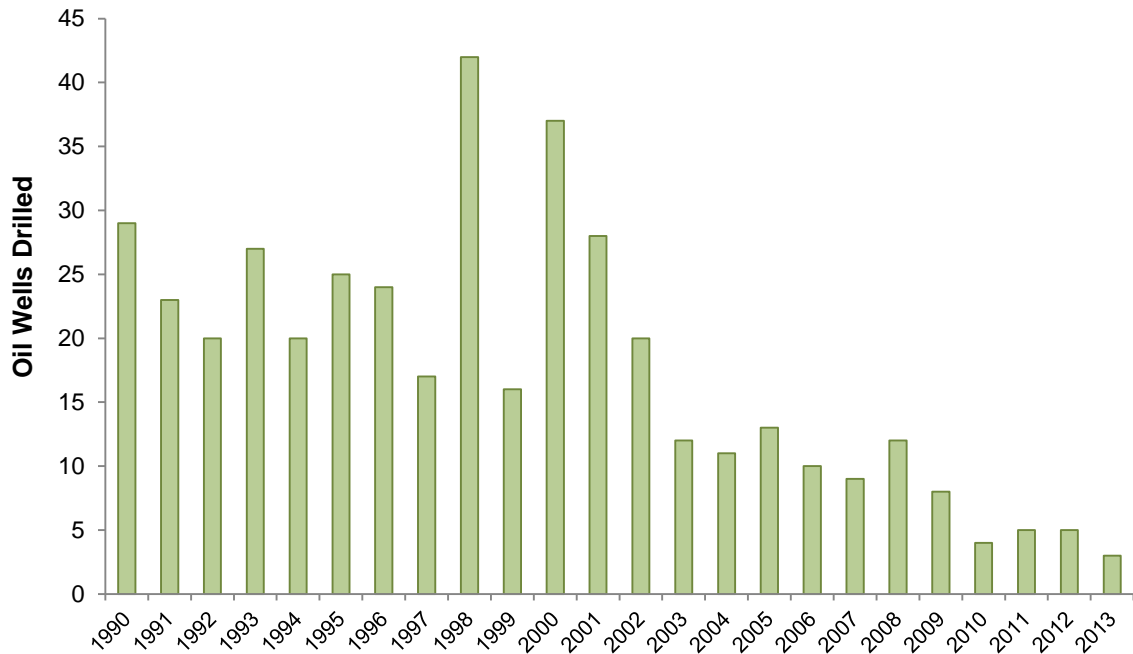
Figure 9: Change in Oil Production in Canada and Ontario since 1990



Source: Ontario Oil, Gas, & Salt Resources Library; Canadian Production from National Energy Board

One of the core reasons for the decline in oil production in Ontario has been the steady decrease in exploration and development of new wells. This has limited growth of the province’s reserves and will lead to continued decline of the trend presented in Figure 9. The trend presented in Figure 10 demonstrates how little recent growth there has been in exploration and development activities. Since 1990, only 417 oil wells have been drilled with some years having as few as four oil wells drilled. In the past decade, there have only been 89 oil wells drilled in Ontario with a total of only 60,514 metres drilled.

Figure 10: Oil Wells Drilled in Ontario since 1990

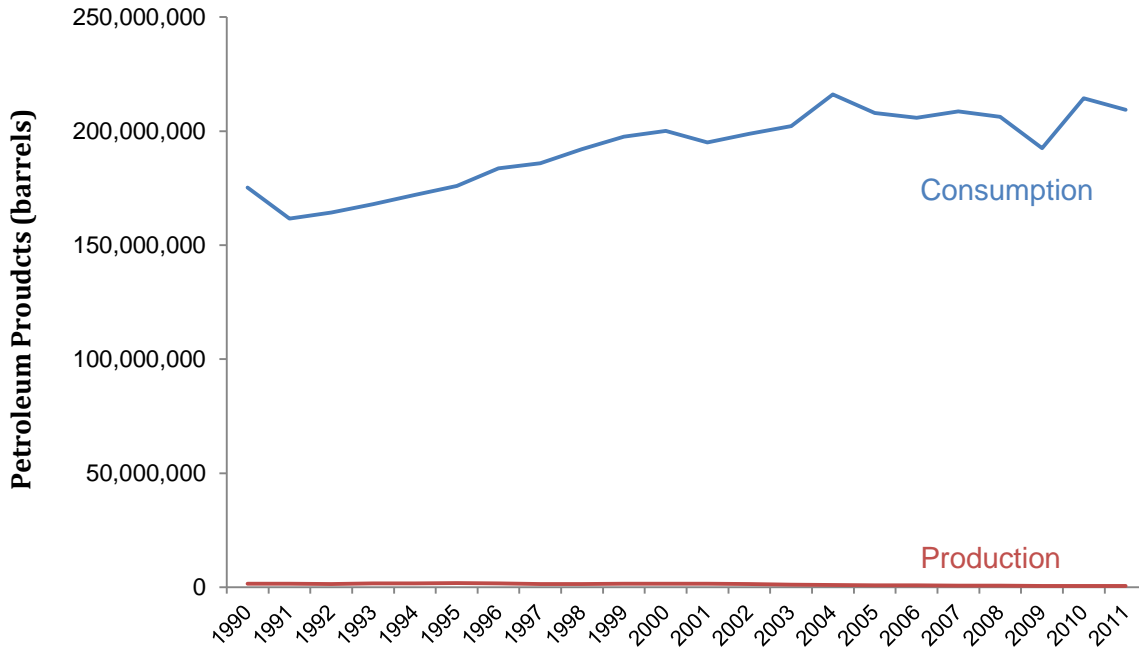


Source: OPI Well Data

Note: This graph represents all wells for oil production (OP), oil production and gas production (OPGP), oil show (OS), and oil show and gas show (OSGS)

While production in Ontario has declined, consumption of petroleum products has continued to rise. With population increases in urban centres there has been growing demand for automobiles and the commensurate increase in demand for gasoline. Figure 11 depicts the disparity between domestic Ontario production and consumption. In fact, Ontario production only meets about 0.25% of provincial demand. However, what is noteworthy from this data is that back in 1990 domestic production was able to meet 1% of Ontario demand. The remainder of Ontario’s oil demand is mostly met by supply from Western or Eastern Canada and abroad.

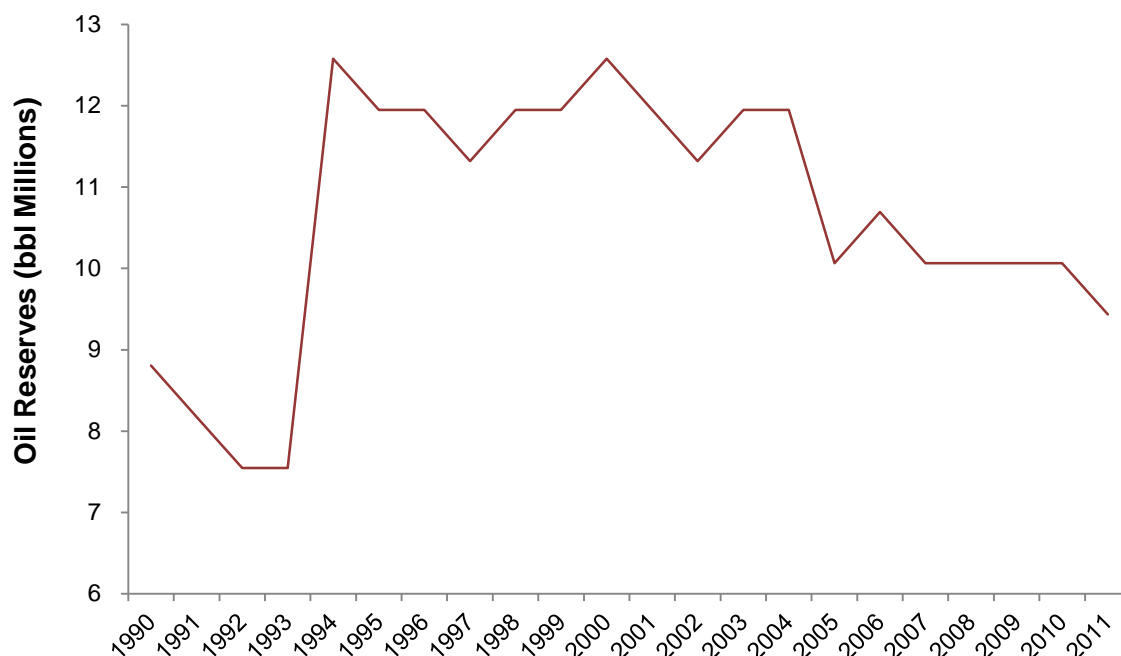
Figure 11: Oil production and consumption in Ontario



Source: Statistics Canada (Energy Statistics Handbook); Ontario Oil, Gas, & Salt Resources Library

As a result of continued production combined with the reduction in drilling exploration and development wells, the provincial reserves of oil have been falling. Figure 12 depicts the downward trend in the closing annual stock of the proven crude oil reserves in Ontario as estimated by the National Energy Board. At the average annual rates of production, the current usable Ontario reserves would be less than twenty years. The undiscovered potential for the province is far greater than this estimate but exploitation of this is beyond current rates of development with the capital currently employed in the sector.

