

**Potential Economic Impacts of Shale Oil and Shale Gas
Development in the Northwest Territories**

Prepared For:

**Department of Industry, Tourism and Investment
Government of the Northwest Territories**

By:

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Executive Summary

Objective

Numerous oil and gas companies have recently expressed interest in developing shale oil and shale gas prospects in the Northwest Territories (NWT). Schlenker Consulting Ltd. was commissioned by The Department of Industry, Tourism and Investment of the Government of the Northwest Territories (GNWT) to **estimate the potential economic impacts of shale oil and shale gas development in the NWT.**

The Oil and Gas Industry in the NWT Economy

Significant oil development and production began in the NWT during the 1980s, with peak production levels of over 30,000 barrels per day between 1998 and 1994. **Territorial oil production has declined by about 50% since the early 1990s and was roughly 15,000 barrels per day in 2010.** Gas production in the NWT has fallen much more severely in recent times, with 2010 territorial gas production (20 million cubic feet per day) being only about 10% of the peak gas production levels that occurred in 2001.

Despite falling production levels, the value of oil and gas production in the NWT over the last 10 years has averaged over \$500 million annually. This can largely be attributed to rapidly rising oil prices since 1999 (and gas prices until 2008) which have offset production declines. However, the decrease in production activity has resulted in a **substantial decline in the proportion of real territorial Gross Domestic Product (GDP) coming from the oil and gas industry in the last decade, falling from about 12% of NWT GDP in 1999 to less than 5% by 2010.**

The industry has also been responsible for a significant portion of investment in the NWT, with exploration and development spending averaging about \$350 million since 1999. This constitutes about one quarter of all investment in the NWT in the last decade. However, with depressed natural gas prices and the slowdown in the global economy **since the financial crisis of 2008, oil and gas investment spending has decreased to around \$250 million per year. Exploration, development and production of shale oil and shale gas prospects in the NWT could serve to restore or enhance the contribution of the industry to the NWT economy.**

Shale Oil and Shale Gas Potential in the NWT

A recent study of shale gas and shale oil potential in the NWT concluded that there are a number of good prospects in various regions of the NWT. Much of the attention on shale oil and shale gas potential in the NWT in recent years has focused on prospects in the central Mackenzie region near Tulita. In particular, the Canol, Hare Indian and Bluefish formations of the Horn River group arguably represent some of the best shale oil (and perhaps shale gas) prospects in the NWT. **A recent call for bids by Aboriginal Affairs and Northern Development Canada involving properties in the Tulita region resulted in work commitments of \$534 million.**

Methodology for the Evaluation of Economic Impacts

The analysis here employs an input output framework to measure the direct and indirect impacts arising from potential exploration, development and production of shale oil and shale gas resources in the NWT. The estimates of impacts are based on certain investment spending, price and production assumptions. **Economic impact estimates can be scaled upwards or downwards to reflect alternative spending and production scenarios.**

Economic Impacts of Shale Oil and Shale Gas Exploration and Development

With respect to the investment impacts, the figure of \$534 million that has been committed by the bid winners for parcels of land in the Sahtu region is used to illustrate potential economic impacts of oil and gas exploration activity in the NWT and results are shown in Table ES.1 below. There are **3 columns of impacts** shown in the table **corresponding to different assumptions regarding the percentage of the employment and labour income impacts that would accrue to NWT residents.** In the **100%** scenario, all employment created by the project would be filled by NWT residents. This is likely quite unrealistic given labour market constraints in the NWT and the actual and expected staffing of major projects in the territories. Consequently, for illustrative purposes, estimates for percentages of **50%** and **25%** are shown in Table ES.1.

TABLE ES.1 – ECONOMIC IMPACTS IN THE NWT OF THE INITIAL EXPLORATION WORK COMMITMENTS (\$534 M) IN THE SAHTU AREA
(values are in millions of 2012 Cdn\$, employment in person years)

	<u>% of Employment Impacts to NWT Residents</u>		
	<u>100%</u>	<u>50%</u>	<u>25%</u>
GDP	215	122	75
Labour Income	186	93	47
Territorial Government Revenue	16	12	10
TFF Agreement Adjustment*	12	9	7
Terr. Gov. Rev. after Adjustment	4	3	3
Fed. Gov. Rev. after Adjustment	38	39	39
Employment	1638	819	410

* TFF Agreement is the Territorial Financing Formula Agreement

The GDP impact under the 100% scenario represents about 5% of the annual GDP in the NWT in recent years. The employment impact ranges from 410 to 819 person years in the 25% and 50% scenarios. **If the employment impact were to occur in one year, this would create a 2% to 4% increase in employment in the NWT** given recent labour market conditions.

It may be **more likely that the spending associated with the initial work commitments would be spread over a number of years.** If that were the case, it may be **more consistent with a situation where more of the employment impacts would be felt by NWT residents.** Companies involved in the initial work commitments are already making an effort to train and hire current community members.

