Security of Natural Gas Supply for the Pacific Northwest

Prepared for
Puget Sound Energy

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Summary of Forecast Comparisons

Introduction:

Global Insight has prepared a report for Puget Sound to tabulate and compare its own and publicly available forecasts of the North American natural gas market focused upon the security of natural gas supply for the Pacific Northwest to include discussion of the natural gas supply and demand balance for the U.S. and Canada, the supply basins serving the Pacific Northwest and the prospects for LNG imports to the West Coast.

Publicly available forecasts and energy information were gathered from the energy departments or ministries of the U.S. and Canada and from industry associations and agencies that report upon natural gas resources.

Energy Information from Public Sources.

U.S. Energy Information Sources	Canadian Energy Information Sources
California Energy Commission	British Columbia Ministry of Energy, Mines and Resources
Energy Information Administration, Department of Energy	Canadian Association of Petroleum Producers
Federal Energy Regulatory Commission	Energy Resources Conservation Board, Alberta
National Petroleum Council	National Energy Board
U.S. Geological Survey, Department of the Interior	

Resources for the U.S. and Canada are discussed together followed by separate discussions of the U.S. and Canadian supply and demand forecasts. For the U.S., forecasts from Global Insight and the EIA are compared for price, supply and demand. For Canada, we compare forecasts from the NEB, Alberta and Global Insight.

Forecast Summary: Consumers can Continue to Rely upon Natural Gas to Meet Their Energy Needs

- The supply of natural gas in all three dimensions of production, reserves and resources has increased in the Rockies and in northern B.C. These expanded supplies are mainly due to development of unconventional sources (shale gas, coaled methane and tight formation gas). These supplies appear sufficient to meet the future gas needs of the region.

- World oil prices as well as U.S. natural gas prices are expected to remain relatively high by historical standards which will provide "support" for the development and production of the expanded supplies.

- Demand is growing in the Pacific and Northwest region - mainly due to increased demand for gas for electrical generation. Global Insight forecasts a 20% increase in gas demand for Washington and Oregon from 2007 to 2030.

- There is a need for more pipeline capacity from the Rockies to the Northwest, particularly as Canada will require a higher share of Alberta's natural gas production. Since generation demand is volatile, there may be a need for expanded gas storage facilities in the NW.

- LNG imports do not appear likely for the near to mid-term (until beyond 2015 or so). While numerous LNG terminals have been proposed, they lack commercial support in terms of dedicated supplies of LNG from producing countries.

- Arctic pipelines face cost escalation and a lengthy political process that continue to move an actual project further into the future. Most forecasts expect Arctic pipelines from Alaska and Canada's Mackenzie Delta to be available after 2020.

Resource Summary

Natural gas resources include reserves and estimates by experts in petroleum geology such as the Potential Gas Committee, the U.S. Geologic Survey and the National Petroleum Council. Also, official forecasting agencies develop rigorous assumptions on resource availability including the Energy Information Agency in the U.S. and Canadian agencies such as the National Energy Board, B.C. Ministry of Energy Mines and Resources and the Energy Resources Conservation Board in Alberta.

Recoverable proved reserves: The proved reserves of natural gas as of December 31 of any given year are "the estimated quantities of natural gas which geological and engineering data demonstrates with reasonable certainty to be recoverable in the future from known natural oil and gas reservoirs under existing economic and operating conditions, i.e., prices and costs as of the date the estimate is made."

The Securities and Exchange Commission(SEC) rule 4-10(a)(2) of Regulation S-X quoted above is being revised. The new rules for reporting natural gas reserves in financial statements will to:

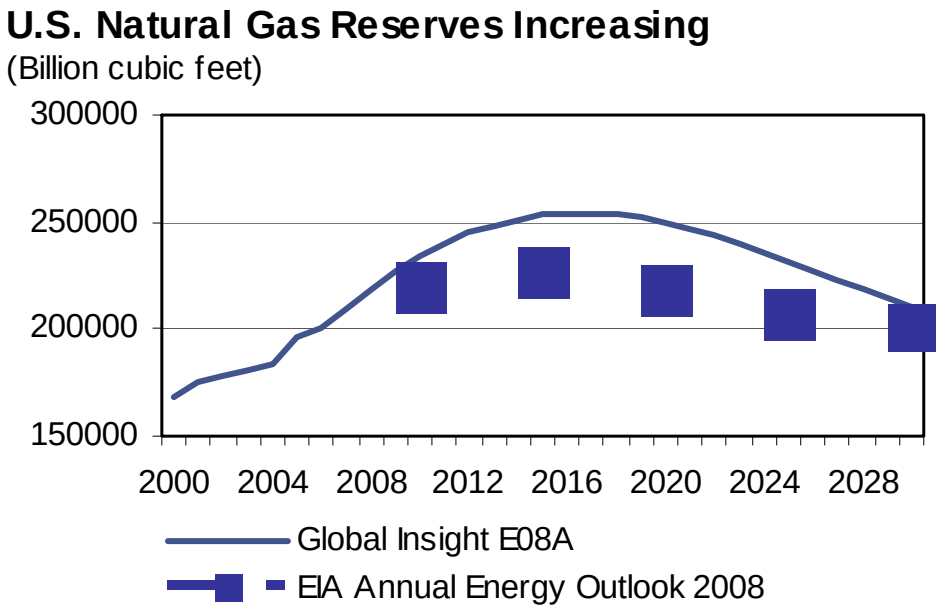
- allow previously excluded resources such as coalbed methane and shale gas to be classified as reserves,
- require companies to report reserves using an average price for the prior 12 month period(as opposed to year-end prices), and;
- permit the use of new technologies to determine proved reserves if they have been demonstrated reliable such as advances in seismic technology that precisely define petroleum reservoirs.

Resources: Natural gas resources are determined with various degree of probability such as the probable, possible and speculative categories used by the U.S. Geologic Survey (USGS) to be ultimately recoverable with know technology. Reporting agencies rely upon the judgments of professional geologists and industry participants. Starting with the known plays and geologic characteristics, judgments are made with respect to the size and frequency with which natural gas deposits will be encountered in the play and the portion that will be ultimately recoverable.

Unconventional resources are estimated separately as shale gas and coal bed methane occur in basin centered or continuous deposits rather than in conventional reservoirs. Recent upward revisions in resource estimates reflect the inclusion of unconventional resources.