Figure 12: Ontario Oil Reserves



Source: Statistics Canada (Table 153-0013); National Energy Board

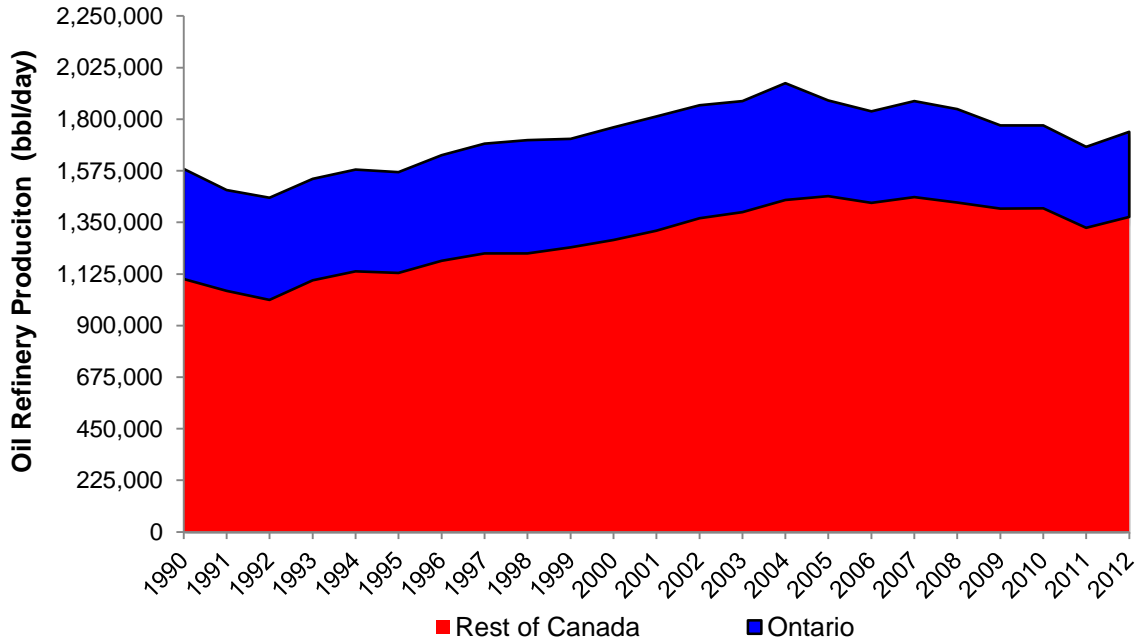
A further source of economic activity from oil production in Ontario is the refining of petroleum products. There are five active oil refineries in the province, which refine oil produced in Ontario as well as that transported from western Canada. Table 1 lists the key information describing these five refineries. The total capacity in Ontario represents about 12% of the total Canadian capacity and ranks third in the country behind Alberta and Quebec. Figure 13 depicts the trend in refinery production in Ontario with comparison to total Canadian refinery production. In 2012, production from the four Ontario refineries was 21% of the Canadian total.

Table 1: Refineries in Ontario – 2012

Refinery	Owner	Established	Crude Capacity (bbl/day)	Employees
Sarnia - Imperial Oil	Imperial Oil	1897	121,000	1,000
Nanticoke	Imperial Oil	1978	112,000	300
Sarnia - Suncor	Suncor Energy	1953	85,000	900
Corunna – Nova	Nova Chemicals	1978	125,000	495
Corunna	Shell Energy	1952	100,000	350

Source: CAPP; Environment Canada.

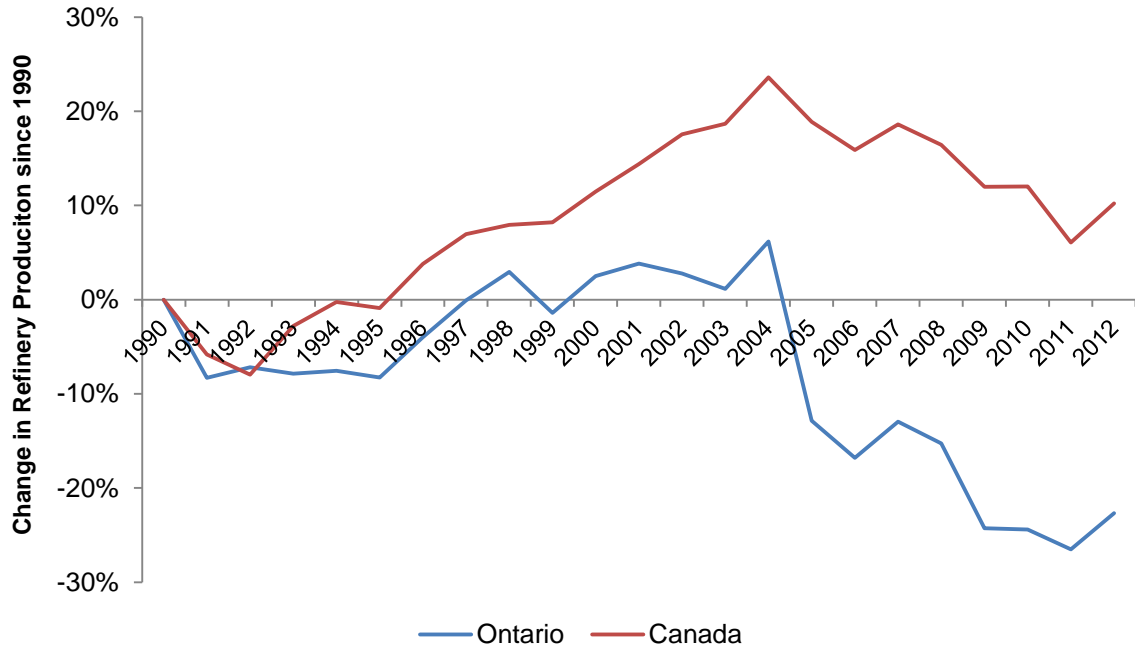
Figure 13: Oil Refinery Production



Source: Canadian Association of Petroleum Producers

The refining capacity in Ontario is an important sign of the overall Canadian mix of value added activities in the oil and gas sector. However, despite growing production in the country the quantity refined in Ontario has declined steadily since 1990. Figure 14 depicts the change over time and illustrates the stark changes between Ontario and Canada. While Canadian refinery production is 10% above 1990 levels, production in Ontario has declined by 23%. This decline is partly explained by a substantial reduction in capacity following the closure of two refining facilities.

Figure 14: Change in Refinery Production in Canada and Ontario since 1990

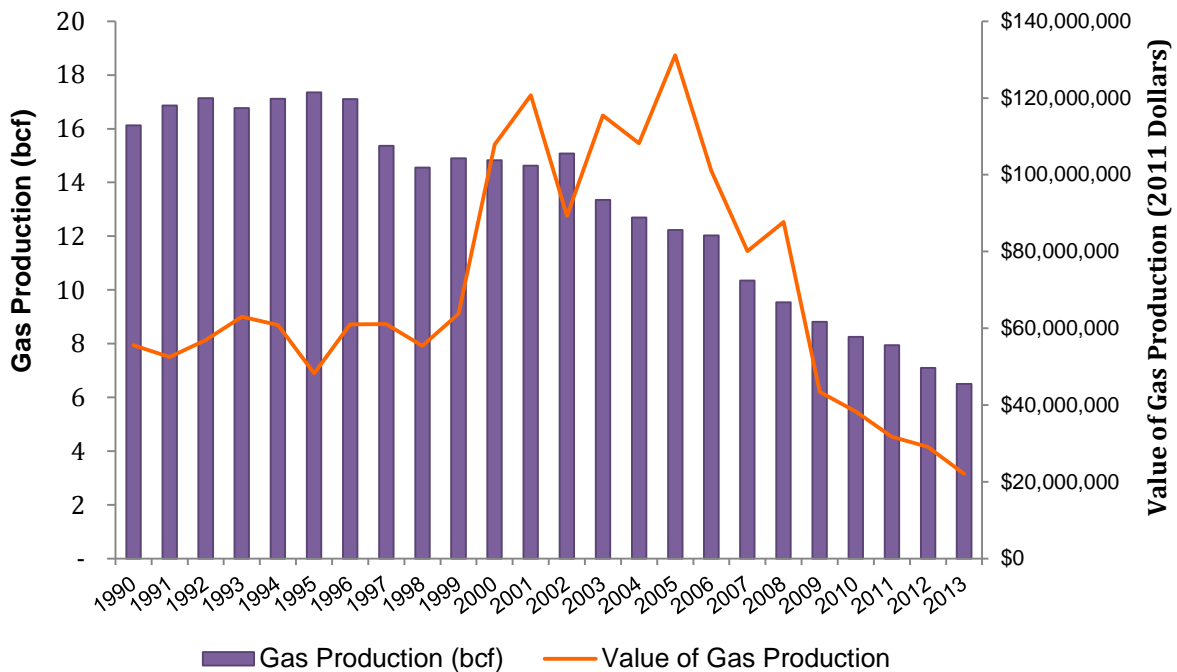


Source: Canadian Association of Petroleum Producers

ii. Natural Gas Production

Similar to the production of oil, Ontario has seen a steady decrease in the production of natural gas. The 2013 production of natural gas was 6.5 bcf, which would account for about 0.8% of total Ontario demand for natural gas. The drop in gas production is strongly correlated with the record low market prices that have resulted from a glut in supply due to the discovery of new shale gas reserves over the past decade. As a result, the value of Ontario gas production has dropped significantly to about \$30 million. Figure 15 depicts these trends since 1990.