It should be emphasized that **if NWT shale oil and gas exploration efforts are successful, it can be expected that the aggregate investment related economic impacts would be far greater than those associated with the initial work commitments shown in Table ES.1.** For example, the cost to drill and test a vertical exploration well, and then to complete it using multi-stage hydraulic fracturing is estimated to be between \$20 and \$25 million in the NWT. Should development of fields take place, most of the wells would likely be horizontal, much more productive than vertical wells but also more costly. **Just 50 \$20 million wells would create \$1 billion in spending alone. Other required exploration and development expenditures would include those related to seismic work, roads, field equipment, gathering systems, barging stations, oil batteries and gas plants.**

Economic Impacts of Potential Shale Oil and Gas Production

Currently there are no reliable estimates concerning potential production from NWT shale oil or shale gas resources. As a result, **the illustrative estimates shown in Table ES.2 below are for a purely hypothetical scenario where a 10,000 barrel per day shale oil field is ultimately developed.** For the illustration, **an oil price of \$100 Cdn per barrel is assumed.**

TABLE ES.2 – ANNUAL ECONOMIC IMPACTS IN THE NWT OF A 10,000 BARREL PER DAY SHALE OIL FIELD WITH OIL PRICES OF \$100 CDN PER BARREL

(values are in millions of 2012 Cdn\$, employment in person years)

	<u>% of Employment Impacts to NWT Residents</u>		
	<u>100%</u>	<u>50%</u>	<u>25%</u>
GDP	315	304	299
Labour Income	21	10	5
Territorial Government Revenue	23	22	22
TFF Agreement Adjustment	14	14	14
Terr. Gov. Rev. after Adjustment	9	9	9
Fed. Gov. Rev. after Adjustment	64	64	64
Employment	199	100	50

* TFF Agreement is the Territorial Financing Formula Agreement

The annual GDP impact under the assumptions used in the illustration would amount to over 6% of recent NWT GDP levels. With respect to the operating employment impacts, it is more likely that a relatively high proportion of the jobs would be taken by NWT residents. **An additional 200 jobs per year would represent an increase of about 1% over current NWT employment levels.**

Annual territorial government revenue increases of \$23 million could be expected before the Territorial Formula Financing Agreement adjustment, with \$9 million remaining in the NWT after clawbacks. If the GNWT were to receive a net 50% of the forecast royalties as a result of devolution, the impact would be an additional \$9 million per year for the GNWT (absent the triggering of the cap on the net fiscal benefit). This would roughly double the expected impact on net GNWT revenues in the absence of devolution.

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1. Introduction

Numerous oil and gas companies have recently expressed interest in developing shale oil and shale gas prospects in the Northwest Territories (NWT). In mid-2011, Aboriginal Affairs and Northern Development Canada accepted bids for parcels of land in the Sahtu region representing a work commitment of \$534 million. The focus in the Sahtu region is likely to be on shale oil, although some shale gas prospects may exist in the area as well. In addition, there is the potential for shale gas development in the Fort Liard area in the southwest corner of the NWT.

Schlenker Consulting Ltd. was commissioned by The Department of Industry, Tourism and Investment of the Government of the Northwest Territories (GNWT) to estimate the potential economic impacts of shale oil and shale gas development in the NWT.

2. The Oil and Gas Industry in the NWT Economy

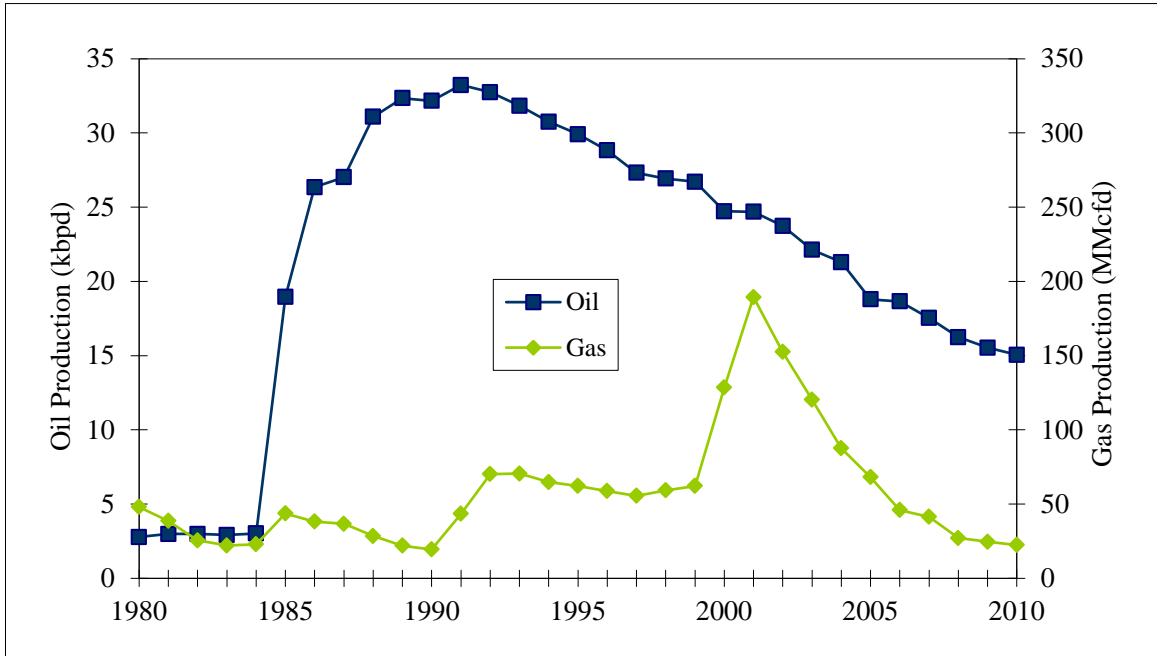
There has been oil and gas exploration, development and production in the NWT since the first half of the 20th century. At Norman Wells, oil was discovered in 1920 and production began in the 1930s. More significant development of the field in the 1980s led to peak production levels of over 30,000 barrels per day between 1998 and 1994 (total territorial production is shown in Figure 1 below).¹ Production at Norman Wells has declined since the early 1990s and was roughly 15,000 barrels per day by 2010. In recent times, there has also been some oil production at Cameron Hills, although this has constituted less than 10% of overall NWT oil production.