Estimates of Natural Gas Reserves are Increasing

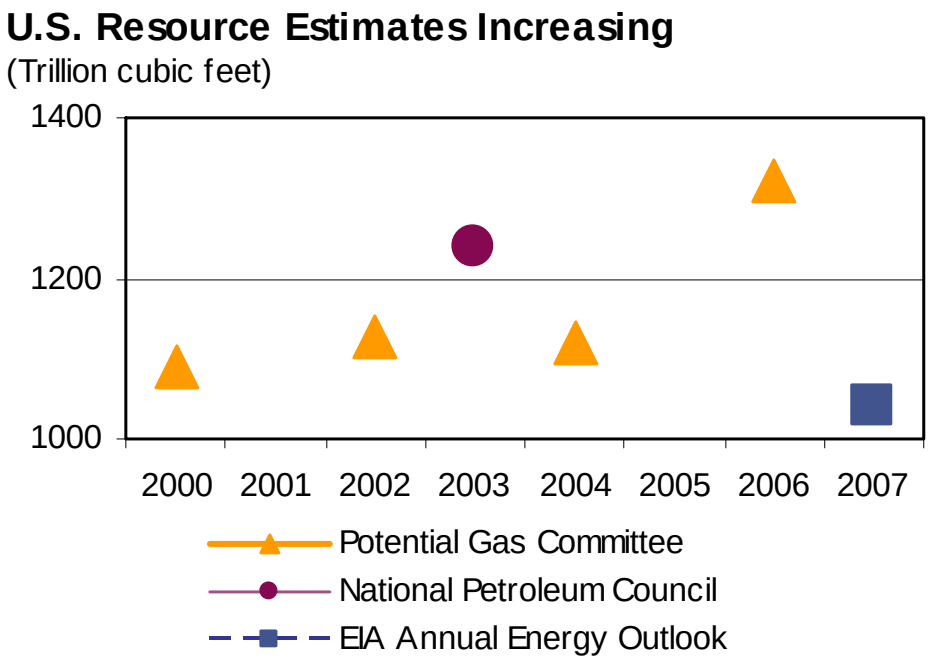
A more secure part of the resource base is proven reserves which are incremental to the estimates of unproven resources. Proven reserves as of year end 2006 add 211 tcf to the U.S. total supplies of natural gas available to meet future demand. Canadian reserves are 67.2 tcf for 2006. Preliminary reserve estimates for 2007 are 237.7 tcf for the U.S., an increase of 26 tcf during the year. Further increases are expected from the change in definition of reserves proposed by the SEC for 2010 but as the rules are still in process, reserves forecasts reflect the current rules in place.



Estimates of Natural Gas Resources are Increasing

Despite depletion of U.S. resources from the cumulative production of natural gas at the rate of more than 20 tcf per year, estimates of the remaining resources are increasing. Thus remaining resources are adequate to not only sustain the level of natural gas production achieved in 2008 in the lower 48 states but to further increase it.

- In 2006, the Potential Gas Committee raised its estimate of resources to 1525 tcf (1320 tcf of undiscovered) the equivalent of 82 years of production at current rates and a 17% increase since 2004.
- The National Petroleum Council estimated resources at 1027 tcf in 2003 but only included 7 tcf for shale gas in the Barnett shale play.
- The Energy Information Agency used 1040 tcf for its resource estimate in its 2008 forecast and included 125 tcf of shale gas resource but had a small contribution from Alaska of 30.7 tcf compared to the 250 tcf and 258 tcf estimated by the PGC 2006 and NPC 2003.
- The USGS estimates resources by area and does not try to provide an overall estimate for the U.S. However, it did estimate Barnett Shale resources of 26 tcf in 2003 a dramatic increase over the 7 tcf estimate provided by the NPC.



The Potential Gas Committee reports every two years upon the probable, potential and speculative resources located within the U.S. and has increased its estimates of resources for 16 years. More recently, the estimate of the remaining natural gas resources was increased by 17% or 200 tcf from 1119 tcf in 2004 to 1320 tcf in 2006 as the contribution of unconventional resources became recognized.

The EIA has also increased its estimate of remaining resources. In particular, shale gas resources have increased from almost nothing to the 125 tcf estimated by the EIA in 2007 while industry operators claims range from 200 tcf to as high as 800 tcf of shale gas resources.

Total resources are increasing because of the contribution of tight formations, coal bed methane and shale gas. The EIA includes 52% or 540 tcf of conventional resource and 48% or 500 tcf of unconventional resources. The NEB includes 302.3 tcf of conventional and 62 tcf of unconventional resource for Canada.

While the EIA includes only 30.7 tcf for Alaskan resource, the National Petroleum Council study in 2003 included 258 tcf.

North American Natural Gas Resources (Trillion cubic feet)

	Reserves 2006	Total Resources			
U.S.		NPC - 2003	USGS partial assessments	EIA-2007	PGC-2006
California	**2.2**	23	2.2	**13.5**	
West Coast Offshore	**0.6**	21			
Rocky Mountains	**46.9**	209	147.4	**265.4**	287.2
San Juan	**14.0**		50.6		
Permian	**16.4**	27	41	**79.8**	
Mid Continent	**36.7**	32	26.7	**139.5**	239.7
Gulf Coast Onshore	**46.0**	86	130.2	**194.2**	333
Gulf Coast Offshore	**15.3**	244		**223**	
Other U.S. Onshore	**22.7**	94	85.6	**93.9**	205.8
East Coast Offshore		33			
Alaska	**10.2**	258		**30.7**	250.8
Total U.S.	**211.1**	1,027		**1,040**	*1320.9*
Canada				**NEB-2007**	
Western Canada Sedimentary Basin				**139.0**	
Alberta	**40.2**				
British Columbia	**13.0**				
Saskatchewan	**3.5**				
Mackenzie Delta	**9.0**			**76.3**	
Other	**1.5**			**149.0**	
	67.2			**364.3**	

North American Natural Gas Resources (Trillion cubic feet)

			Conventional Resources		
	EIA -2007	EIA -2007	PGC-2006	Alberta-2004	B.C. 2006
U.S.					
California	7	7			
West Coast Offshore					
Rocky Mountains	31	31	233.6		
San Juan					
Permian	28	28			
Mid Continent	71	71	232.2		
Gulf Coast Onshore	144.3	144.3	329.6		
Gulf Coast Offshore	223	223			
Other U.S. Onshore	5.1	5.1	169.3		
East Coast Offshore					
Alaska	30.7	30.7	193.8		
Total U.S.	540	540	*1154.8*		

	NEB - 2003	NEB - 2005	NEB-2007		
Canada					
Western Canada Sedimentary Basin			77.0		
Alberta	59.0	61.0		62	
British Columbia	10.0	27.0			35
Saskatchewan	1.0	1.0			
Mackenzie Delta	55.0	52.0	76.3		
Other	172.0	144.0	149.0		
	296.9	285.0	302.3		

North American Natural Gas Unconventional Resources (Trillion cubic feet)