Figure 15: Natural Gas Production in Ontario

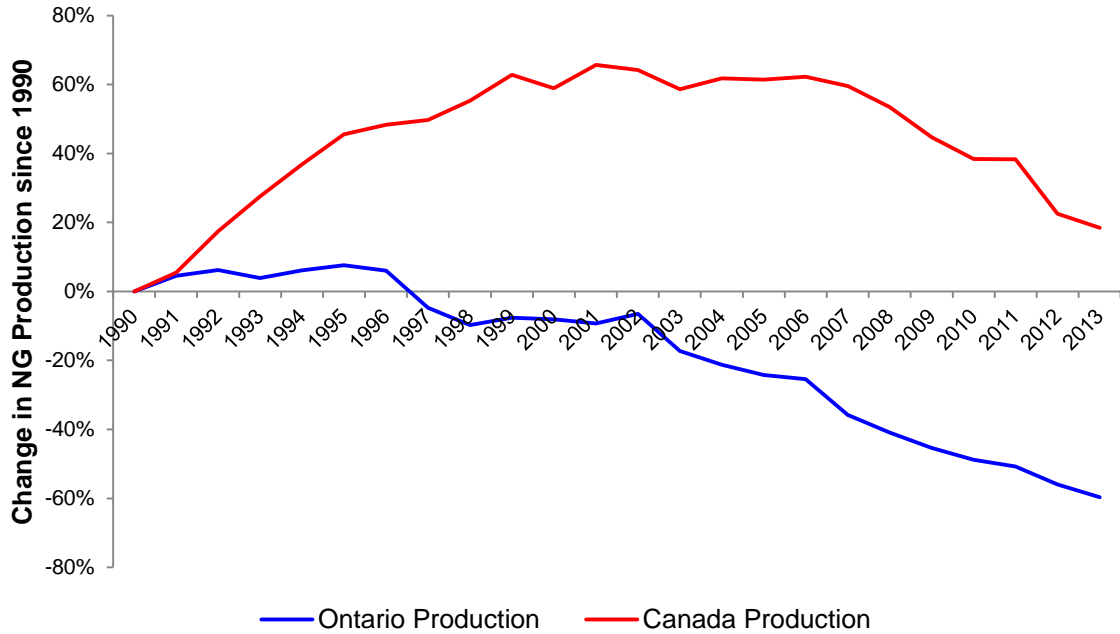


Source: Ontario Oil, Gas, & Salt Resources Library; Prices from National Energy Board

Similar to the decline in oil production, the decline in natural gas production diverges from the national trend. While the drop in natural gas prices has depressed production coast to coast, the decline in Ontario presents a marked difference. This has diminished the contribution that Ontario production has made to the national total. Figure 16 presents the decline in natural gas production since 1990 and offers a comparison to the change seen across Canadian production. A small rise is seen in both followed by the more recent drop in production that is timed with the growth of shale gas reserves. However, the dramatic decline observed in Ontario is remarkably different from that at the national level. Figure 17 demonstrates how

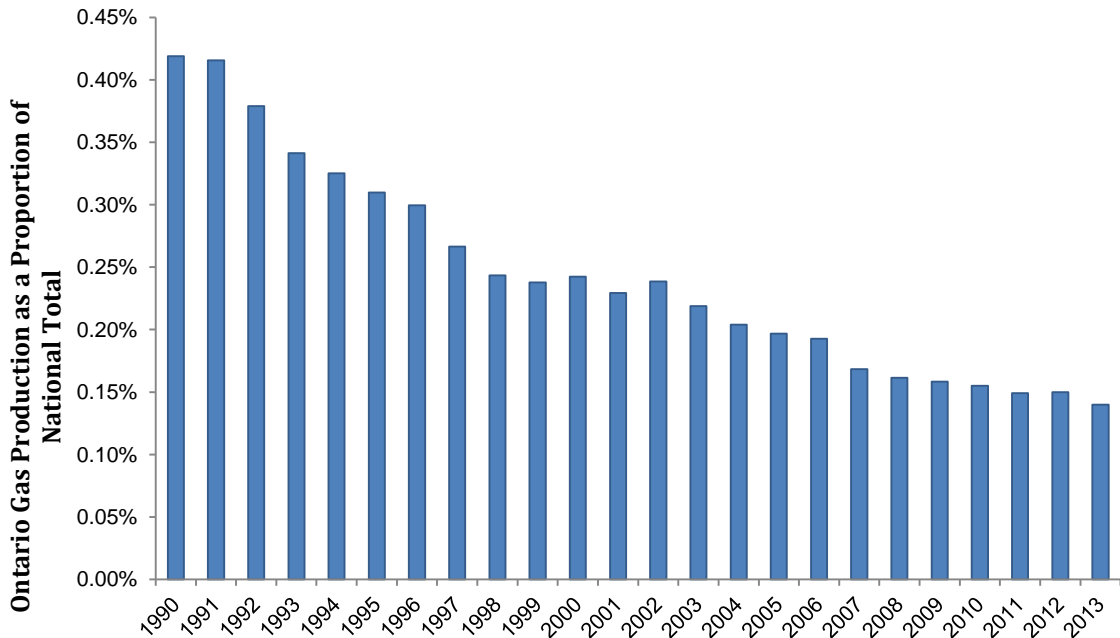
Ontario production has lowered to less than 0.2% of total Canadian natural gas production.

Figure 16: Change in NG Production in Canada and Ontario since 1990



Source: Ontario Oil, Gas, & Salt Resources Library; Canadian Production from National Energy Board

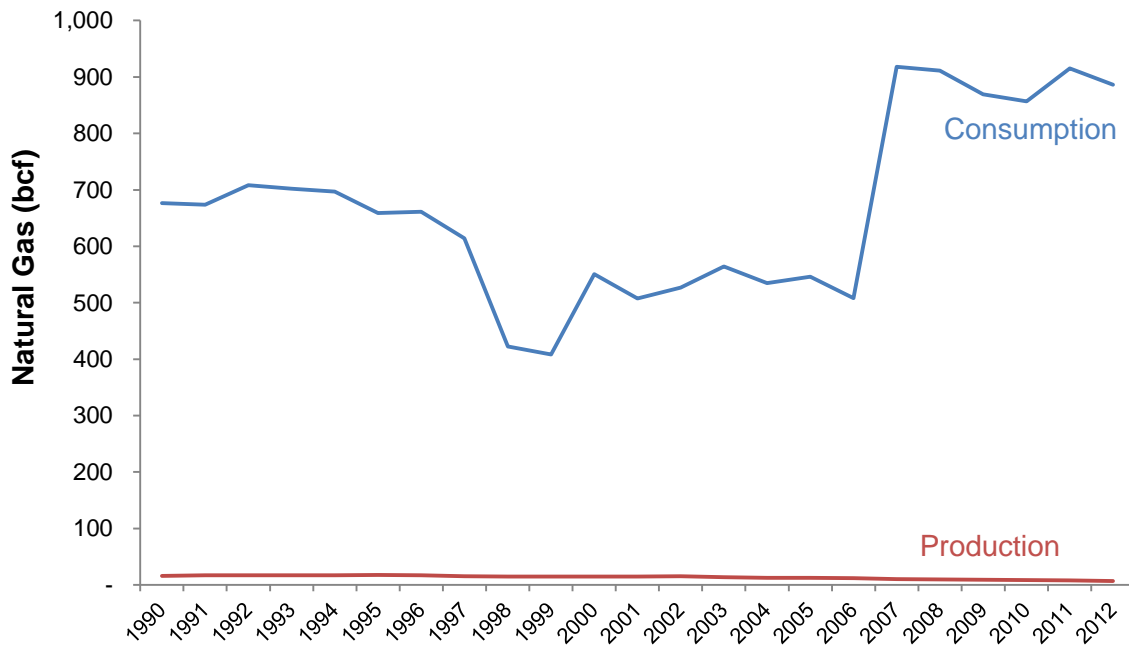
Figure 17: Ontario Gas Production as a Proportion of the National Total



Source: Ontario Oil, Gas, & Salt Resources Library; Canadian Production from National Energy Board

While production has dropped, consumption in Ontario has steadily increased. This has been a result of increased adoption of natural gas furnaces and the construction of combined cycle electricity generating plants that use natural gas as the primary fuel. Figure 18 depicts the trend in Ontario consumption relative to in-province production. By 2012, consumers in the province were importing 879 bcf of natural gas to meet the vast majority of their needs. This represents about 125 times the volume of natural gas produced in Ontario. The remainder of Ontario’s demand is supplied from Western Canada and U.S. sources.

