National Energy Board

Office nationa
de l'énergie

Short-term Canadian Natural Gas Deliverability

2010–2012

AN ENERGY MARKET ASSESSMENT MARCH 2010

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FIGURES

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CAPP	Canadian Association of Petroleum Producers
EMA	Energy Market Assessment
HH	Henry Hub (North American Gas Reference Price)
LNG	liquefied natural gas
NEB	National Energy Board
NGLs	natural gas liquids
PSAC	Petroleum Services Association of Canada
WCSB	Western Canada Sedimentary Basin

Units

m^3	= cubic metres
MMcf	= million cubic feet
Bcf	= billion cubic feet
m^3/d	= cubic metres per day
$10^6m^3/d$	= million cubic metres per day
MMcf/d	= million cubic feet per day
Bcf/d	= billion cubic feet per day
GJ	= gigajoule
MMBtu	= million British Thermal Units

Common Natural Gas Conversion Factors

1 million m^3 (@ 101.325 kPaa and 15° C) = 35.3 MMcf (@ 14.73 psia and 60° F)
1 GJ (Gigajoule) = .95 Mcf (thousand cubic feet) = .95 MMBtu = .95 decatherms

Price Notation

North American natural gas prices are quoted at Henry Hub and given in $US/MMBtu.
Canadian natural gas prices are quoted as the Alberta Gas Reference Price and are listed in $C/GJ.

Foreword

The National Energy Board (the NEB or the Board) is an independent federal agency whose purpose is to promote safety and security, environmental protection and efficient infrastructure and markets in the Canadian public interest[1] within the mandate set by Parliament in the regulation of pipelines, energy development and trade.

The Board's main responsibilities include regulating the construction and operation of interprovincial and international oil and gas pipelines, international power lines, and designated interprovincial power lines. Furthermore, the Board regulates the tolls and tariffs for the pipelines under its jurisdiction. With respect to the specific energy commodities, the Board regulates the export of natural gas, oil, natural gas liquids (NGLs) and electricity, and the import of natural gas. Additionally, the Board regulates oil and gas exploration and development on frontier lands and offshore areas not covered by provincial or federal management agreements.

In an advisory function, the Board also keeps under review and analyzes matters related to its jurisdiction and provides information and advice on aspects of energy supply, transmission and disposition in and outside Canada. In this role, the NEB publishes periodic assessments to inform Canadians on trends, events and issues which may affect Canadian energy markets.

This Energy Market Assessment (EMA) Short-term Canadian Natural Gas Deliverability, 2010–2012, examines the factors that affect gas supply in the short term and presents an outlook for deliverability through 2012. The main objective of this report is to advance public understanding of the short-term gas supply situation in Canada. This report follows the Board's October 2009 Energy Briefing Note, Short-term Canadian Natural Gas Deliverability, 2009-2011.

While preparing this report, the NEB conducted a series of informal meetings and discussions with drilling companies, natural gas producers, pipeline companies, and industry associations. The NEB appreciates the information and comments provided and would like to thank all participants for their time and expertise.

If a party wishes to rely on material from this report in any regulatory proceeding before the NEB, it may submit the material, just as it may submit any public document. Under these circumstances, the submitting party in effect adopts the material and that party could be required to answer questions pertaining to the material.

This report does not offer an opinion as to whether any application before the Board will be found to be in the public interest. The Board evaluates each application based solely on the material before it at that time.

1 The public interest is inclusive of all Canadians and refers to a balance of economic, environmental, and social interests that changes as society's values and preferences evolve over time. As a regulator, the Board weighs the relevant impacts on these interests when making its decisions.