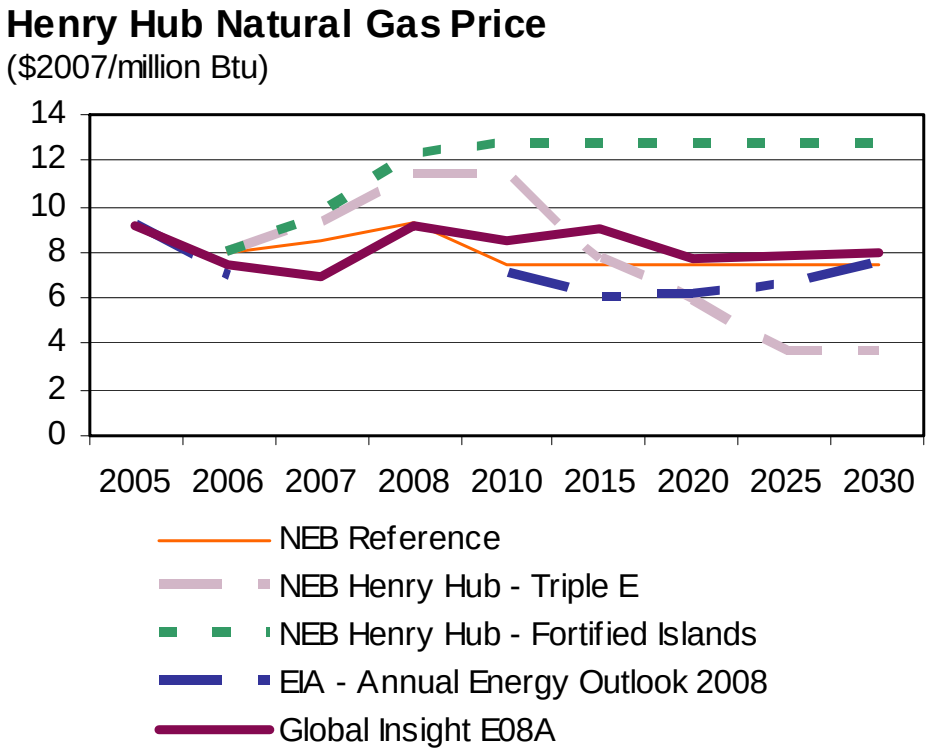
	Tight	EIA - 2007 Shale	Coalbed	PGC - 2006 Coalbed
U.S.	6.5			
California				
West Coast Offshore	164.2	14.3	55.9	53.6
Rocky Mountains				
San Juan	13.8	38		
Permian	17.5	45	6	7.5
Mid Continent	46.2	0	3.7	3.4
Gulf Coast Onshore				
Gulf Coast Offshore	56	27.7	5.1	36.5
Other U.S. Onshore				
East Coast Offshore				57
Alaska	304	125	71	*166.1*
Total U.S.				

	NEB Tight	NEB Shale	NEB Coalbed
Canada	21	6	35
Western Canada Sedimentary Basin			
Alberta			
British Columbia			
Saskatchewan			
Mackenzie Delta			
Other	21.0	6.0	35.0

NATURAL GAS PRICE FORECASTS

Prices Remain High by Historical Standards

- Henry Hub prices have been between $4 and $13 in the past four years, with an average of $8 during this period.
- Henry Hub prices in 2006 dollars average $6.64 for 2010 to 2030 in the EIA forecast, $7.41 in the NEB forecast and $8.21 in the Global Insight E08A forecast.
- Henry Hub natural gas prices during the decade of the 1990's averaged $2.60 in 2007 dollars and will average about $6.50 in the 2000 to 2009 period and then increase further with the forecast of $8 for the 2010 to 2019 decade.
- Crude oil prices are expected to decrease from the record high levels of mid 2008. West Texas Intermediate prices in 2006 dollars average $62.67 for 2010 to 2030 in the EIA forecast, $52.95 in the NEB forecast and $82.85 in the Global Insight E08A forecast.
- West Texas Intermediate crude oil prices averaged $26 per barrel in 2007 dollars for 1990 to 1999 and will average about $55 per barrel for 2000 to 2009. Forecasts point to even higher prices in the next decade.



Natural gas prices remain volatile with a range of $4 to $13 for Henry Hub over the past four years. Forecasts of natural gas prices indicate long term averages and provide numerous alternative scenarios as a consequence. Global Insight expects three distinct phases to the natural gas market through to 2030:

- **Near-term (2008-2010)**: All forecasters expect natural gas prices to begin at a high level in 2008 due to a combination of strong growth in power sector demand, high oil prices and delays in development of LNG projects. From a high starting point, prices decline due to an increase in supply from unconventional sources and LNG. While new pipeline construction is adding competitive pressures in regional markets, advance development of supplies in the Rockies and shale gas plays to fill the pipelines is further depressing prices.
- **Medium-term (2010-2015)**: Forecasters generally show prices declining during this period as supply increases and demand growth slows though they have a mixed view of the contribution of unconventional gas and LNG to North American supply with the most recent forecasts more optimistic on unconventional and less optimistic on LNG. While all of the LNG projects that will be completed by 2012 are well known as lead times are 5 to 8 years, there have been almost no additional investment decisions in LNG since 2006. Supply costs for LNG projects have more than doubled since 2005 with delays and cost escalation slowing progress on projects not yet completed. Thus LNG supply after 2012 may not increase. A particularly important player is Russia which plans development of Arctic LNG by 2014, a project which is almost certain to be delayed. A shortfall in LNG is offset by more aggressive results from unconventional gas with shale gas supplies still on the uprise in 2015. There are risks arising from the demand in the power sector which will certainly be impacted by environmental policy but the specifics of carbon regulation are unknown and the net direction of the change varies across forecasters.
- **Long-term (2015-):** Global Insight expects to see a slowing of natural gas demand growth as renewable energy and conservation policies impact the power generation sector. The contribution of shale gas peaks around 2018 and attention turns to developing the Arctic pipelines. Further development of LNG proceeds across West Africa, Latin America, Australia and Oceania as the projects under discussion today complete a rather slow journey into fruition. High prices for natural gas support improved efficiency, new investment in unconventional production in the U.S. and Canada as well as the LNG development. North American gas prices follow oil prices down to some degree but are constrained by the marginal costs of production. Natural gas prices rise relative to oil prices even though real prices are constant. The dependence upon conservation and alternative energy for electric power supply presents an upside potential for natural gas demand rather than declining after 2020 with a consequent upside price risk.

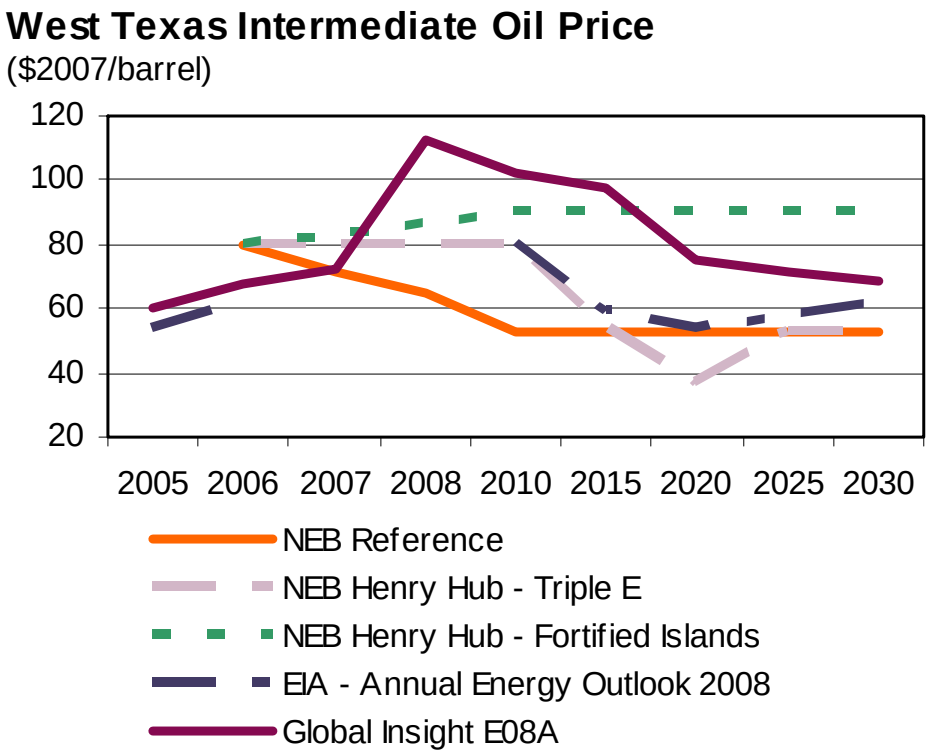
Long-term Oil Price Outlook for Declining Real Prices

We would highlight that oil prices are volatile and that the forecasts assume long term averages and provide numerous alternative scenarios as a consequence. Global Insight expects three distinct phases to the oil market through to 2020:

- **Near-term (2008-2010)**: All forecasters expect prices to decline due to combination of weaker demand (credit crunch, slowdown in non-OECD) and surge in new supply. This will result in a significant increase in spare capacity, which should restore more

confidence in supply. The upside and downside risks are balanced – weaker economic growth could unbalance the market more substantially and push prices lower, though with most new supply coming from OPEC. Upside risks relate to supply, particularly geopolitical risks in the Middle East.