Figure 18: Natural Gas production and consumption in Ontario

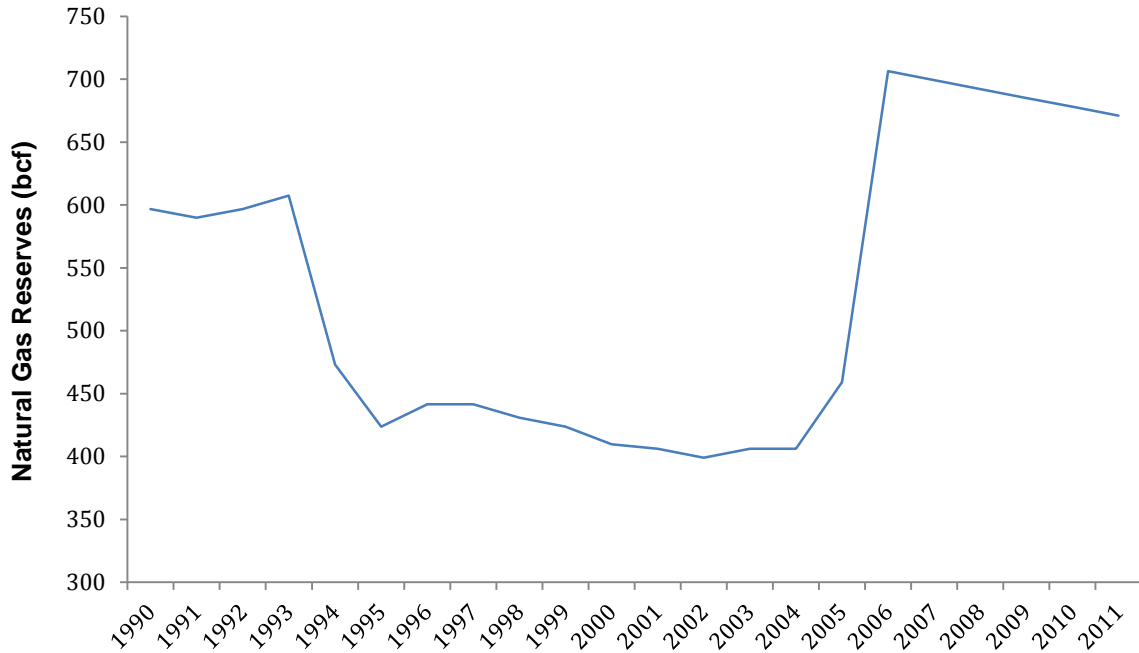


Source: Statistics Canada (CANSIM Table 129-0003); Ontario Oil, Gas, & Salt Resources Library

Despite the recent drop in the production of natural gas, Ontario is endowed with abundant natural gas resources. As of 2011, the closing stock, established natural gas reserves was about 670 bcf. Therefore, at current rates of production there would be approximately a century of production remaining. Figure 19 depicts the trend over the past two decades. Most identifiable is a 53% increase in the estimated reserves in 2006. This coincides with an increase in the drilling of new gas wells just after the turn of the millennium. Not surprisingly this increased trend in the size of the provincial reserve drops as the drilling of wells has decreased substantially. Nevertheless, the long-term potential of the natural gas resources in

the province is significant and opportunities remain to develop the province's established reserves with further exploration. In addition, estimates of potential undiscovered natural gas reserves stand at about 462 bcf and would substantially increase the province's potential for natural gas production.

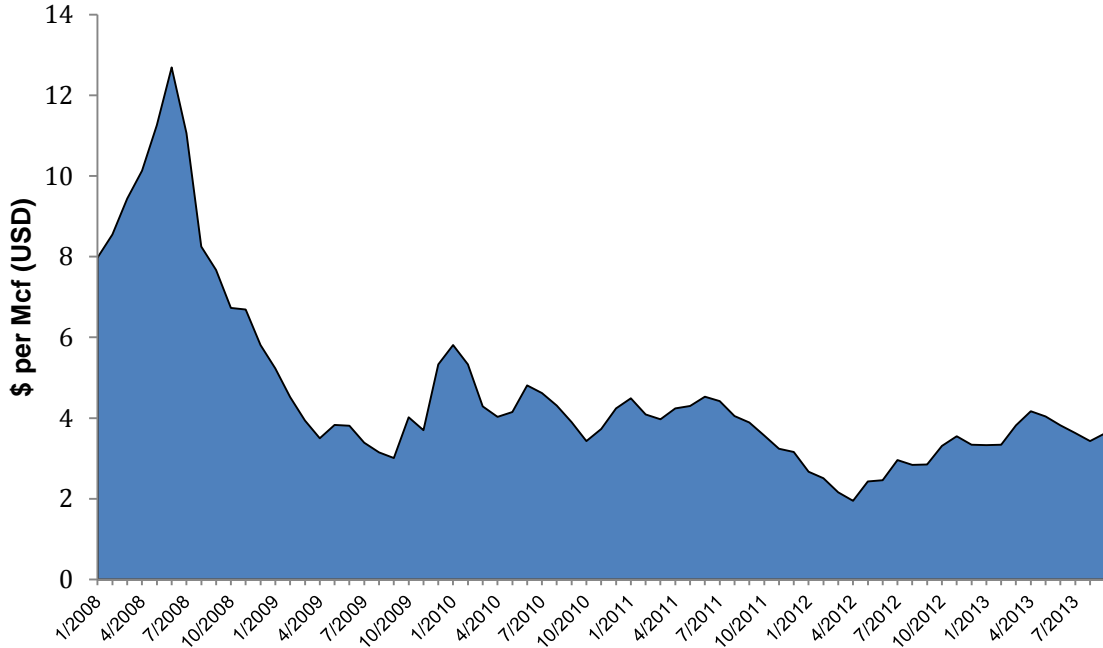
Figure 19: Ontario Natural Gas Reserves



Source: Statistics Canada (Table 153-0014); National Energy Board

A major reason for the decrease in production is the record low costs of natural gas. Increased shale gas production in the United States combined with the global recession kept natural gas prices below mid-decade levels through to the present. Despite declining Canadian production, North American gas production increased in 2012 due to a significant increase of 3.1 billion cubic feet (Bcf) per day in the U.S. Forecast of future prices remain positive before; however changes to the Ontario marketplace including the potential reversal of pipelines can have a longer term impact on supply and prices. Figure 20 presents the pricing trends of natural gas.

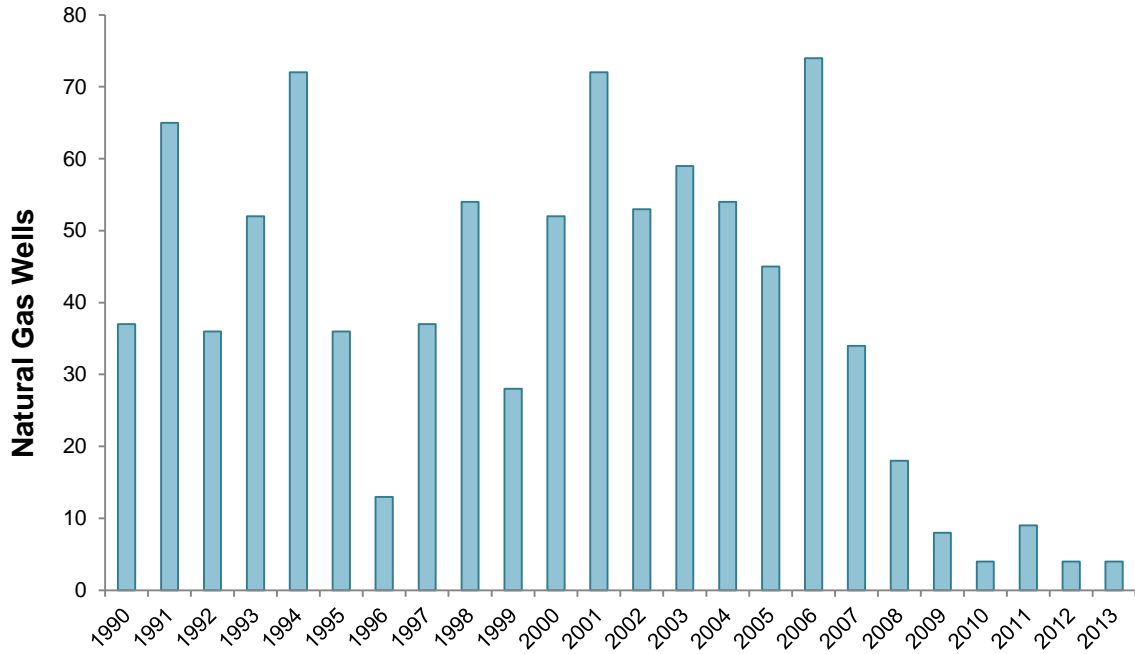
Figure 20: Natural Gas Prices



Source: Canadian Gas Association

In addition to the downward pressure on production that has come from lower natural gas prices, there has also been limited growth in the exploration and development of new natural gas wells. While the drilling of natural gas wells has been more prevalent than oil as we have seen over 900 wells drilled since 1990, it has slowed down substantially in the past four years. Figure 21 depicts the trend of natural gas well exploration and development. Over the past few years less than 5 wells have been drilled for natural gas and over the past decade only 120,656 metres have been drilled for this purpose. The trend, once again, demonstrates how vibrant the Ontario natural gas sector once was and the potential for it to return to this degree of investment given the right circumstances.

Figure 21: Natural Gas Wells Drilled in Ontario since 1990



Source: OPI Well Data

Note: This graph represents all wells for gas production (GP), oil production and gas production (OPGP), gas show (GS), and oil show and gas show (OSGS).

iii. Storage

Ontario provides substantial storage capacity for energy products. These include storage pools for (i) natural gas and (ii) liquefied petroleum gas. These facilities are essential to the economic success of the oil and gas sector in the province and help distinguish it from other jurisdictions.

Table 2 presents the natural gas pools in the province and their working capacity. The total working capacity of the natural gas storage in the province is 258.4 bcf with pools activated as recently as 2009. Of particular note is Union Gas' Dawn Hub, the largest underground storage facility in Canada, which is located in Lambton County. The Dawn Hub facility has 155 bcf of high deliverability storage with interconnectivity to numerous pipelines. This helps link the Ontario market to the movement of natural gas from western Canadian and American supply basins to markets in central Canada, the Great Lakes region and the northeast U.S. In addition, the Dawn Hub has consistently offered a premium price for natural gas as compared to the other major North American hubs. For instance, the October 2013 average price for natural gas at the Dawn Hub was US\$4.04/Mcf as compared to US\$2.81/Mcf at the Intra-Alberta Hub.