Natural gas production has also been ongoing at Cameron Hills for a number of years. Between 2006 and 2010, roughly one third of NWT gas production came from the Cameron Hills field. The majority of gas production in the NWT now comes from Norman Wells but this is largely the result of a suspension of production from the Fort Liard area. Production increases at Fort Liard were largely responsible for a more than tripling of territorial production between 1999 and 2001 to peak annual levels of about 190 million cubic feet per day (see Figure 1 below). Since then, gas production

¹ Oil and gas production data is from the Canadian Association of Petroleum Producers (CAPP) Statistical Handbook and Indian and Northern Affairs Canada, Northern Oil and Gas Annual Reports.

in the NWT has fallen substantially to now just over 20 million cubic feet per day.

FIGURE 1 – NWT OIL AND GAS PRODUCTION: 1980-2010



Source: Canadian Association of Petroleum Producers (CAPP) Statistical Handbook

Despite falling production levels, the value of oil and gas production in the NWT over the last 10 years has averaged over \$500 million annually (see Figure 2).² This can largely be attributed to rapidly rising oil prices since 1999 (and gas prices until 2008) which have offset production declines.

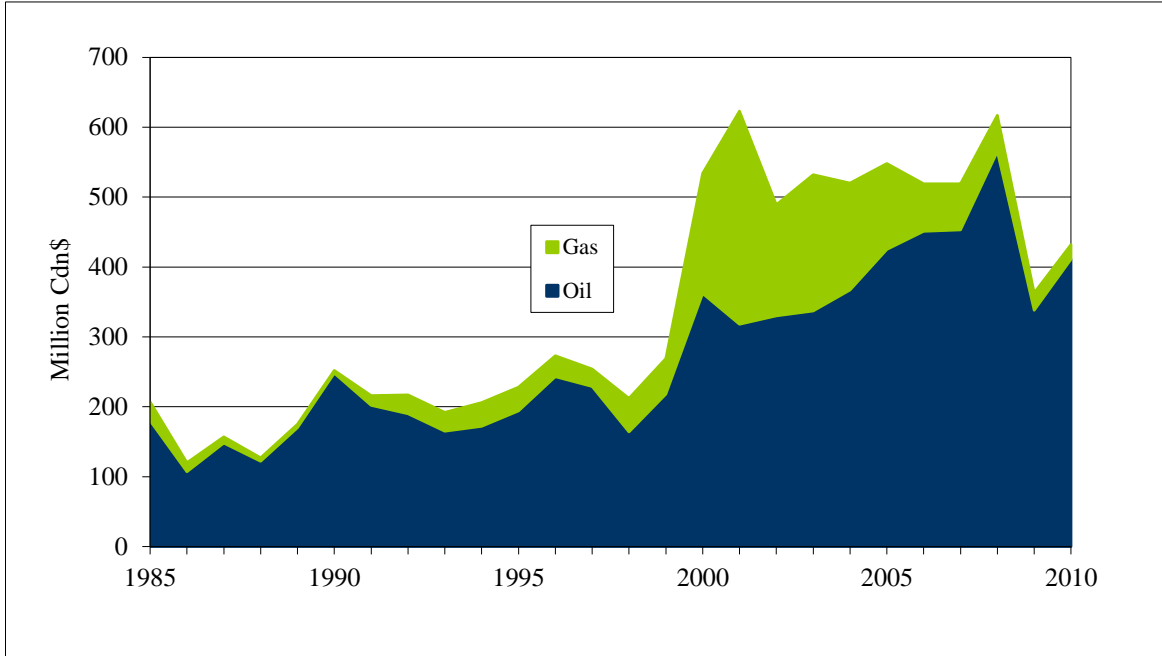
However, the decrease in production activity in the oil and gas sector has resulted in a significant decline in the proportion of real territorial Gross Domestic Product (GDP) coming from the sector in the last decade. For example, in 1999, GDP originating from oil and gas extraction constituted about 12% of NWT GDP whereas by 2010 the percentage had fallen to less than 5%.