- **Medium-term (2010-2015)**: Forecasters have a relatively good idea of new supply though to 2013 (3 to 5-year lead-in times for major new projects are the norm.) At about the time when OECD and non-OECD economies may again be growing strongly, we can see a worrying gap in supply. At this time new projects from 2010—13 are scarce and time is growing short, and even with modest demand growth, the spare capacity increase we see over the next 2 years will be entirely eroded. There are very significant risks of another price spike in this period. Upside risks predominate here. The only thing which might moderate a price rise will be a very sharp reduction in global demand. There is virtually no chance of supply coming in above expectations in this period.
- **Long-term (2015-):** Global Insight expects to see the effects of recent price rises and government policies already enacted beginning to have a more sustained effect on both supply and demand over the longer term. Improved efficiency, new investment in production and the more widespread use of alternative energy supplies should all begin to bring oil prices back down to the marginal cost of production in the more distant future. Consequently we forecast a falling real price out through the remainder of the forecast period, but would highlight upside price risks if it proves more difficult to shift away from oil (or reach new sources of supply). The risks to this period are driven primarily by policy responses, geopolitics and OPEC behavior.

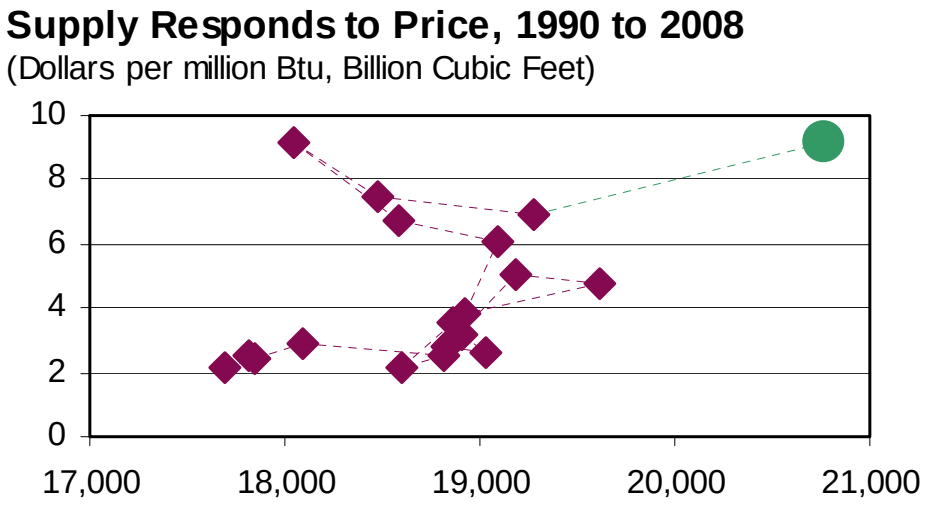


NATURAL GAS SUPPLY FORECASTS

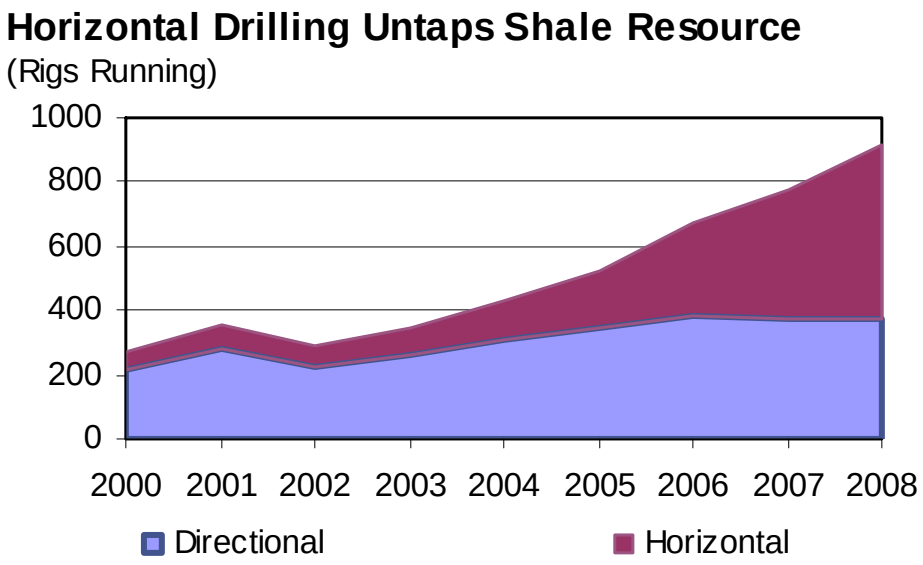
Highlights:

With prices rising for oil and natural gas during the first half of 2008, U.S. domestic natural gas production increases to 20.5 trillion cubic feet in 2008 up from 19.28 tcf in 2007. Recent trends in natural gas production reflect the higher prices as production increases are coming from unconventional resources with supply costs of $4 to $6. With price forecasts above the supply cost, both the EIA and Global Insight forecast that natural gas production will hold at or above the 2007 level.

- In the EIA forecast, U.S. natural gas production averages 19.5 tcf per year for 2010 to 2030.
- In the Global Insight forecast, U.S. natural gas production averages 21.6 tcf per year for 2010 to 2030.



Much of the production increase comes from unconventional resources. Production of natural gas from shale will increase substantially from 3.4 billion cubic feet per day in 2007 to 4.6 bcf/day in 2008 and 6.1 bcf/day in 2009. In the Global Insight forecast, shale gas production reaches 12 bcf/day by 2015. Production of shale gas and tight formation gas results from new technology that features horizontal drilling and precise fracturing of the formation. The number of rigs drilling horizontal wells has increased from 50 in 2002 to nearly 600 in 2008, indicating the strength of the production response to higher prices and technological advances.