Table 2: Natural Gas Storage Pools in Ontario - 2012

Operator	County	Wells	Working Capacity at Delta Pressure (Bcf)
Union Gas	Lambton	151	149.7
Enbridge Energy Distribution	Lambton/Welland/Kent	119	100.3
Sarnia Airport Storage Pool	Lambton	5	5.3
Huron Tipperary Limited Partners	Huron	9	2.9
Market Hub Partners	Lambton	2	1.1

Source: Ontario Oil, Gas, & Salt Resources Library

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In addition, to natural gas storage Ontario has 70 salt caverns that are used to store liquefied petroleum gas. These are co-located by the refineries and chemical operations in Lambton and Essex County. These caverns are used for temporary storage and play a critical role in the sector's performance. At current prices, if the caverns were filled to capacity the contents would be valued at around \$2.5 billion. Table 3 presents the salt caverns by operator and their capacity.

Table 3: Salt Cavern Storage for Liquefied Petroleum Gas in Ontario - 2012

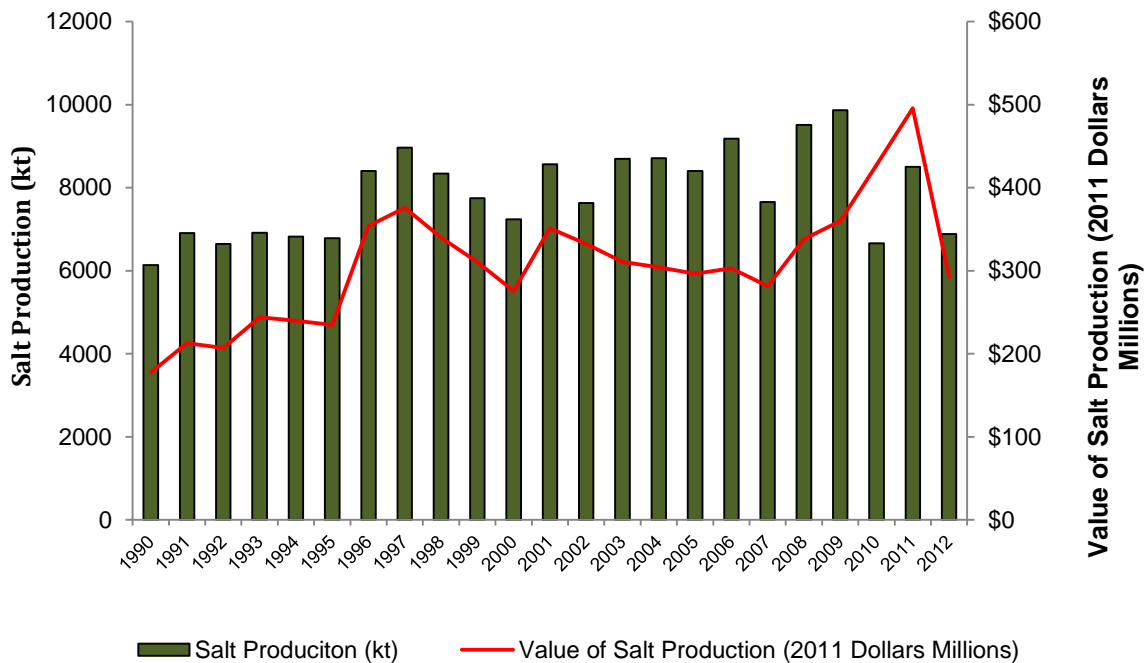
Operator	County	Caverns	Capacity (bbl)
Plains Midstream	Lambton/ Essex	27	12,603,273
Spectra Energy Empress LP	Lambton	11	7,013,979
Imperial Oil	Lambton	8	2,226,660
Nova Chemicals	Lambton	6	2,037,960
Suncor Energy Products Partnership	Lambton	9	1,547,340
LANXESS Inc.	Lambton	5	830,280
Shell Canada	Lambton	4	622,710

Source: Ontario Oil, Gas, & Salt Resources Library

iv. Salt Solution-Mining

Beyond oil and gas exploration and production, Ontario supports a vibrant salt solution-mining sector located along the shores of lakes Huron and Erie. The salt production in Ontario is used for human consumption and for the production of sodium and chlorine-based chemicals. Ontario’s salt production represents close to two-thirds of Canada’s production of salt, which positions it 5th in global salt production. The greatest activity is at sites in Essex and Huron county. Most notably is the world’s largest salt mine in Goderich, which is owned by Sifto Canada. This mine produces around 7 million tons of salt annually. Figure 22 depicts salt production in Ontario and the value of the output. As demonstrated, production has consistently moved up over the years with the value peaking at around \$500 million in 2011.

Figure 22: Salt Production in Ontario

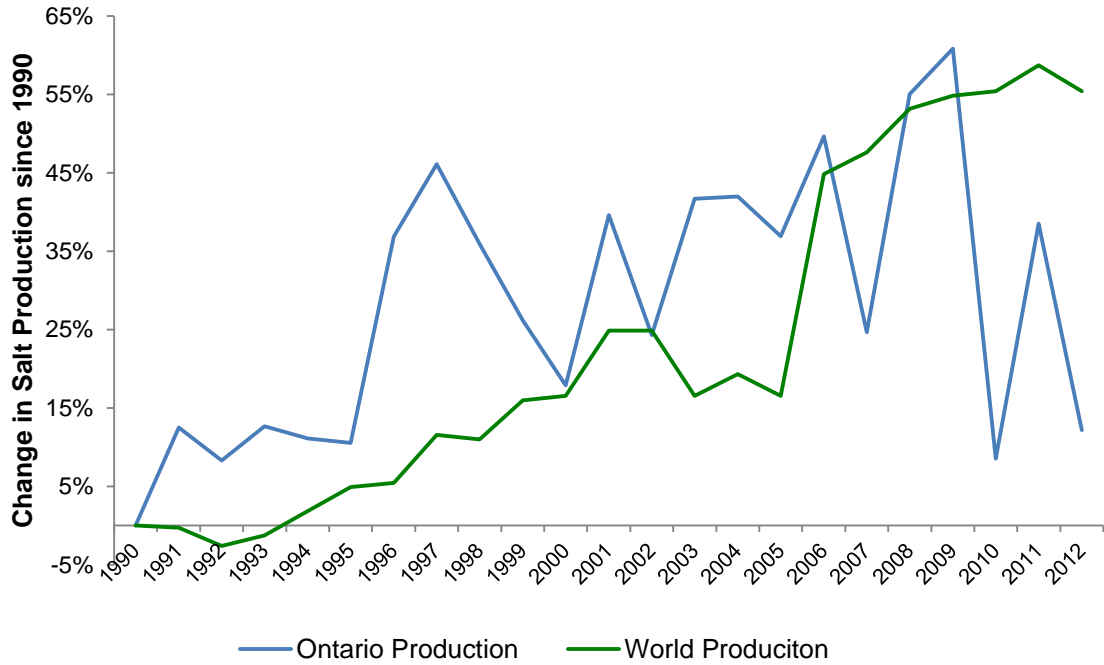


Source: Natural Resources Canada – Canadian Minerals Yearbook

Figure 23 illustrates the growth in salt production in Ontario as compared to the world production. As global demand for salt rises, especially in Asian markets, Ontario producers have kept pace. Peaking in 2009 with production levels 60% greater than in 1990. Sustained growth has come from consistent industry

reinvestment, such as approximately \$85 million since 2006. Declined production in 2011 and 2012 were a result of natural disaster and labour dispute.

Figure 23: Change in Salt Production in the World and Ontario since 1990

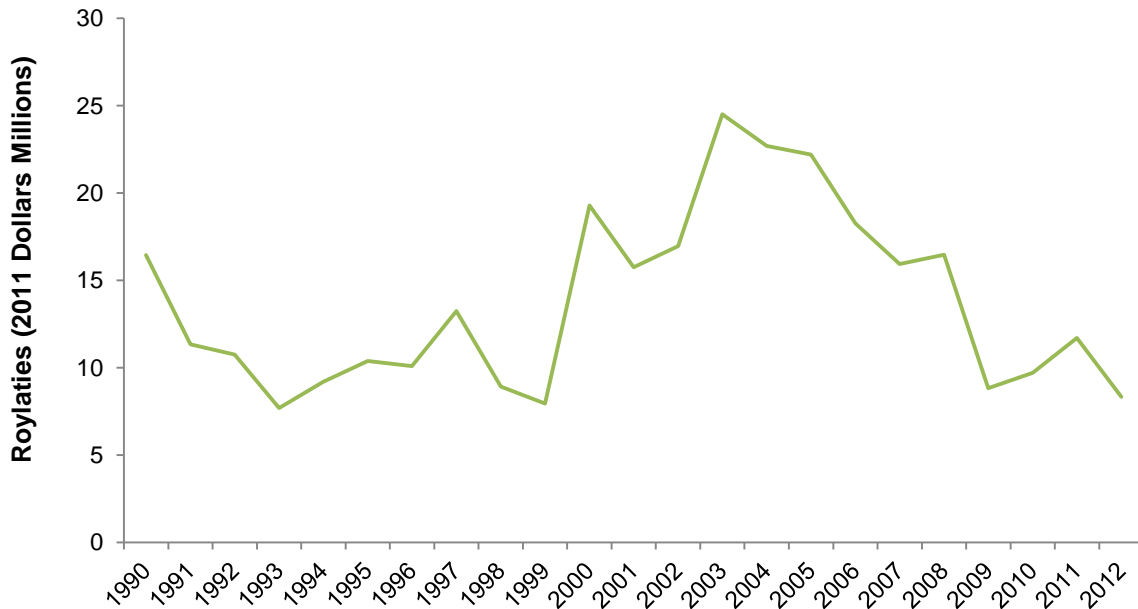


Source: Natural Resources Canada – Canadian Minerals Yearbook; United States Geological Survey

v. Royalty Benefits

Beyond the direct benefits from economic activity, the oil and gas sector provides significant payments to the province and landowners in the form of royalties and taxes. Since 1990, over \$350 million in royalties have flowed into the province from the sector's royalty payments. Figure 24 depicts the trend of these royalty payments over the years (net any incentive credits provided public agencies). Not surprisingly as production and development slowed in the last few years so has these royalties. Nonetheless, the potential to produce revenue for the province is apparent. These royalties are above any corporate or property taxes paid by the industry or other income that generate additional income tax revenues. For instance, since 1990 the sector has invested in over \$60 million in land, which brings with a commensurate amount of revenue for landowners and governments.