Historically, the oil and gas industry has also been responsible for a significant portion of investment in the NWT. Figure 3 shows investment by

² See CAPP Statistical Handbook.

the oil and gas industry by year from 1999-2010 as well as the proportion of total investment in the territories attributable to the industry.³

FIGURE 2 – VALUE OF NWT OIL AND GAS PRODUCTION: 1985-2010



Source: CAPP Statistical Handbook

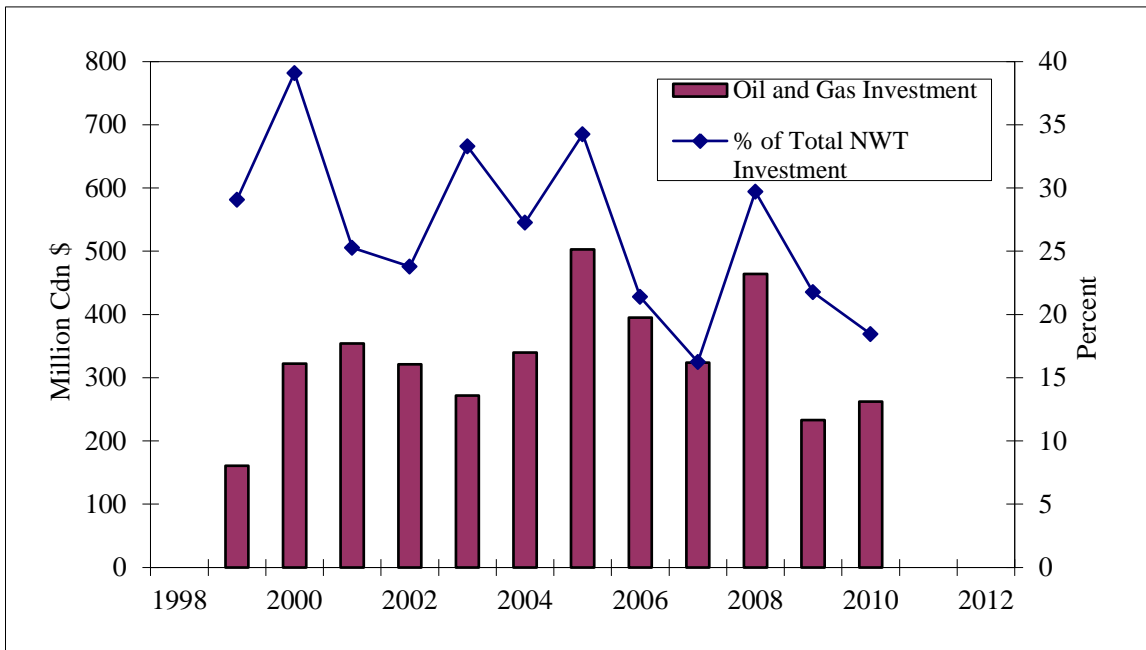
Exploration and development spending in the NWT has averaged about \$350 million annually since 1999. This constitutes about one quarter of all investment in the NWT in the last decade. However, with depressed natural gas prices and the slowdown in the global economy since the financial crisis of 2008, oil and gas investment spending has slipped to around \$250 million per year and has constituted less than 20% of overall investment in the NWT.

Arguably the key reason that natural gas prices have been depressed in North America since 2008 has been the emergence of massive supplies of shale gas in the United States. In 2007, shale gas production in the US totalled 1.3 trillion cubic feet (Tcf), representing about 7% of total US gas production. By 2010, US production of shale gas had almost quadrupled to 5.0 Tcf. This increase in shale gas production was equivalent to the entire

³ Investment data is from the CAPP Statistical Handbook and Statistics Canada, Industry Accounts Division.

increase in US production over the period and shale gas now constitutes almost a quarter of all American gas production. The US Department of Energy projects that by 2035 roughly one half of US gas production will be shale gas.⁴

FIGURE 3 – OIL AND GAS INVESTMENT IN THE NWT: 1999-2010



Source: CAPP Statistical Handbook and Statistics Canada, Industry Accounts Division

The emergence of shale gas production in the US in recent times (and in Canada in locations such as the Horn River basin in northeast BC) has been the result of the use of repeated hydraulic fracturing of shale formations. The same technology could potentially be applied to oil and gas bearing shales in the NWT.