U.S. Production is Expanding

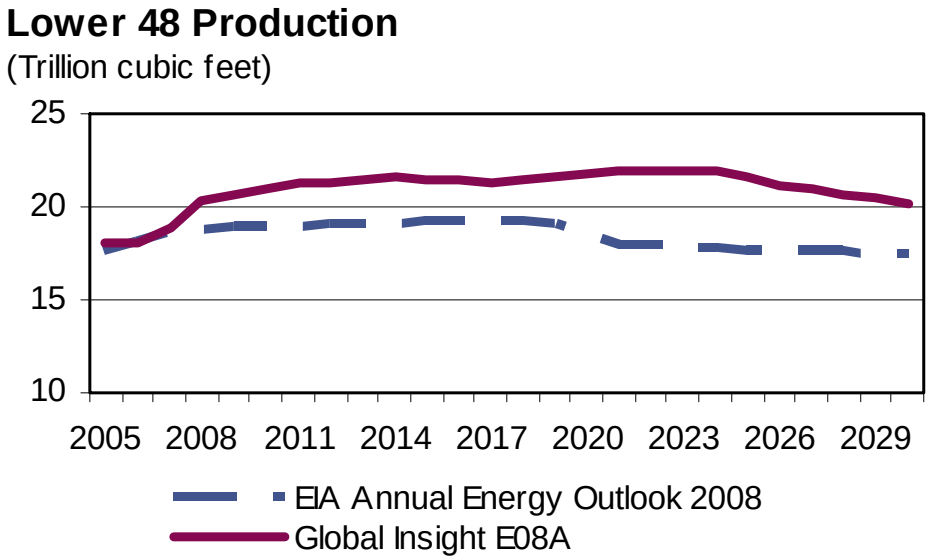
Rocky Mountain production is expected to increase by all forecasters. The EIA forecasts a 22% increase or 3.2 bcf/day from 12.3 bcf/day in 2007 to 15.5 bcf/day in 2030. Global Insight forecasts a 22% increase of 2.7 bcf/day to 15.1 bcf/day by 2030.

B.C. production is expected to decrease by 16% or 0.4 bcf/day in the National Energy Board forecast form 2.7 bcf/day in 2007 to 2.2 bcf/day in 2030. Global Insight expects a smaller decrease of 0.3 bcf/day. The B.C. government is more expansive about resources and future developments but does not produce a forecast.

Natural Gas Production Shifting
(Billion cubic feet per day)

	2007	2030	% Change
Rocky Mountains and San Juan			
EIA	12.33	15.51	**26%**
Global Insight	12.36	15.07	**22%**
British Columbia			
NEB	2.65	2.22	-16%
Global Insight	2.76	2.44	-12%
Alberta			
NEB	12.65	4.94	**-61%**
Global Insight	13.25	7.59	**-43%**

Supply is also responding to price, particularly in 2008. Shale resources became widely developed after prices surpassed $8 in 2005. Thus more recent forecasts are more optimistic about U.S. supply. In particular, the EIA short term forecast expects U.S. lower 48 dry natural gas production to reach 20.4 tcf in 2008 whereas the EIA 2008 Annual Energy Outlook projects 18.77 tcf. Global Insight forecasts 20.36 tcf for the lower 48 in 2008 in the E08A outlook.



Production Depends upon Reserves

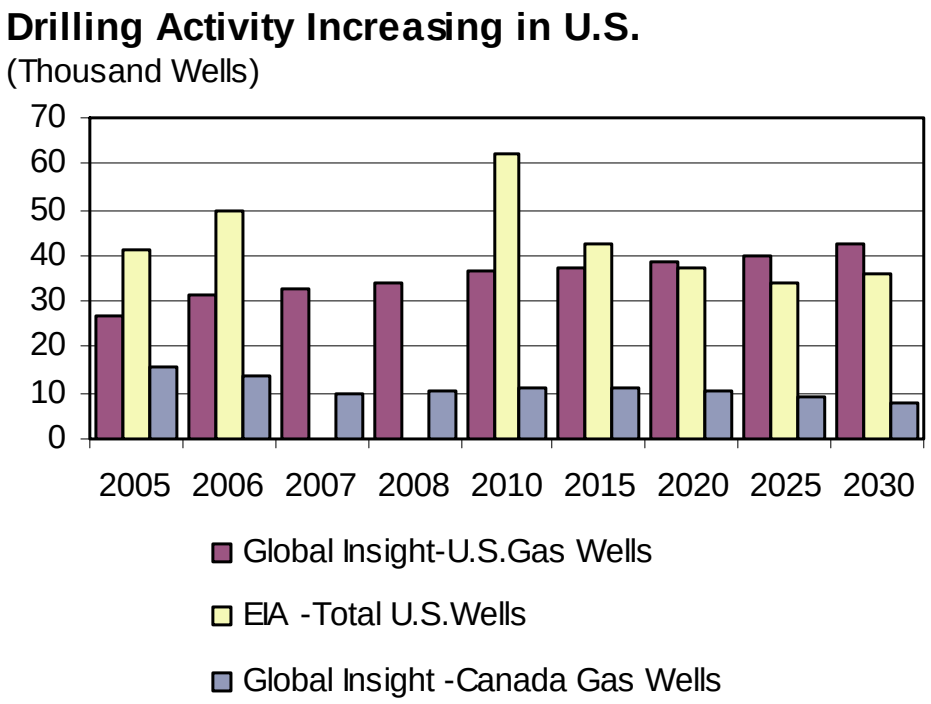
Natural gas reserves are increasing in the U.S. from a low of 162 tcf in 1993 to 211 tcf in 2006 and a preliminary estimate of 238 tcf for 2007. Global Insight forecasts reserves in the lower 48 to peak at 254 tcf in 2017. In addition, Alaskan reserves add 11.9 tcf in 2007 and more than 30 tcf when the Prudhoe Bay gas field is included. The EIA expects reserves to peak at 227 tcf in 2015.

Drilling Activity on Rise

U.S. gas well drilling increases from 33,000 wells in 2007 to 42,200 in 2030 in the Global Insight forecast.

EIA expects U.S. drilling to rise from 49,700 wells in 2007 to 62,300 in 2010 then decline to 35,700 by 2030.

Canadian drilling of gas wells peaked at 15,900 in 2006 and fell to 9,600 in 2007. Global Insight expects Canadian drilling activity to rise until 2015 to reach 11,400 gas wells before entering a gradual decline.



U.S. production will increase as horizontal drilling opens up the abundant resources of shale and tight formation. U.S. resources in shale and tight formations have long been known but have been too costly and difficult to produce in large scale until the recent application of horizontal drilling and fracturing technology.

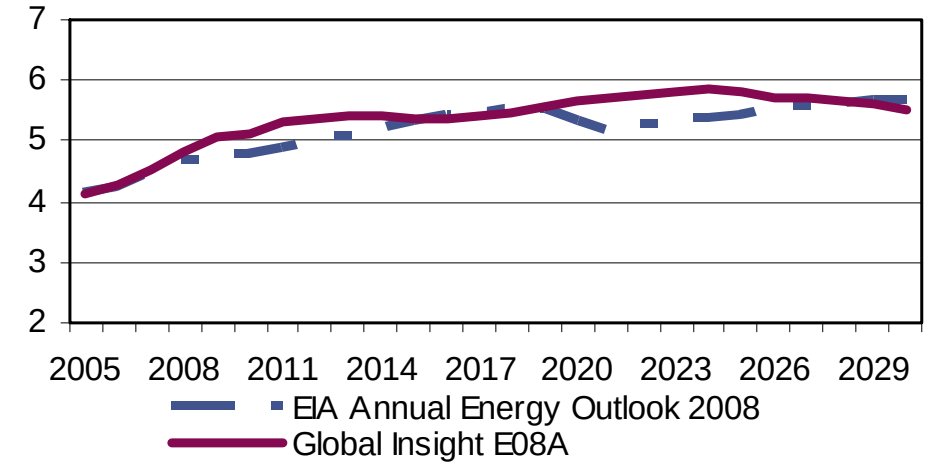
- Horizontal rigs have increased from 50 in 2002 to 550 in 2008. Productivity of the new rigs is enhanced in many ways including pad drilling where one rig can drill up to two dozen wells from one location thus eliminating the time and expense of moving and setting up prior to drilling.