Background Information

Canadian natural gas continues to play a major role in the integrated North American marketplace, providing approximately 20 per cent of continental supply as well as a source of over $47 billion in revenue.[2]

Over most of the last decade, Canadian deliverability[3] has remained fairly constant, at around 481 $10^6m^3/d$ (17 Bcf/d). In 2008, deliverability declined to roughly 447 $10^6m^3/d$ (15.8 Bcf/d) at year's end, largely due to significantly reduced drilling activity in the second half of the year. 2009 saw that trend continue, as low gas prices and restricted access to capital for producers, especially junior producers in western Canada, led to levels of reduced drilling activity not seen since the 1990s. This low level of activity resulted in a decline in deliverability to an estimated 409 $10^6m^3/d$ (14.4 Bcf/d) at year's end. In contrast, deliverability in the United States increased in 2009 due to activity in new and prolific shale gas plays. More information on shale gas can be found in the Board's Energy Briefing Note entitled "A Primer for Understanding Canadian Shale Gas".

Recent advances in technology have allowed producers to develop new gas resources, primarily unconventional ones such as shale gas. This has increased the resource base in North America, and it has also shifted some capital investment to those fields. Canada is likely to see an increase in the development of shale gas resources, but has thus far not seen the shale gas activity that has occurred in the United States. The pace of development and commercialization of the tight sands in the Montney and shales of the Horn River areas is likely to increase over the projection period, with the prospect for applying this experience to other shale gas areas.[4] These include the Utica in Quebec, the Frederick Brook in the Maritimes and the Duvernay shale in Alberta. These developments and others add to the resource base that meets domestic gas needs in the foreseeable future.

Canadian gas prices have fluctuated widely over the past two years, from a high of $9.84 in July of 2008, to a low of $2.48 in September 2009.[5] The recession which began in 2008 caused a sharp drop in natural gas demand, particularly in industrial uses. Coupled with increased overall supply in the U.S., the gas market was considered to be oversupplied.

Financial markets in 2009 made it difficult for producers to raise capital. Particularly for junior producers in western Canada, this meant that cash flow was the only source of drilling capital for much of the year. Those markets have since improved, but capital is still likely to be more difficult to access than in 2007 and previous years. Producers that do raise capital have indicated a preference towards paying down debt or buying existing production rather than drilling. Relatively higher costs and longer distances to major gas markets have decreased activity and production and the resulting deliverability in western Canada.

2 CAPP estimate of 2008 natural gas revenues in Canada.

3 Deliverability is the estimated amount of gas that can be supplied from a given area based on historical production and declines as well as projected activity and results. Production may be less than deliverability due to a number of factors, such as weather related supply interruptions and shut-in production due to economic or strategic considerations.

4 These assumptions are in no way suggestive of the outcome of regulatory applications currently before the Board or expected in the future.

5 Alberta Gas Reference Price for the month in $C/GJ.

Current Issues

The latter part of 2009 saw natural gas prices increase from recent lows as supply and demand became more closely matched. Economic projections have grown more optimistic, and while gas demand may remain lower in the short term, the upward trend projected for demand has returned a measure of confidence to the industry. Producers have been able to raise capital to increase production, though this is largely confined to producers with exposure in the Montney and Horn River in western Canada. Service costs have come down by as much as 20 per cent from their 2008 levels, and gas prices returned to levels that enabled more drilling in western Canada to be economic. Recent land sales in Alberta and British Columbia have seen an increase in revenue, normally a leading indicator of activity. While many natural gas developments are still economically uncertain, tight gas and shale gas developments in Alberta and British Columbia have approached or surpassed historical activity levels. As technology and understanding of the resource continues to improve, these developments are likely to continue to attract more capital and activity in the future.

Conventional gas, including tight gas, currently accounts for over 90 per cent of Canadian deliverability, which could change as more new sources of tight gas and shale gas is developed. Given the current state of development in the Montney and Horn River, it appears likely that more gas drilling capital will move to those developments and with it a gradual shift in the deliverability of Alberta and British Columbia. As a result, Alberta could continue to see its deliverability fall and British Columbia increase over the projection period. Should shale gas development accelerate in Alberta, either in the Duvernay or other sources, then that trend may change. Saskatchewan's deliverability continues to decline as investment continues to be directed to oil developments.