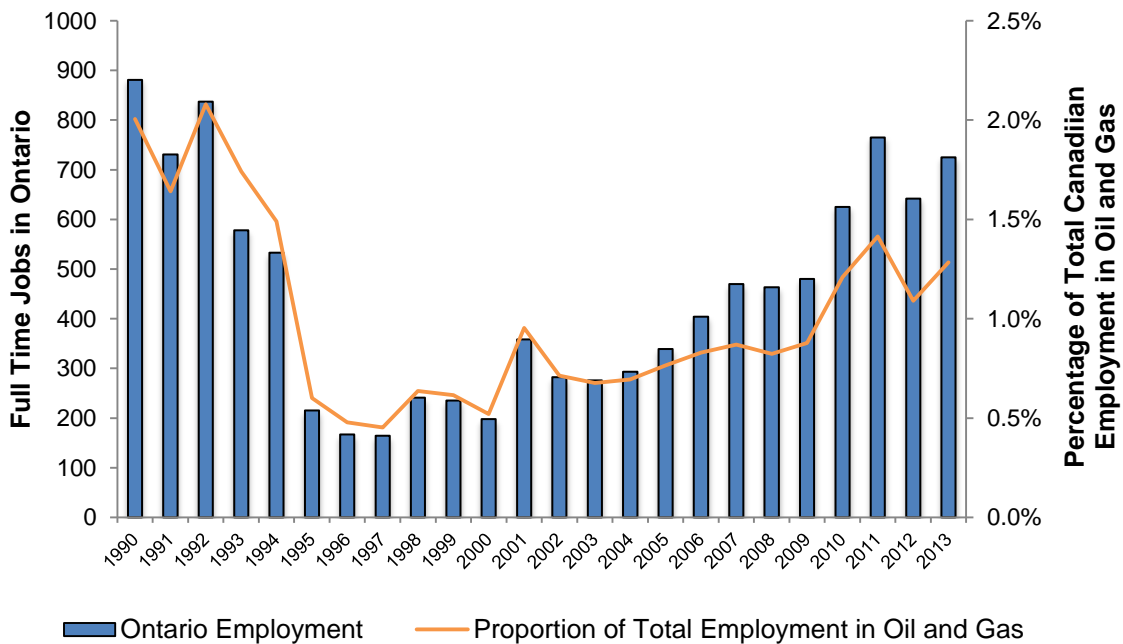
Figure 24: Royalty Payments by the Ontario Oil and Gas Sector



IV Employment and Productivity

As of 2013, the Ontario oil and gas exploration and development sector directly supported about 700 full-time jobs in the province. As depicted in Figure 25, this number represented an increase over the past decade and substantially more than the number of full time employees in the early 2000s. However, some caution should be noted due to the substantial decline from the early 1990s. In fact, in the early 1980s the sector supported over 1,200 full-time employees. Similarly, as the number of jobs in the sector has declined so has the proportion of the total national number of jobs in the oil and gas sector, which has averaged at about 1.0%. Of particular note, however, is that these data do not include the close to 3,000 full-time employees in the province’s five refineries (presented in Table 1 above).

Figure 25: Full-Time Employment in the Ontario Oil and Gas Exploration & Production sector



Source: Statistics Canada (Survey of Employment, Payrolls, and Hours)

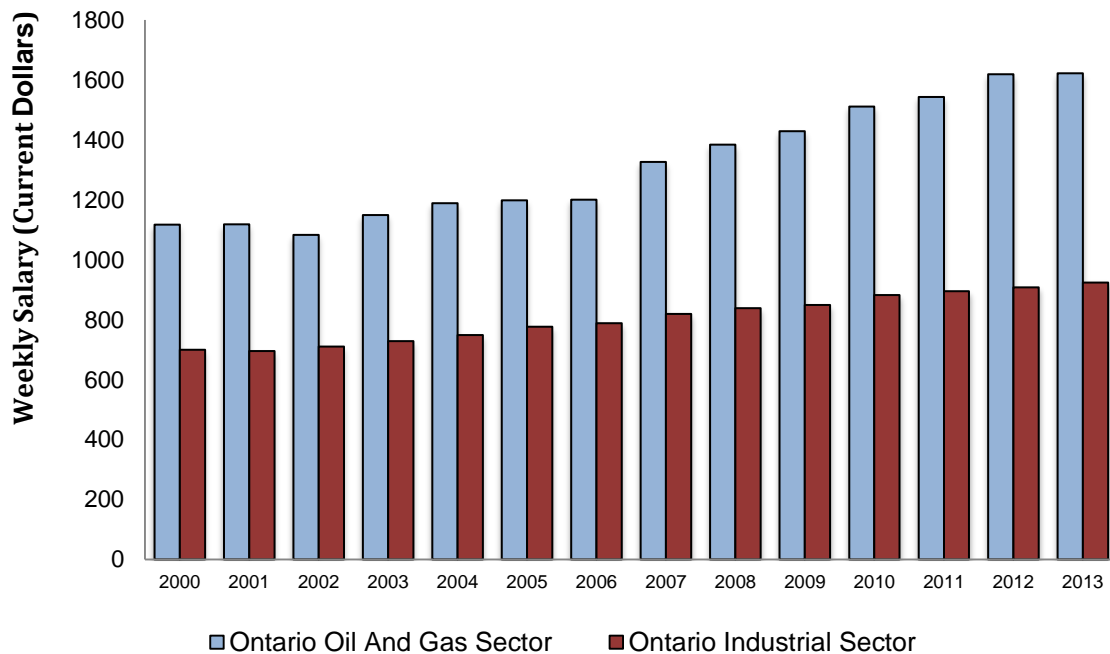
Beyond those directly employed in the Ontario oil and gas sector are those that provide support services and activities. These are beyond those captured in Figure 25 and can include those employed to provide services to oil fields, drilling operations, and machinery. Based on estimates of these supporting activities, for

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each full-time position in sector there would be an additional position offering support activities for oil and gas extraction. This would double the number of jobs in sector to approximately 1,500 positions. In addition, there are those professional services firms, such as lawyers, real estate, accountants, and financial services, which are essential to supporting the industry. This is well demonstrated in the diverse membership of the OPI that includes many of these supporting sectors. Furthermore, it is important to note that the location for these jobs are mainly in southwestern Ontario where unemployment rates peaked at close to 12% and have consistently remained far above the national rate for the past decade. In sum, there are about 4,500 full time employees directly involved in Ontario's oil and gas sector.

The full time positions in the Ontario oil and gas sector tend to be well-paying jobs that exceed the average industrial position in the province. Figure 26 depicts the trend in average weekly salary of those employed in the sector versus those in the broader industrial sector. By 2013, the oil and gas jobs were paid a 75% premium over the average industrial job in the province. It must be noted that these are average figures based on salary, not wage, data and include a wide group of employee classes.