- Resource estimates for the U.S. were increased by 270 trillion cubic feet (tcf) for the shale and tight sands regions of the Rocky Mountains, Mid continent and Gulf Coast onshore from 327 Tcf in the 2003 National Petroleum Council study to 598 tcf in the 2007 Energy Information Agency assessment. Industry estimates of the contribution of Fayetteville, Haynesville and Marcellus shale deposits would add up to 100 tcf more.

Rocky Mountain production is expected to increase by all forecasters. The EIA forecasts a 22% increase or 3.2 bcf/day from 12.3 bcf/day in 2007 to 15.5 bcf/day in 2030. Global Insight forecasts a 22% increase of 2.7 bcf/day to 15.1 bcf/day by 2030.

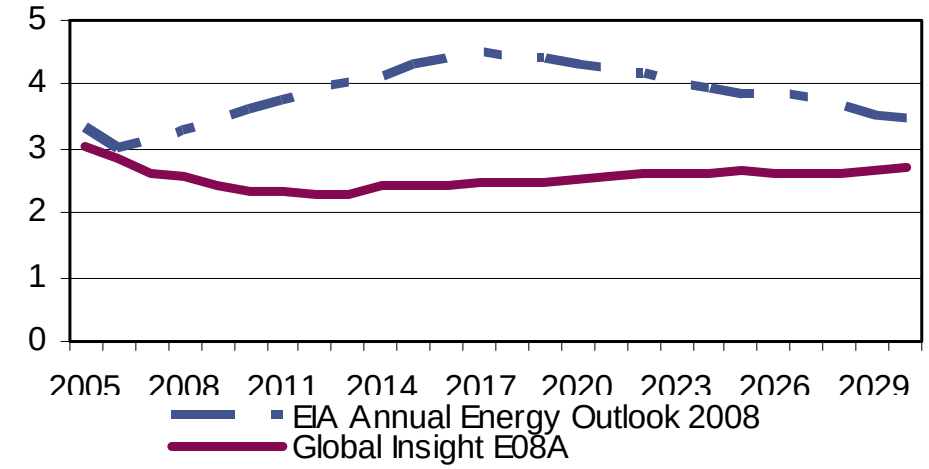
Rocky Mountains Production Rising

(Trillion cubic feet)



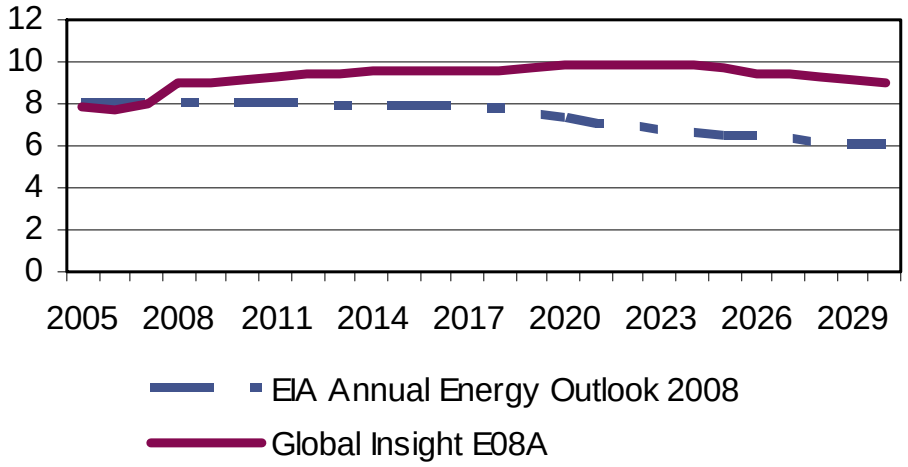
Deep Gulf Drives Offshore Production Up

(Trillion Cubic Feet)



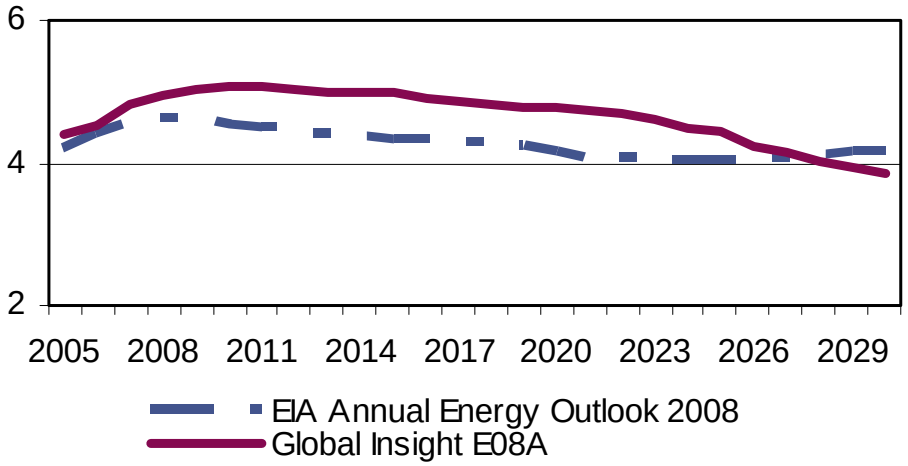
Gulf Coast Production Robust

(Trillion cubic feet)