Reduced deliverability in Canada has contributed to the decline in the amount of Canadian produced gas exported to the United States. This has been driven in large part by the emergence of gas sources in the United States with more favourable economic prospects than those in western Canada. Gas from western Canada is still a vital part of the continental gas market, and is projected to remain so. The ongoing economic competition between basins involves supply cost, transportation cost, economies of scale as well as fiscal and regulatory incentives.

Considerable interest exists in developing natural gas in other parts of Canada, particularly New Brunswick and Quebec, and the Board continues to monitor these developments for their impact on all Canadians. Quebec is unlikely to see significant commercial volumes from the Utica shale within the time period of this outlook. Deliverability in the Maritimes should increase in 2011, due to offshore volumes from the Deep Panuke project more than offsetting declining volumes from Sable Island. Onshore development in New Brunswick is not projected to produce large growth in volumes during this time period.

The recent increase in natural gas prices has somewhat improved the economics for natural gas production in Canada. Currently, the North American natural gas supply and demand balance is uncertain. Demand will increase from 2009, but it is uncertain by how much. As for supply, many

observers agree that reduced activity will lead to declines in deliverability; however, the amount and timing of changes is uncertain.

Oil prices increased much more quickly than gas prices in 2009. This has meant that drilling for oil became more attractive in western Canada. The use of technology originally developed for shale gas extraction is now being used for oil plays, particularly the Cardium, Pembina and Viking plays in Alberta, as well as the Bakken and Shaunavon in Saskatchewan. The ability to access previously undeveloped oil accumulations could further draw capital investment away from gas development.

Many market observers anticipate minor growth in demand and marginal deliverability declines that would lead to a balanced gas market by the second half of 2010. Prices should generally remain within a range of $5.00 to $6.00/MMBtu over this period as significant movements outside this range are resisted by two factors. Should prices move much below $5.00/MMBtu, demand for gas to generate power would increase, and cause gas prices to move back up into the range. This situation occurred for a period of time in 2009, when natural gas began to displace some coal in base load generation. If prices break above $6.00/MMBtu, then more liquefied natural gas (LNG) imports would likely be attracted to North America to boost supply sufficiently to cause prices to move back down into the range. At the end of 2009, reports suggested that price hedges were in place for as much as 40 per cent of North American natural gas supply to lock in prices for 2010 at an average of $6.15/MMBtu. With so much of the supply having a locked-in price, price movements during 2010 will have less influence over producers' revenue and spending projections for the year. Consequently the variability in estimates for 2010 is more constrained due to the extent of price hedging.

Scenario Methodology and Results

In order to better reflect the uncertainty of both the natural gas market and the economy, three natural gas price scenarios were constructed using different macroeconomic assumptions. These prices were then used to develop drilling activity and deliverability projections for Canada.

- The mid-price scenario results in a continued decrease in deliverability over the projection, from 428 $10^6m^3/d$ (15.1 Bcf/d) in 2009, to 369 $10^6m^3/d$ (13.0 Bcf/d) in 2012. Gas drilling activity would rise by 19 per cent in 2010, then by less than 10 per cent annually in the two following years.
- In the high-price scenario, deliverability decreases in 2010 to 401 $10^6m^3/d$ (14.2 Bcf/d) then shows a marginal decrease in 2011 to 395 $10^6m^3/d$ (13.9 Bcf/d) before rebounding in 2012 to 405 $10^6m^3/d$ (14.3 Bcf/d). Gas drilling activity rises sharply in this scenario, by a total of 64 per cent over the projection period.
- In the low-price scenario, deliverability continues to drop over the projection, to 328 $10^6m^3/d$ (11.6 Bcf/d) in 2012. Drilling activity continues to fall and averages 60 per cent of 2009 levels throughout the projection. The areas most sensitive to these scenarios are the more marginal conventional plays, while unconventional development would likely proceed in all but the most negative reality.