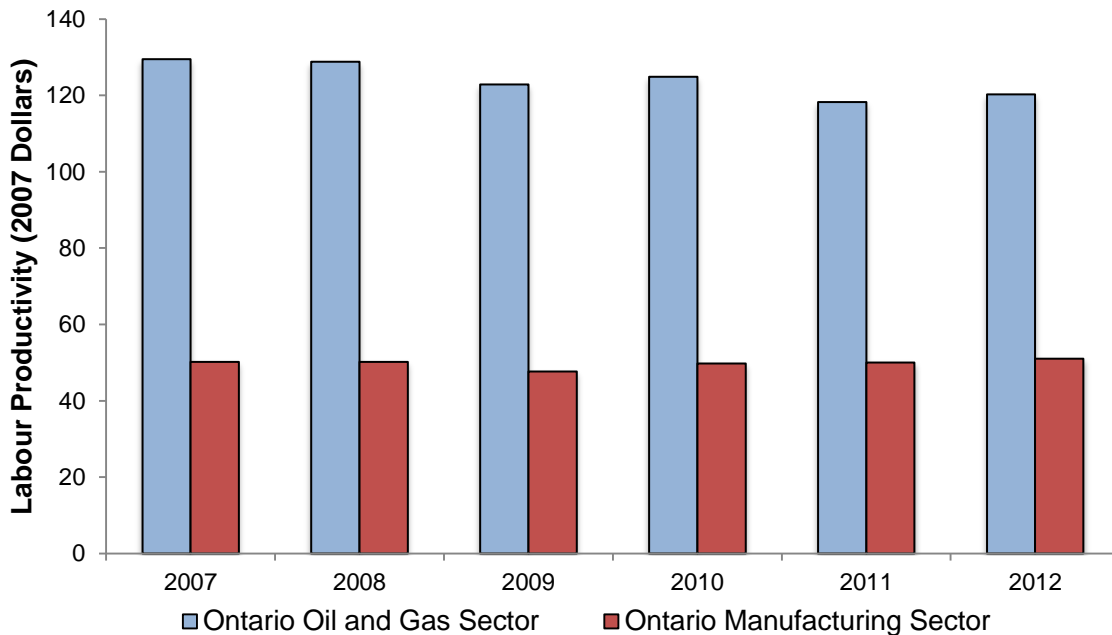
Figure 26: Comparison of Weekly Salary in Ontario Oil and Gas and Industrial Sectors



Source: Statistics Canada (Survey of Employment, Payrolls, and Hours)

Based on labour productivity measures, the Ontario oil and gas sector is highly productive. This is a result of both sustained investment in technology and human capital, as well the high value placed on the oil and gas in our economy. Figure 27 depicts the output or GDP of the sector per hour worked. While productivity has decreased slightly over the past few years it is more than double that of Ontario’s manufacturing sector. This implies that the province could be well served by a reallocation of skilled labour from southwestern Ontario’s historically large manufacturing sector to oil and gas extraction.

Figure 27: Comparison of Labour Productivity in Ontario Oil and Gas and Manufacturing Sectors

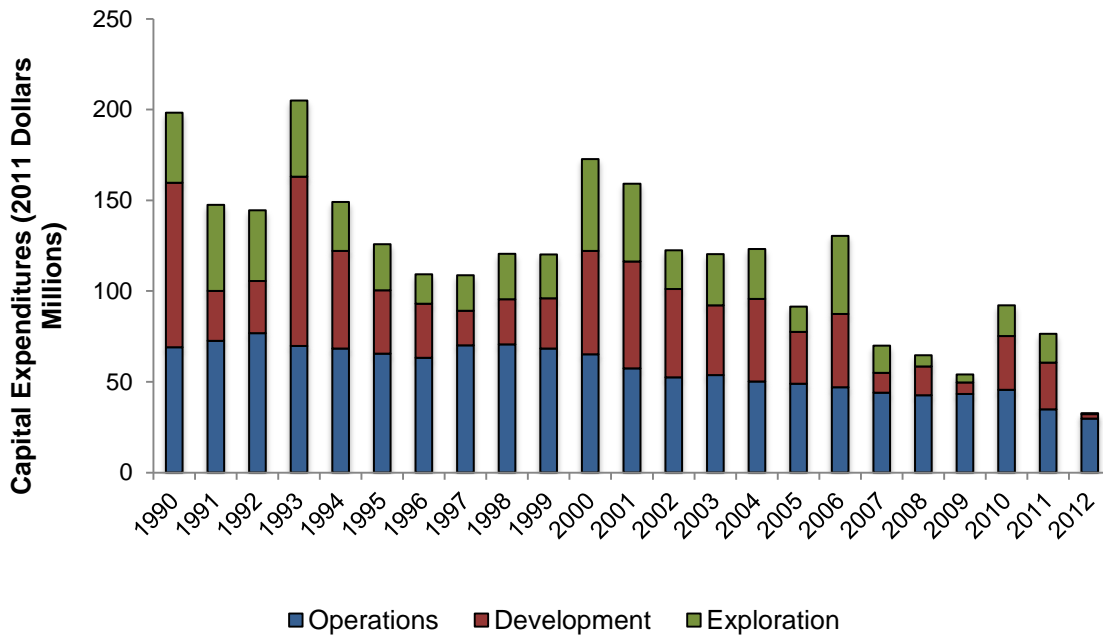


Source: Statistics Canada (Labour Productivity Measures)

The source of these productivity gains lie at the quality of labour and technology used by the oil and gas sector in Ontario. As depicted in Figure 28, the sector has consistently invested in developing the resource as represented by sustained capital expenditures. However, the decline that is illustrated is consistent with the slow down in production as was illustrated above. Most concerning in this figure is the

limited investment that has been made in exploration and development, which is necessary for future growth of the sector.

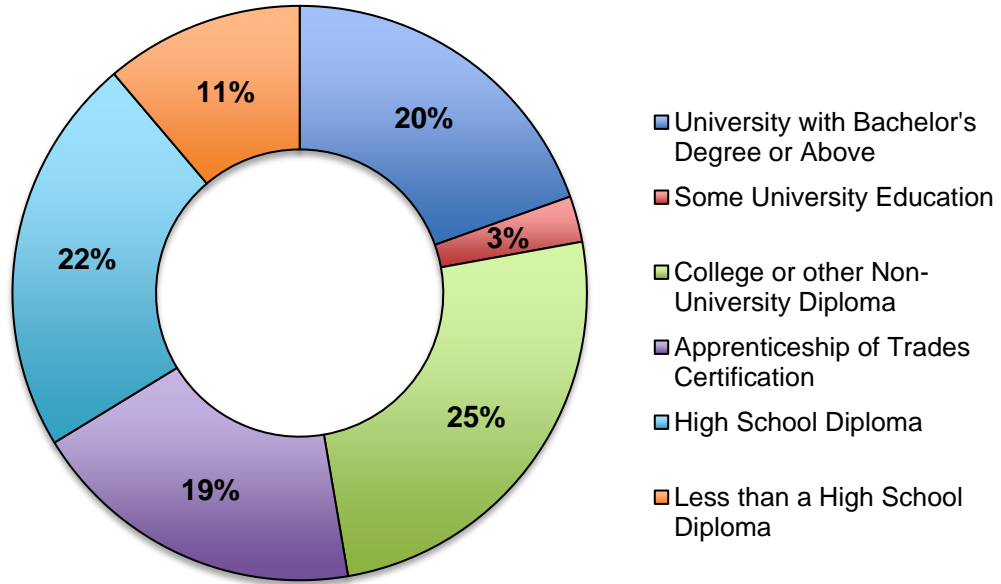
Figure 28: Capital Expenditure in the Ontario Oil and Gas Sector



Source: Canadian Association of Petroleum Producers

A further strength of the oil and gas sector in Ontario is the quality of labour employed. This is likely due to the historical role of the sector in southwestern Ontario and the post-secondary educational institutions that are co-located. Figure 29 highlights how the vast majority of the labour force in the sector have received higher education and/or specialized training. In fact, two-thirds of the labour force in the sector has greater than a high school diploma. This attribute further distinguishes the sector from others in the province and partially explains both the higher levels of productivity and compensation that were noted above.

Figure 29: Levels of Educational Attainment in the Ontario Oil and Gas Sector - 2011

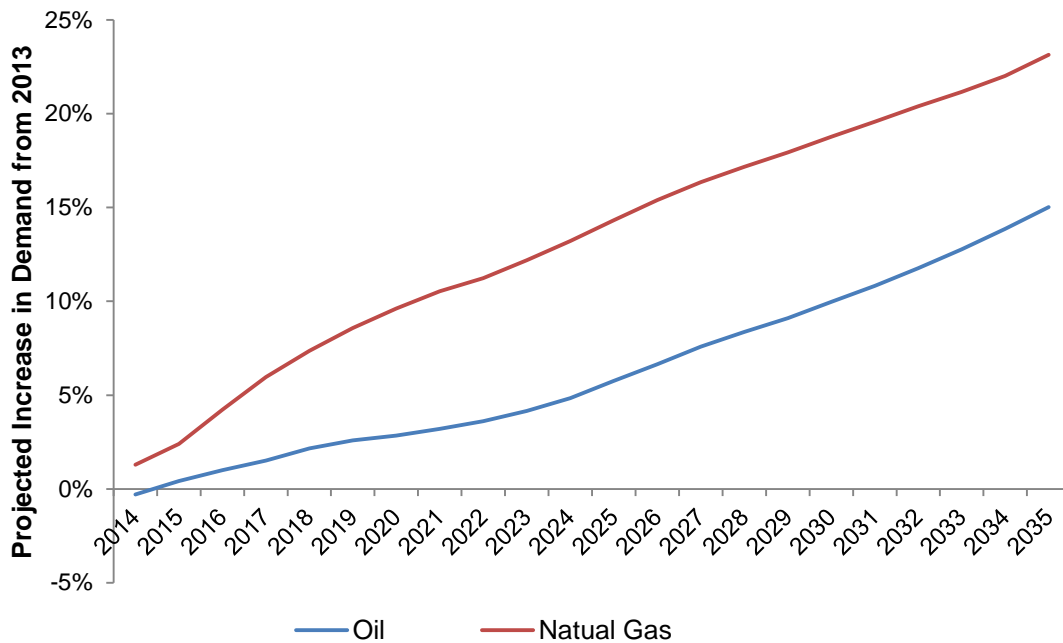


Source: Statistics Canada (2011 National Household Survey)

V Future Trends

The direction for the industry in the province is mixed. Clearly, the salt resources sector will continue to grow as demand and production capacity continue to expand. On the other hand, the recent slow down in the exploration and development of oil and gas in the province will make expansion in the near-term a challenge. This is coupled with dwindling reserves of oil in the province. Nevertheless, demand in the province for oil and gas is expected to continue to grow for the next 15 years. Figure 30 depicts the reference outlook as estimated by the National Energy Board.