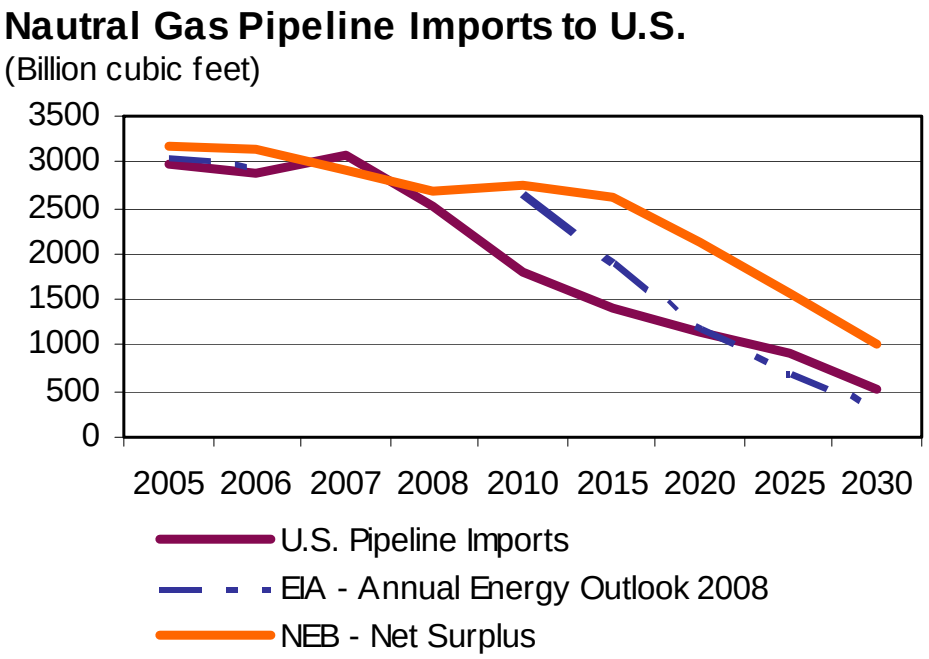


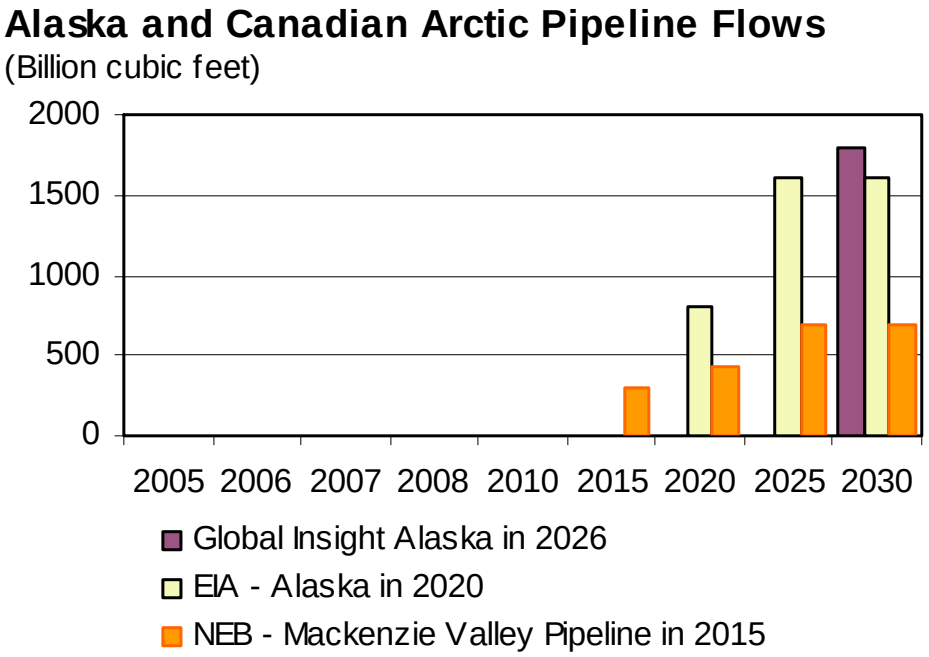
Mid-Continent Production to Decrease

(Trillion cubic feet)



Pipeline Imports





LNG Imports

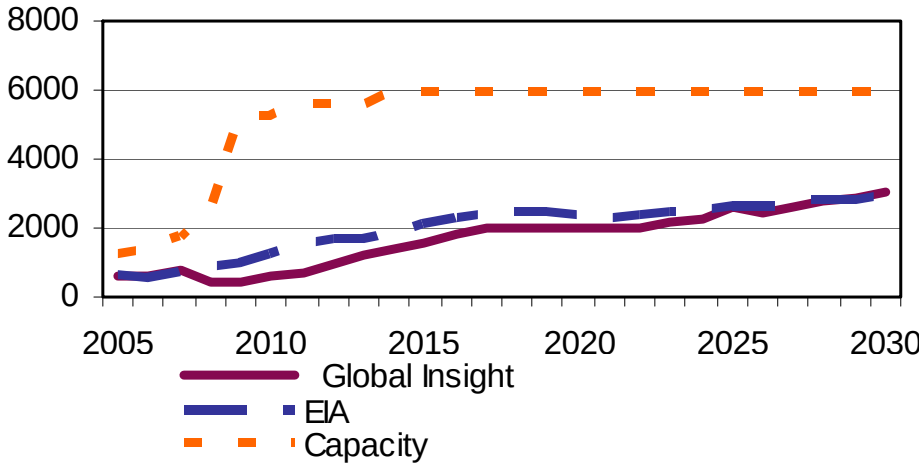
The Sempra Energia Costa Azul LNG terminal is ready for operation but will receive few cargoes in 2008 and 2009. Sempra has diverted its Tangguh LNG supplies to South Korea

under a 3 year contract at a value approaching $20 per million Btu. Imports to the Sempra LNG terminal are expected to begin in 2009 at a reduced rate.

- No additional LNG terminals are included on the West Coast of the U.S. or Canada in the Global Insight forecast. Lack of supply of LNG in the near term and competition from Alaskan gas in the long term make LNG terminals questionable investments. Most U.S. LNG terminals are sitting idle in 2008.
- The NEB includes a small LNG terminal in British Columbia starting in 2017. The terminal would have capacity of 0.25 bcf/day.
- Mexico is going ahead with a second west coast LNG terminal which will be supplied from Peru LNG. Chile is also developing an LNG terminal.

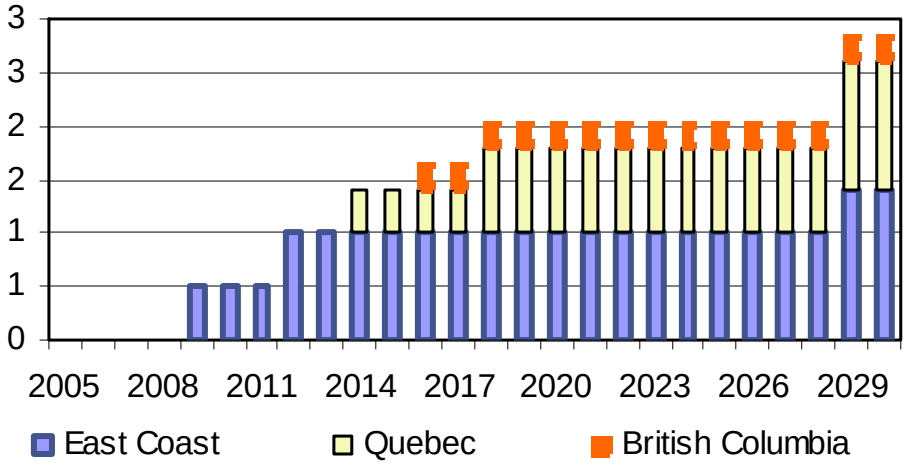
LNG Imports to Increase

(Billion cubic feet per year)



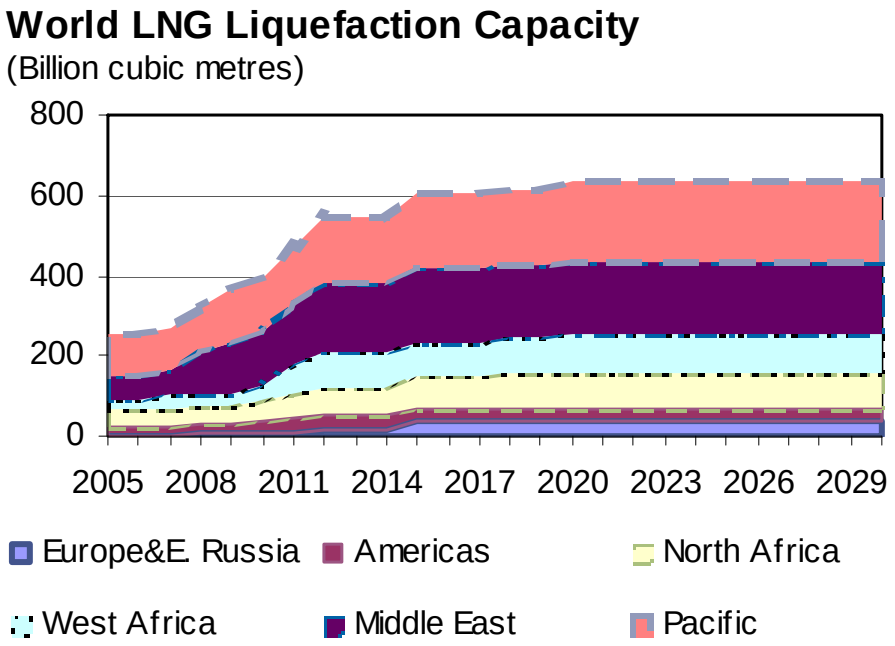
Canadian LNG Terminal Capacity NEB Forecast

(Billion cubic feet per day)



World LNG liquefaction capacity reached 259 billion cubic metres (BCM) in 2007 with production of 226 BCM. In the Global Insight forecast, world LNG capacity will increase by 120% by 2015.