Detailed data on the scenarios and their corresponding deliverability results can be found in the Appendices.

3.1 Mid-Price Scenario

In this scenario, a balance would exist between supply and demand, with continental drilling and LNG imports offsetting projected demand growth resulting in more stable natural gas prices. Though deliverability drops in Canada, and is assumed to do the same for North America as a whole, LNG imports would fill any short-term gaps that may appear, such as those arising from weather-related supply or demand changes. The development of shale gas continues, and largely meets expectations in terms of cost, deliverability and lifespan. The shift in supply will continue in this scenario, as newer shale plays are defined and commercialized. Prices find a balance that represents the marginal cost of supply, which in 2010 is estimated to be $5.50/MMBtu. The price increases over the projection period, driven by increases in demand and escalation in costs, to $6.75/MMBtu in 2012. Activity in western Canada recovers from 2009 levels, but oil drilling would account for more of this activity than in the past.

Deliverability Results:

Deliverability in this scenario follows a downward trend over the projection period, decreasing by 62 $10^6m^3/d$ (2.2 Bcf/d) from 2009 levels. Tight gas and shale gas developments continue to grow, with

TABLE 3.1

Overview of Assumptions and Deliverability Results

	2009	Mid-Price Scenario			High-Price Scenario			Low-Price Scenario		
		2010	2011	2012	2010	2011	2012	2010	2011	2012
Henry Hub (HH) Average Price (US$/MMBtu)	$4.06	$5.50	$6.00	$6.75	$6.50	$7.00	$7.75	$4.25	$4.75	$5.25
Alberta Gas Reference Price (C$/GJ)	$3.70[1]	$5.09	$5.55	$6.38	$6.26	$6.71	$7.55	$3.34	$3.76	$4.27
Natural Gas Drilling Expense ($ Millions)	6 600	7 500	8 200	9 100	9 800	10 800	12 000	4 200	4 700	5 000
Natural Gas Intent Drill Days		45 659	47 735	50 512	60 679	66 011	69 742	25 588	28 019	30 066
Natural Gas Intent Wells	4 000[2]	4 819	5 075	5 358	5 767	6 309	6 652	2 201	2 450	2 576
Gas Share of Drill Days (per cent)	53	55	55	55	55	57	58	50	50	51
Size of WCSB Rig Fleet	854[3]	785	789	791	797	795	804	775	774	773
Canadian Deliverability ($10^6m^3/d$)	**428[4]**	**393**	**372**	**369**	**401**	**395**	**405**	**380**	**343**	**328**
Canadian Deliverability (Bcf/d)	**15.1**	**13.9**	**13.1**	**13.0**	**14.2**	**13.9**	**14.3**	**13.4**	**12.1**	**11.6**

1. Government of Alberta, Alberta Gas Reference Price History, http://www.energy.alberta.ca/NaturalGas/1322.asp
2. PSAC Estimate – 27 January 2010.
3. CAODC Estimate – 21 October 2009.
4. Annual average of reported provincial production. Field receipts used where provincial data unavailable.

over 200 wells drilled in the Montney and 70 in Horn River in 2010, increasing over the projection. Horn River deliverability increases from 1.2 $10^6m^3/d$ (41 MMcf/d) to 13.1 $10^6m^3/d$ (462 MMcf/d) by 2012. British Columbia Montney deliverability increases as well, from 11 $10^6m^3/d$ (387 MMcf/d) in 2009 to 42 $10^6m^3/d$ (1.5 Bcf/d) in 2012.

Implications:

The largest implication in the mid-price scenario would be that the net amount of Canadian produced gas exports to the United States would decline over the projection period. Deliverability would readily meet Canadian demand, including projected growth for the oil sands and to generate electricity. Capital spending and sector employment should stabilize and then slowly increase over the period. At this level of activity Canada's ability to significantly increase deliverability in the future would diminish over time as service capacity is rationalized. The tight gas and shale gas activity in western Canada relies on deep drilling rigs and hydraulic fracturing, and this equipment is already experiencing higher utilization than other components of the drilling and service industry. There may be limited room for expansion in these areas until capital spending increases are seen from service providers, driven by producer spending.