Figure 30: Projected Growth in Ontario Demand for Oil and Natural Gas from 2013



Source: National Energy Board (Canada’s Energy Future, 2013)

Of particular note, is the substantial expansion in demand for natural gas in the province. The source of this demand is driven by (i) the choice of the province to abandon coal burning power plants and shift attention to natural gas peaking plants for electric generation and (ii) to increased penetration of natural gas heating for residential and commercial use. Despite recent political controversy surrounding the siting of natural gas plants, the necessity to increase flexible generation will

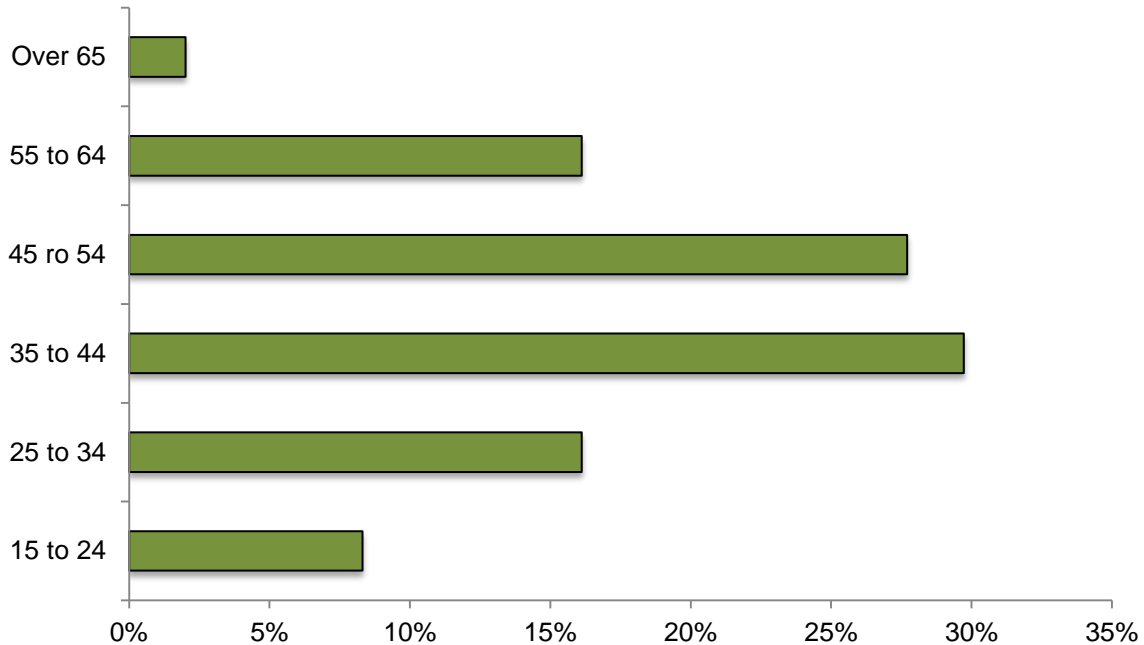
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continue to fuel demand for natural gas. This is coupled with the substantial investment that has been made in gas pipeline and distribution infrastructure in the province by local distribution companies, including well over 60,000 kilometers of pipeline. This dynamic provides motivation for greater exploration and production at levels more in line with that of the earlier 1990s when gas production was double that of current production.

The growing demand for natural gas and potential for increases in production will likely be accompanied by greater demand for natural gas storage. Since 2008, nineteen active natural gas storage wells have been drilled, primarily by Union Gas and Enbridge Gas Distribution. Given the increasing demand for natural gas and the geographic locale of the source for these wells there will likely be continued demand and a strong economic case for the drilling of additional storage wells.

An important strength of the oil and gas sector in Ontario has been a high quality labour force that has contributed to productivity gains and overall success. Like most other sectors in the Ontario economy, the labour force is aging and the continued performance is contingent on younger cohorts moving in and up within organizations. However, this is a particular strength of the sector as the demographic profile is well balanced and depicts a more traditional pyramid like structure where the middle 35 to 44 and 45 to 54 years old categories are most densely populated. Figure 31 highlights the demographic composition of the workforce. Nevertheless, attracting and retaining skilled labour to the sector will continue to be a challenge as tremendous expansion of the western Canadian oil and gas sector continues to draw labour from throughout the country.

Figure 31: Demographic Profile of the Ontario Oil and Gas Sector -2011



Source: Statistics Canada (National Household Survey, 2011)

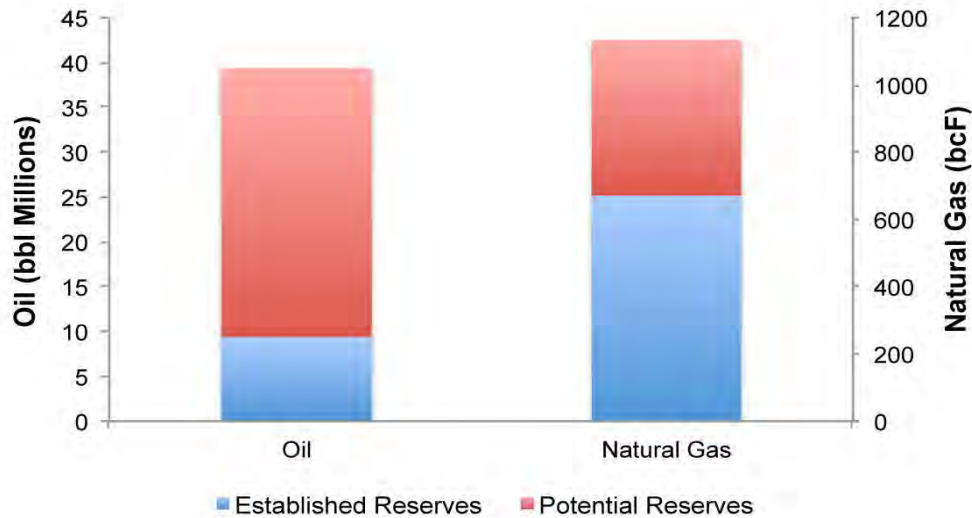
Environmental concerns remain a key consideration for policymakers and consumers alike. The moratorium on coal burning electric generation plants leaves the province’s oil and gas sector as the last remaining fossil fuel focused sector. The Ontario government has made some ambitious environmental commitments that can have a direct impact on the sector. These include a reduction of green house gas emission by six per cent below 1990 levels by 2014, 15 per cent by 2020 and 80 per cent by 2050. The initiatives that may most encumber the oil and gas sector is the creation of a cap-and-trade system, which will place an additional cost on greenhouse gas intensive industries, and a series of new reporting requirements, such as the disclosure of greenhouse gas emission data.

Finally, the potential for further growth in oil and gas exploration and development should be great as a significant share of Ontario’s reserves has yet to be developed. Studies of the potential for both the Ordovician and Cambrian plays have demonstrated vast opportunities for further growth beyond what current proven reserves have been identified. Figure 32 depicts the potential reserves relative to those remaining established reserves. In the case of oil, studies estimate that there are 320% more reserves that potentially remain in the ground and have yet to be

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explored. While for natural gas there are roughly 70% more potential reserves available. This vast potential provides significant incentive for both incumbent players and new entrants that are seeking to invest and develop Ontario's resource.

Figure 32: Established and Potential Reserves of Oil and Natural Gas



Source: Ontario Oil, Gas, & Salt Resources Library; Bailey and Cochrane (1984)

VI Concluding Remarks

This economic profile demonstrates that the Ontario Oil, Gas, and Salt Resources sector has gone through various cycles of development over the past twenty years. The economic production of the oil and gas exploration and development side of the sector is currently at historic lows, while the salt production element of the sector continues to thrive as a result of large natural endowments and significant reinvestment of capital.

While the trajectory for the salt-side of the sector has been shored up for years to come the same cannot be said for the oil and gas sector. A return to pre-2000 levels of production and the reemergence of a vibrant sector does face some significant challenges, such as low natural gas prices and low levels of invested capital, yet as established in this profile the foundation for this return is still likely. Many key elements for the sector's success are in place. Most notably is high quality labour that is in the prime working years of 25 to 60 years old. The tacit knowledge and competence that comes with this is otherwise difficult to replace and must be rallied should the sector return to its earlier prominence. However, this labour must be paired with the adequate technology to reach the high productivity levels required to make the sector profitable. Further delay in the comeback of the sector may inhibit its future success, as demand for skilled labour in this sector is growing at a fervent pace in western Canada and the productive assets degrade over time. Nevertheless, the potential for long-term growth for the sector is in place given the vast potential oil and natural gas reserves that have yet to be discovered. Estimates of these potential reserves are 320% and 70% larger than established reserves for oil and natural gas, respectively.

A growing oil and gas sector in Ontario would provide significant benefits to the province. A return to historic high levels could result in at least an additional \$150 million in economic activity in the province. This would lead to growth in high productivity employment in southwestern Ontario where unemployment rates are well above the provincial and national averages and royalties for both public authorities and landowners. However, the sector is currently at a crossroads where further growth and reemergence requires a spark to fuel exploration and development of new production wells. Unlike other forms of energy in the province, the sector has not benefitted from preferential treatment that would otherwise support its growth. Policy options that recognize the historical importance of this

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sector, the distinct skill advantages we currently hold, capital investment in pipeline and refining capacity, and the low-impact benefits to local communities should help fuel the reemergence of the sector.