3. Shale Oil and Shale Gas Potential in the NWT

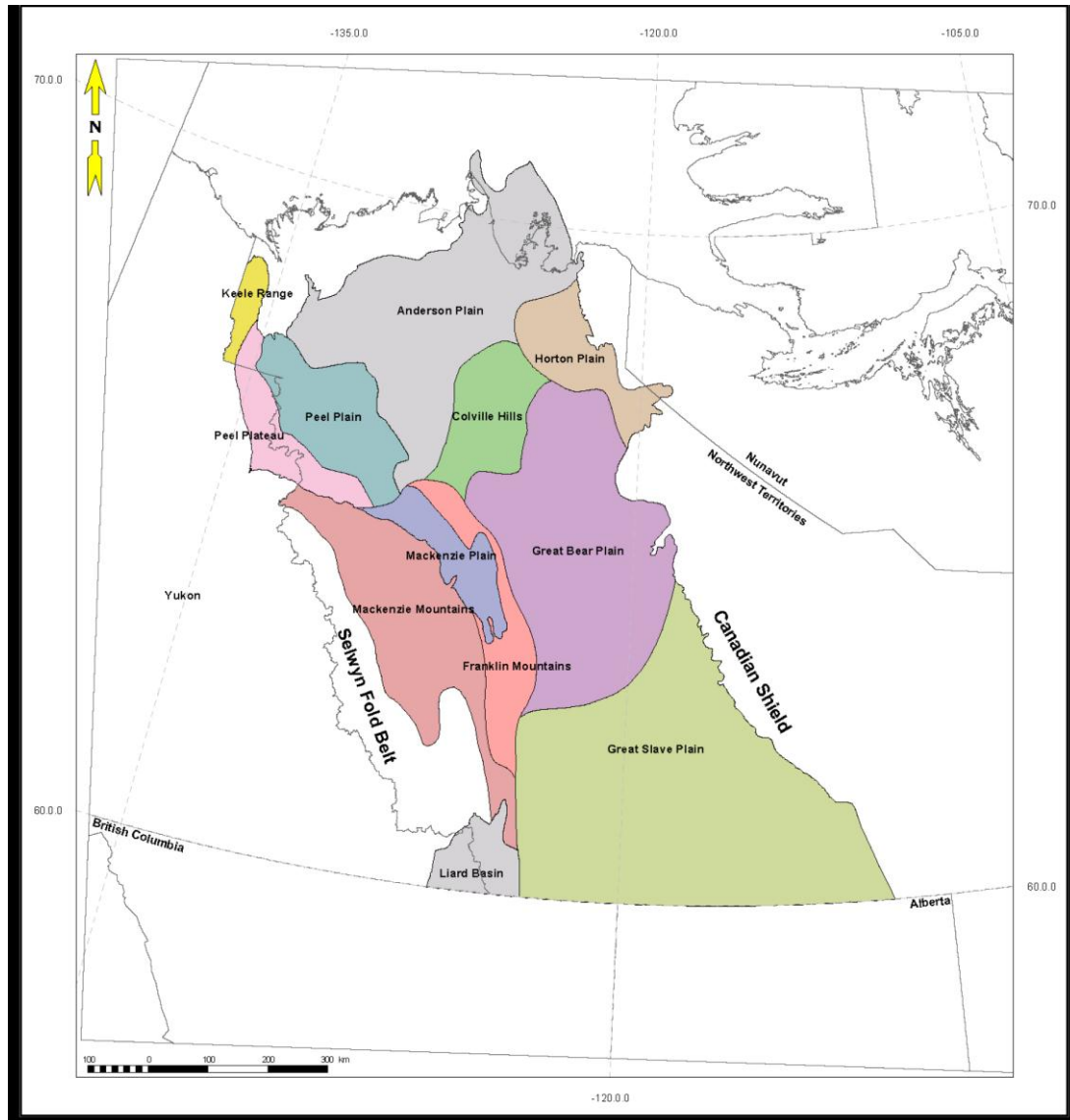
A recent study of shale gas and shale oil potential in the NWT concluded that there are a number of good prospects in various regions of the NWT (see Figure 4).⁵ For example, in the Liard / Great Slave area, the Muskwa and Klua shales in the NWT portion of the Horn River basin are directly

⁴ See US Department of Energy, Energy Information Administration, 2012 Annual Energy Outlook.

⁵ See B.J.R. Hayes, Regional Characterization of Shale Gas and Shale Oil Potential, Northwest Territories; Northwest Territories Geosciences Office, NWT Open File 2011-08, 2011.

adjacent to the same formations in northeastern BC that have existing and prolific dry gas production. Shale oil potential is also believed to exist in that area. In addition, in the Liard basin in the southwest corner of the NWT, shale formations that have large, mapped gas-in-place resources and/or expected high gas production capability adjacent to them in northeastern BC include the Besa River Shale and the Fort St. John Group.