Full results of this scenario are available in Appendix C.

FIGURE 3.1

Deliverability Results

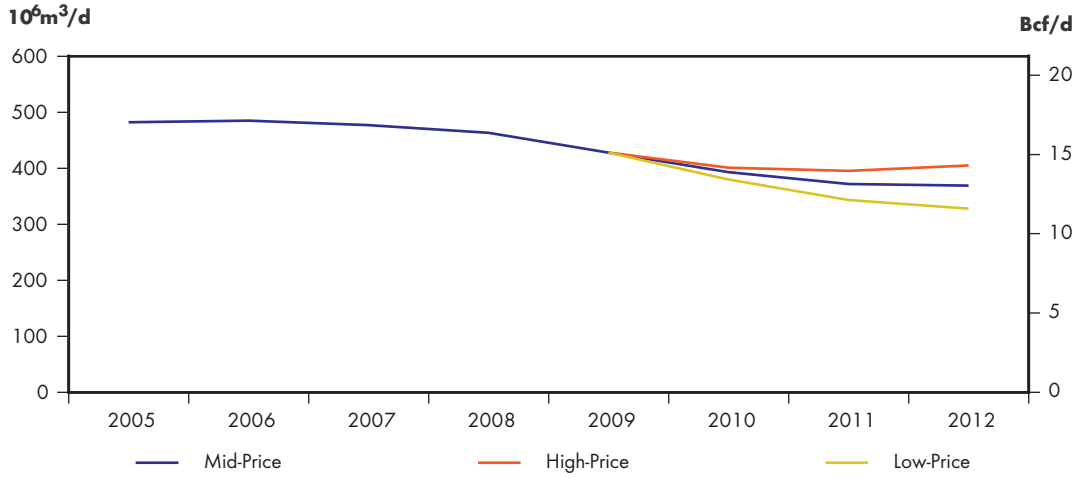

FIGURE 3.2

Gas Intent Drill Days Comparison

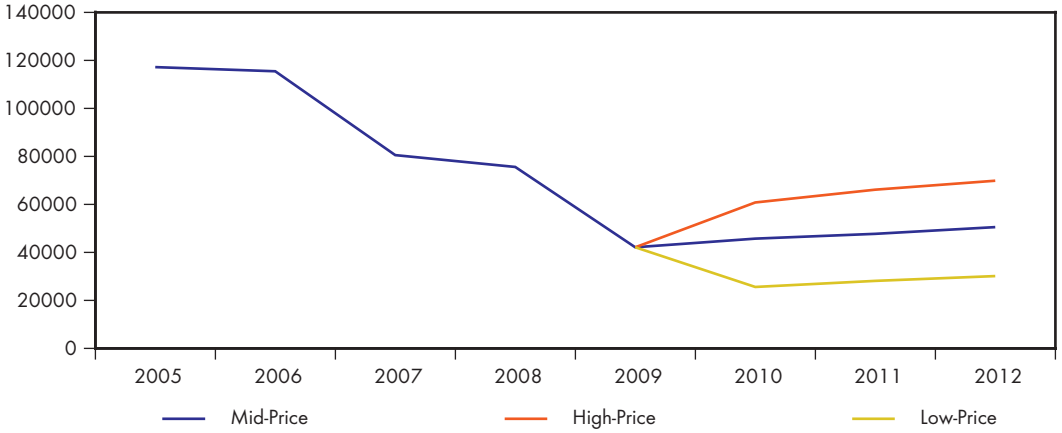

FIGURE 3.3

Gas Intent Wells Drilled Comparison

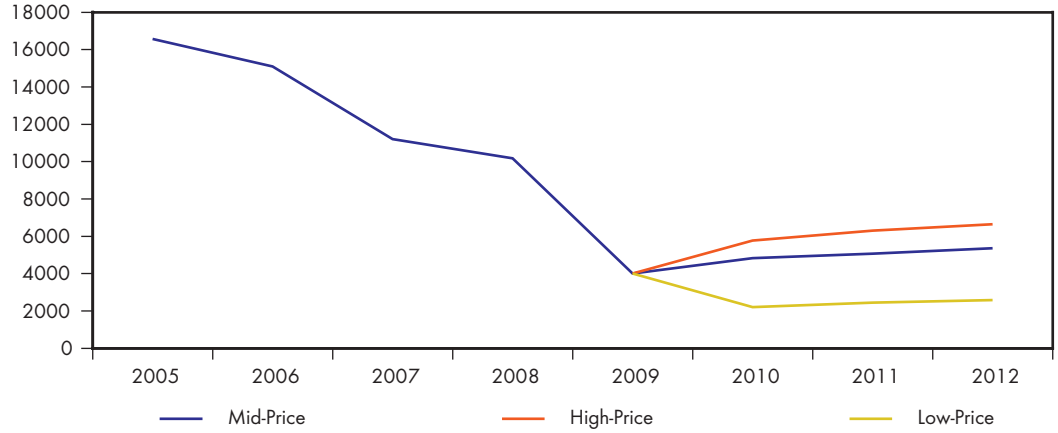

TABLE 3.2

Overview of Assumptions and Deliverability Results - Mid-Price Scenario

	Average HH Price	Gas Intent Drill Days	Gas Intent Wells	Average Deliverability	
	$US/MMBtu			$10^6m^3/d$	Bcf/d
2009E	$4.06		4 000[1]	428	15.1
2010	$5.50	45 659	4 819	393	13.9
2011	$6.00	47 735	5 075	372	13.1
2012	$6.75	50 512	5 358	369	13.0

1. PSAC 2009 Estimate as of 27 January 2010.

3.2 High-Price Scenario

This scenario was created using the most optimistic economic projections resulting in an undersupplied North American gas market. Actual growth in the economy not only recovers natural gas demand lost in 2009, but incrementally builds on it. As deliverability decreases in the United States and Canada, gas prices move substantially higher since LNG imports cannot completely fill the gap. This combination would drive Henry Hub gas prices to $6.50/MMBtu in 2010 and to $7.75 by 2012. This does not take into account other events which may drive prices higher for a short period, such as cold winter or hot summer weather, and weather-related supply interruptions.

Deliverability Results:

Deliverability in this scenario continues to decline in 2010, despite activity increases over the year. Deliverability drops from 428 $10^6m^3/d$ (15.1 Bcf/d) in 2009 to 401 $10^6m^3/d$ (14.2 Bcf/d) in 2010. After a decline in 2011 to 395 $10^6m^3/d$ (13.9 Bcf/d), Canadian deliverability rebounds slightly in 2012 to 405 $10^6m^3/d$ (14.3 Bcf/d). Tight gas and shale gas are the primary contributors to this increase, but at some point, shallower, less complex developments would also attract more capital as supply shortages in deep rigs and pressure pumping forces producers to look at other targets. British Columbia Montney and Horn River deliverability increases more rapidly in this scenario, from 12.1 $10^6m^3/d$ (428 MMcf/d) in 2009 to 74.2 $10^6m^3/d$ (2.6 Bcf/d) in 2012.

Implications:

Though overall deliverability drops, this scenario sees a large increase in drilling activity over the projection period and with it, increased employment and spinoff economic activity such as in hotels, restaurants and other businesses that typically support field operations. The decline in deliverability would affect the net amount of Canadian produced gas exports to the United States. In this scenario, new sources of demand (such as vehicles or incremental power generation) could eliminate any oversupply and return the market to conditions where demand growth is limited by availability of supply, as seen in 2005-2007. In Canada, increased activity would lead to higher drilling costs; that would tend to reinforce the upward pressure on gas prices.

Full results of this scenario are available in Appendix C.

TABLE 3.3

Overview of Assumptions and Deliverability Results - High-Price Scenario

	Average HH Price	Gas Intent Drill Days	Gas Intent Wells	Average Deliverability	
	$US/MMBtu			$10^6m^3/d$	Bcf/d
2009E	$4.06		4 000[1]	428	15.1
2010	$6.50	60 679	5 767	401	14.2
2011	$7.00	66 011	6 309	395	13.9
2012	$7.75	69 742	6 652	405	14.3

1. PSAC 2009 Estimate as of 5 November 2009.

3.3 Low-Price Scenario

This scenario was based on a more pessimistic macroeconomic picture. Generally this scenario reflects small positive growth in the economy, but with little to no increase in demand. The United States would be in a position to require a lower level of imports from Canada, only relying on them during times of peak demand. This would translate into Canada being called on for domestic demand, plus sporadic exports. As well, gas from western Canada would have to compete with LNG for the United States import market, and in this scenario, a global surplus of LNG supply would tend to disadvantage WCSB gas in that competition. Tight gas and shale gas activity would increase, but at more modest rates. Crude oil drilling would attract more drilling capital in Canada, and although overall activity levels may remain constant in this scenario, the share of dollars allocated to gas would steadily decline.

Deliverability Results:

Overall deliverability continues to drop, by 100 $10^6m^3/d$ (3.5 Bcf/d) from 428 $10^6m^3/d$ (15.1 Bcf/d) to 328 $10^6m^3/d$ (11.6 Bcf/d) over the projection period. In this scenario, deliverability would continue to drop until a tighter continental supply/demand balance puts upward pressure on prices leading to an increase in exploration and development beyond 2012. Canadian deliverability would still be greater than projected domestic demand during the projection period.

Implications:

The longer term implications in this scenario include lower prices for consumers but also lower levels of employment and spending by the natural gas sector, as well as the reduction in Canada's ability to pioneer new technologies and processes in gas exploration. There would likely be a net outflow of skilled workers and businesses as capital pursued more economic prospects. This would in turn reduce government revenue in land sales, royalties and taxes from the industry. Lower prices would also encourage natural gas consumption, but without sustained economic growth this would not result in a large scale demand shift.

Full results of this scenario are available in Appendix C.

TABLE 3.4

Overview of Assumptions and Deliverability Results - Low-Price Scenario

	Average HH Price	Gas Intent Drill Days	Gas Intent Wells	Average Deliverability	
	$US/MMBtu			$10^6m^3/d$	Bcf/d
2009E	$4.06		4 000[1]	428	15.1
2010	$4.25	25 588	2 201	380	13.4
2011	$4.75	28 019	2 450	343	12.1
2012	$5.25	30 066	2 576	328	11.6

1. PSAC 2009 Estimate as of 5 November 2009.

OTHER CONSIDERATIONS

Natural gas activity and deliverability will be driven by a number of issues that have the potential to alter Canadian drilling activity and deliverability. The considerations listed below do not capture all additional drivers, but instead provide an indication of important factors moving forward.

- Changing social and environmental concerns such as land and water use;
- Growth of historical sources of gas demand, such as power generation and industrial use;
- Effect on demand from efficiency gains in end-use markets;
- Performance of new resource plays and the subsequent impact on future activity levels. Steep early declines in shale gas regions may lead to a need for higher baseline drilling to maintain deliverability;
- Transportation costs, both for existing infrastructure and any planned additions;
- The LNG equation: How much is imported (and at what price)? Will development in Canada be affected?
- Cost escalation in gas activity. Labour costs are typically a major driver of drilling and service costs in western Canada;
- Ability of producers to access capital in a global marketplace; and
- Fiscal and regulatory conditions relative to other jurisdictions and their impacts on development.