FIGURE 4 – EXPLORATION REGIONS OF THE NWT

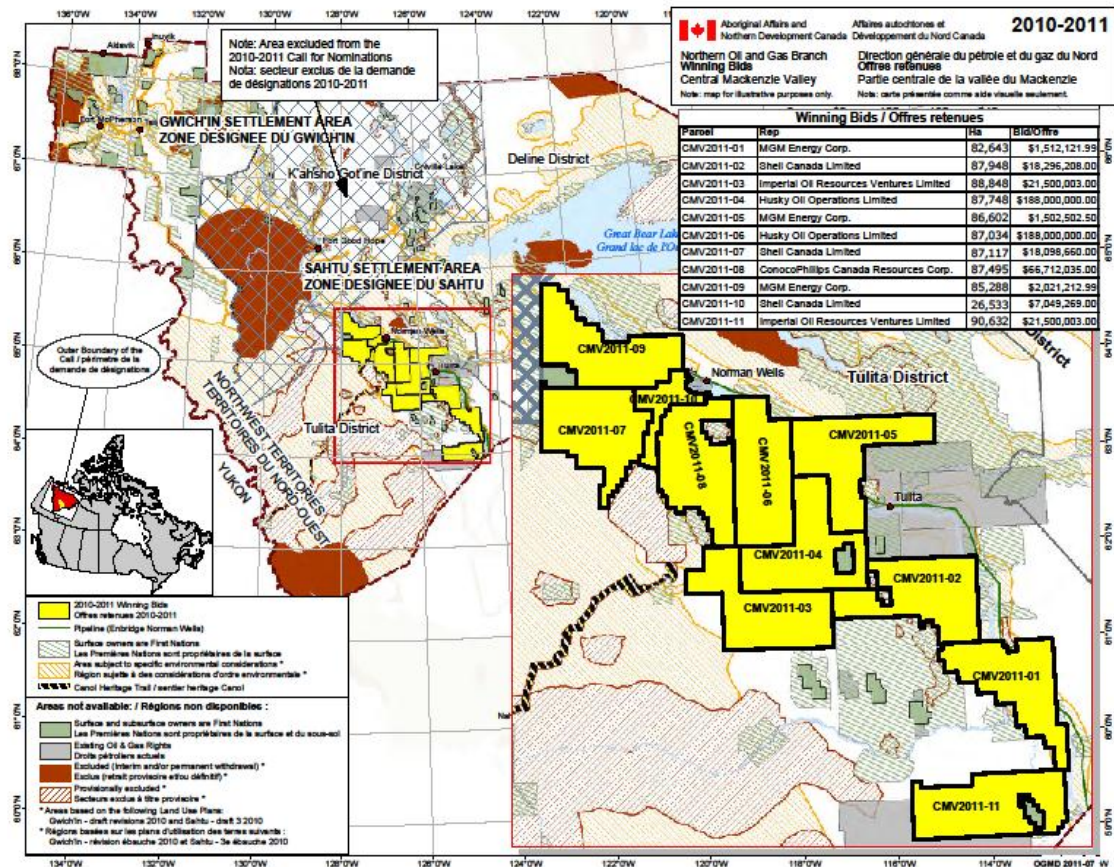


Source: B.J.R. Hayes, Regional Characterization of Shale Gas and Shale Oil Potential, Northwest Territories; Northwest Territories Geosciences Office, NWT Open File 2011-08, 2011

Much of the attention on shale oil and shale gas potential in the NWT in recent years has focused on prospects in the central Mackenzie region (Peel and Mackenzie regions in Figure 4) near Tulita. In particular, the Canol, Hare Indian and Bluefish formations of the Horn River group arguably represent some of the best shale oil and shale gas prospects in the NWT. In places, these formations are up to several hundred metres thick.⁶

The recent call for bids by Aboriginal Affairs and Northern Development Canada that resulted in work commitments of \$534 million involved properties in the Tulita region containing these shale formations. Figure 5 below illustrates the parcels of land that were acquired and the bid amounts.

FIGURE 5 – MAP OF ACQUIRED PARCELS IN THE 2010-2011 ABORIGINAL AFFAIRS AND NORTHERN DEVELOPMENT CALL FOR BIDS IN THE CENTRAL MACKENZIE VALLEY



Source: Aboriginal Affairs and Northern Development Canada

⁶ See p.26 of Hayes study cited in previous footnote and p.11 of MGM Energy, Presentation to Peters and Co. North American Oil and Gas Conference, September 2011.

The economic impacts associated with this initial round of work commitments are used as a starting point to illustrate the potential of shale oil and shale gas development in the NWT.

4. Methodology for the Evaluation of Economic Impacts

The analysis here employs an input output framework to measure the direct and indirect impacts arising from potential exploration, development and production of shale oil and shale gas resources in the NWT. Multipliers from the 2007 Statistics Canada Interprovincial Input Output Model are used to estimate the implications for gross domestic product (GDP), income, employment and government revenues in the NWT.⁷ Some additional modeling was also undertaken in order to estimate the overall impacts on government revenues.⁸

Other than the commitments made by various oil and gas companies in mid-2011, there is currently very little information concerning project specific details for shale oil and shale gas development in the NWT. As a result, the estimates of impacts described below are based on certain investment spending, price and production assumptions. **Economic impact estimates can be scaled upwards or downwards to reflect alternative spending and production scenarios.**

5. Economic Impacts of Shale Oil and Shale Gas Exploration and Development

With respect to the investment impacts, the figure of \$534 million that has been committed by the bid winners for parcels of land in the Sahtu region is used to illustrate potential economic impacts of oil and gas exploration activity. It can be noted that this amount is equivalent to about

⁷ For a detailed description of the different types of economic impacts and qualifications regarding input-output analysis in general, see Section 1.3 of Schlenker Consulting Ltd., An Evaluation of the Economic Impacts of the Gahcho Kue Diamond Project (2011).

⁸ The Statistics Canada Interprovincial Input-Output model provides estimates of only indirect tax impacts (i.e. consumption taxes like GST, PST or HST, gas and other excise taxes, etc.). Often more substantial government revenues are generated via direct taxes on personal and corporate income or, in mining and oil and gas projects, mining taxes and/or royalties. Payroll and property taxes are other forms of government revenues that may also be significantly affected by a project.

one and a half year's worth of oil and gas investment in the NWT over recent years.

Table 1 shows the various impacts of \$534 million of oil and gas related investment spending in the NWT. There are 3 columns of impacts shown in the table corresponding to different assumptions regarding the percentage of the employment and labour income impacts that would accrue to NWT residents. In the 100% scenario, all employment created by the project would be filled by NWT residents. This is likely quite unrealistic given labour market constraints in the NWT and the actual and expected staffing of major projects in the territories. For example, estimates of the percentage of employment filled by NWT residents in oil and gas and diamond mining projects ranges from between 10% and 60%.⁹ Consequently, for illustrative purposes, estimates for percentages of 50% and 25% are shown in Table 1.

TABLE 1 – ECONOMIC IMPACTS IN THE NWT OF THE INITIAL EXPLORATION WORK COMMITMENTS (\$534 M) IN THE SAHTU AREA

(values are in millions of 2012 Cdn\$, employment in person years)

	<u>% of Employment Impacts to NWT Residents</u>		
	<u>100%</u>	<u>50%</u>	<u>25%</u>
GDP	215	122	75
Labour Income	186	93	47
Territorial Government Revenue	16	12	10
TFF Agreement Adjustment	12	9	7
Terr. Gov. Rev. after Adjustment	4	3	3
Fed. Gov. Rev. after Adjustment	38	39	39
Employment	1638	819	410

The GDP impact under the 100% scenario represents about 5% of the annual GDP in the NWT in recent years.¹⁰ Other than the GDP estimate under the 100% scenario, the values in Table 1 for the 50% and 25% scenarios are the most useful.¹¹ The employment impact ranges from 410 to 819 person years

⁹ For example, see Schlenker Consulting Ltd., An Evaluation of the Economic Impacts of the Gahcho Kue Diamond Project (2011) and Wright Mansell Research Ltd., An Evaluation of the Economic Impacts Associated with the Mackenzie Valley Pipeline and Mackenzie Gas Development (2007).

¹⁰ Nominal GDP in the NWT over the last five years has ranged from \$4-5 billion (see CANSIM series V1407356).

¹¹ The GDP estimate in the 100% scenario is technically the correct estimate regardless of whether the jobs created by shale oil and gas activity end up being taken by NWT residents. GDP is defined as the

in the 25% and 50% scenarios. If the employment impact were to occur in one year, this would create a 2% to 4% increase in employment in the NWT given recent labour market conditions.¹² It may be more likely that the spending associated with the initial work commitments may be spread over a number of years. If that were the case, it may be more consistent with a situation where more of the employment impacts would be felt by NWT residents. Workers would be able to gain experience in oil and gas related activity and as more seismic activity, drilling, etc. is carried out over successive years, more sustainable employment may be created. In addition, it is likely that the companies involved would make an effort to train and hire current community members. For example, Husky Energy (which is responsible for over 70% of the initial work commitments) has already signed a 10 year deal with four Sahtu land corporations that could be expected to improve local employment prospects.¹³

The territorial government revenue impacts associated with oil and gas exploration and development are relatively small, even before adjustments related to the Territorial Formula Financing agreement.¹⁴ Most of any territorial government revenue (i.e. corporate and personal income taxes, indirect taxes such as fuel taxes, payroll taxes, etc.) generated by investment in shale oil and gas exploration and development would be clawed back.

It should be emphasized that if NWT shale oil and gas exploration efforts are successful, it can be expected that investment related economic impacts would be far greater than those associated with the initial work commitments shown in Table 1. For example, the costs of drilling and completing even a single well can be expected to be unusually high. Average costs per metre drilled in the NWT have historically been over ten times higher than in Alberta due to climate, access and environmental factors.¹⁵ MGM Energy (one of the winners in the 2010-

economic output produced in a region and the output in this case would all be produced in the NWT. However, some or most of the income would leak out to other regions in the 50% and 25% scenarios, as would certain government revenues associated with the labour income leakage.

¹² Employment in the NWT averaged about 22,400 in 2011 (see CANSIM series V46438838).

¹³ See www.cbc.ca/news/canada/north/story/2011/09/02/north-nwt-husky-energy-deal.html.

¹⁴ The Department of Finance of the Government of the NWT provided tax back rates for the 2011-12 Territorial Formula Financing Grant. Although tax back rates tend to vary from year to year, it is assumed that the rates for 2011-2012 would apply in the future.

¹⁵ Average costs were derived using metres drilled and exploration and development drilling cost data over the period 1996-2010 from the CAPP Statistical Handbook data. The estimate includes an adjustment for differences in average well depth in the NWT and Alberta (derived from information in National Energy Board, Natural Gas Supply Costs in Western Canada in 2007, September 2008).

2011 call for bids) estimates that the cost to drill, test and complete a vertical exploration well would be between \$20 and \$25 million.¹⁶ Multi-stage hydraulic fracturing of the shale, which significantly improves the productive capability of a well, is incorporated into this estimate.¹⁷

However, this quoted figure is for a vertical well and the productive capability of a horizontal well can be much greater than for a vertical well.¹⁸ At the same time, horizontal wells are technically more difficult to drill and consequently more costly. Estimates of the ratio of the cost of a horizontal well versus a vertical well of the same depth vary widely and are dependent on a variety of factors. Consequently, it is very difficult to estimate exactly how much the drilling, testing and completion of a horizontal shale oil or gas well in the NWT may cost. However, given the historically higher costs in the NWT versus Alberta or BC, it might be expected that it would be substantially higher than the \$5-10 million that a horizontal shale gas well might cost in northeastern BC.¹⁹

Another factor that could significantly increase the overall investment related impacts of shale oil and gas prospects in the NWT over those shown in Table 1 is that, if exploration efforts were successful, additional development activity could be expected. Given the uncertainty surrounding the productive capability of individual wells in the prospects considered, it is impossible to estimate exactly how many wells would ultimately have to be drilled to achieve a certain production target. In the 1980s, over 400 wells were drilled in the NWT to support the peak production levels at Norman Wells of slightly over 30,000 barrels per day.²⁰ While it would be expected that horizontal, multi-stage fractured shale oil wells would be far more productive than the vertical and more simply completed wells at Norman Wells in the 1980s, just 50 \$20 million wells would create \$1 billion in spending.

Other required exploration and development expenditures would include those related to seismic work, roads, field equipment, gathering systems,

¹⁶ See Daily Oil Bulletin, NWT Canol Oil Shale Play Could Be a Game Changer, March 15, 2012.

¹⁷ For illustrative effects of the number of fracturing events on the production profile of shale gas, see Figure S5.16 of Alberta Energy Resources Conservation Board (ERCB), Alberta's Energy Reserves 2010 and Supply/Demand Outlook 2011-2020 (June 2011).

¹⁸ For example, see page 4-15 and Figures S5.13, S5.14 and S5.15 of Alberta ERCB, Alberta's Energy Reserves 2010 and Supply/Demand Outlook 2011-2020 (June 2011).

¹⁹ See National Energy Board, Understanding Canadian Shale Gas (November 2009).

²⁰ See CAPP Statistical Handbook.

barging stations, oil batteries and gas plants. In addition, the fracturing requirements in the shale oil and gas fields could give rise to development of local sand quarrying service businesses. Disposal facilities and services would also be necessary to deal with the solid and liquid waste products involved in the fracturing process. In total, successful development of shale oil and shale gas prospects in the NWT would lead to significantly greater investment related economic impacts than those shown in Table 1.

6. Economic Impacts of Potential Shale Oil and Gas Production

Currently there are no reliable estimates concerning potential production from NWT shale oil or shale gas resources. As a result, **the illustrative estimates shown in Table 2 below are for a purely hypothetical scenario where a 10,000 barrel per day shale oil field is ultimately developed.** This would be equivalent to about two thirds of the current annual production in the Norman Wells field or about one third of the peak production at Norman Wells. For the illustration, **an oil price of \$100 Cdn per barrel is assumed.** Royalty and tax implications of any project depend critically on price, production and cost assumptions so the government revenues shown in the table are based on averages from historical royalty rates on NWT oil and gas production as well as projected royalty and tax rates for Mackenzie Delta gas development.²¹

TABLE 2 – ANNUAL ECONOMIC IMPACTS IN THE NWT OF A 10,000 BARREL PER DAY SHALE OIL FIELD WITH OIL PRICES OF \$100 CDN PER BARREL

(values are in millions of 2012 Cdn\$, employment in person years)

	<u>% of Employment Impacts to NWT Residents</u>		
	<u>100%</u>	<u>50%</u>	<u>25%</u>
GDP	315	304	299
Labour Income	21	10	5
Territorial Government Revenue	23	22	22
TFF Agreement Adjustment	14	14	14
Terr. Gov. Rev. after Adjustment	9	9	9
Fed. Gov. Rev. after Adjustment	64	64	64
Employment	199	100	50

²¹ Average royalty rates were derived from data in the CAPP Statistical Handbook and Indian and Northern Affairs Canada, Northern Oil and Gas Annual Reports.

The annual GDP impact under the assumptions used in the illustration would amount to over 6% of recent NWT GDP levels. It can be noted that the GDP estimates are largely unaffected by the percentage of created employment that would be taken by NWT residents. In contrast, the annual employment impacts in the NWT would range from between 50 to 100 jobs in the 25% and 50% scenarios with roughly 200 jobs created in the NWT overall. With respect to these operating impacts, it is more likely that a relatively high proportion of the jobs would be taken by NWT residents given the nature of the employment (i.e. ongoing operations of the oil or gas fields). For the Mackenzie gas project for example, the expectation was that well over 50% of the jobs could be taken by NWT residents during the operating phase under most of the scenarios considered.²² An additional 200 jobs per year would represent an increase of about 1% over current NWT employment levels.

Finally, territorial government revenues are quite insensitive to the assumption regarding the percentage of new employment that would be taken by NWT residents. Annual revenue increases of \$23 million before the adjustment and \$9 million with the adjustment could be expected in the illustrative scenario.

There have been ongoing discussions between the federal and NWT governments regarding the devolution (or transfer of authority) of NWT public lands and resources from the federal government to the GNWT. In terms of the economic impacts of the potential shale oil and gas projects, one implication of devolution is that the GNWT may be able to keep some portion of the royalties associated with the projects. Under the Agreement-in-Principle that would govern the terms of devolution, NWT governments would receive 50 per cent of the net fiscal benefit from resource development, subject to a cap. The necessary offsets against gross royalties (all of which would flow to NWT governments) would be made against the Territorial Formula Financing grant. If, for example, the GNWT were to receive a net 50% of the forecast royalties as a result of devolution, the impact would be an additional \$9 million per year for the GNWT (absent the triggering of the cap on the net fiscal benefit). This would roughly double the expected impact on net GNWT revenues in the absence of devolution.

²² See Wright Mansell Research Ltd., *An Evaluation of the Economic Impacts Associated with the Mackenzie Valley Pipeline and Mackenzie Gas Development* (2007).