- There are 129 BCM of new LNG plants under construction which will raise capacity to 395 BCM by 2010 with exports of 291 BCM, an increase of 30% or 65 BCM from 2007.
- By 2025, world capacity reaches 577 BCM with exports of 450 BCM, an increase of 100% from 2007 levels.



World LNG Capacity Expansion
(Billion Cubic Metres)

	Operational	Under Construction	Planned and Feasibile	Global Insight View Capacity	Global Insight View Exports
Asia Pacific	**102.8**	18.1	65.0		
2010				**120.9**	97.4
2015				**144.8**	125.5
2025				**160.4**	151.5
Europe/Russia	0.0	18.9	28.0		
2010				18.9	5.6
2015				46.9	17.6
2025				46.9	17.6
Africa	69.9	13.6	107.1		
2010				89.6	75.5
2015				165.8	121.2
2025				183.7	150.6
Middle East	64.4	73.1	60.3		
2010				137.5	87.5
2015				184.1	160.0
2025				184.1	135.4
Americas	22.4	6.2	14.4		
2010				28.6	25.4
2015				35.8	26.4
2025				35.8	28.3
World	259.5	129.9	274.9		
2010				395.6	291.4
2015				577.3	450.8
2025				610.8	483.4

LNG Terminal Capacity Expanding

Country/Region	Year Expected	Capacity (bcf/day)	Capacity holder	Supply Sources
Canada				
Irving	2009	**1.00**	Repsol	Trinidad
Rapaska	2014	**0.40**	EdF, HydroQuebec, Gaz Metro	Russia
U.S. East Coast				
Distrigas		**0.70**	Suez	Trinidad
NE Gateway		**0.40**	Excelerate Energy	
Neptune		**0.40**	Suez	
Cove Point		**1.00**	Shell, BP, Statoil	Trinidad, Norway, Nigeria
Cove Point Expansion	2009	**0.80**	Statoil	
Elba Island		**0.80**	Shell, BG Group	Trinidad, Nigeria, Eqypt, Eq. Guinea
Elba Island Expansion	2011	**0.90**		
U.S. Gulf Coast				
Lake Charles		**1.80**	BG Group	Trinidad, Nigeria, Eqypt, Eq. Guinea
Excelerate Energy		**0.50**	Excelerate Energy	
Freeport LNG		**1.75**	ConocoPhillips, Dow	
Sabine Pass		**2.60**	Chevron, Total	Nigeria, Yemen, Qatar
Cameron		**1.50**	ENI	
Golden Pass		**2.00**	ExxonMobil, Qatargas, ConocoPhillips	Qatar
U.S. West Coast (none included in forecast)				
British Columbia				
NEB forecast	2016	**0.25**	unspecified	unspecified
Mexico				
Altamira		**0.70**	Shell, Total	Nigeria, Trinidad
Energia Costa Azul		**1.00**	Sempra, Shell	Indonesia, Russia and Australia
Manzanillo	2011	**0.50**	Repsol	Peru
Total LNG Terminal		**19.00**		

NATURAL GAS DEMAND FORECASTS

- In the Global Insight forecast, the long term growth rate for natural gas demand is 0.5% for the U.S. with 0.6% for Pacific and 1.2% for the Mountain region.
- In the EIA forecast, the long term growth rate for natural gas demand is -0.03%, showing a decline from 2007 to 2030.
- The NEB forecast projects long term growth at 0.8% for Canada, 0.6% for B.C. and 0.4% for Alberta.
- Global Insight growth rates for Canada are 0.6% and 0.7% for both B.C. and Alberta.

Natural Gas Demand Growth In Question

(Average Annual Growth Rate, 2007 to 203

	EIA	Global Insight
U.S.	**-0.03**	0.5
Pacific	0.5	0.6
Mountain	**-0.9**	1.2

	NEB	Global Insight
Canada	0.8	0.6
B.C.	0.6	0.7
Alberta	0.4	0.7

U.S. natural gas demand increases by 12% or 2.8 trillion cubic feet (tcf) from 23.07 tcf in 2008 to 25.87 tcf in 2030 in the Global Insight forecast. Most of the demand growth occurs in the power sector as a consequence of environmental restrictions on other fossil fuels.

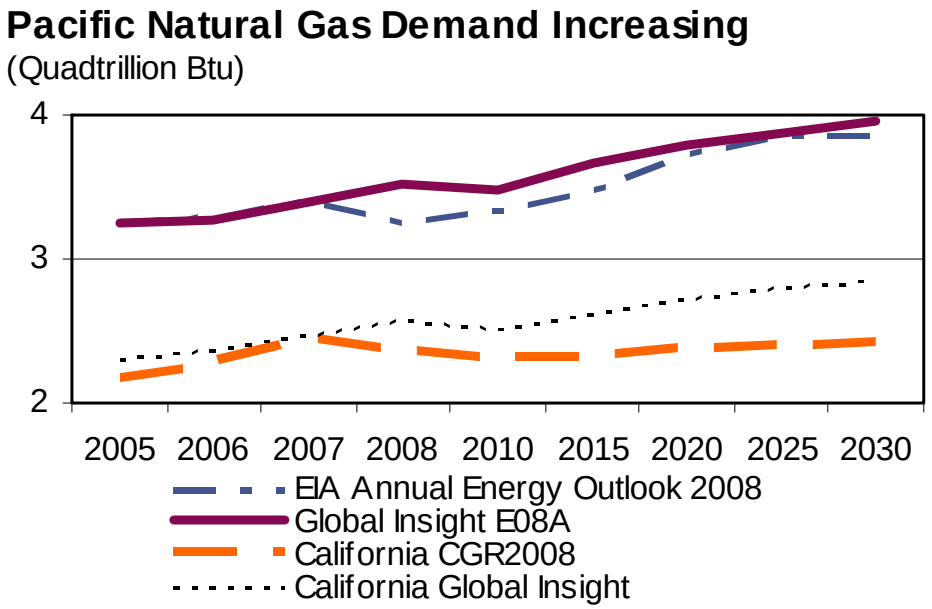
U.S. natural gas demand actually decreases in the Energy Information Agency (EIA) forecast by 0.8% or 0.3 tcf from 23 tcf in 2007 to 22.7 tcf in 2030 under the assumption of indefinite extension of existing energy policy under which, the power sector turns to less expensive coal generation to displace natural gas.

Pacific Northwest natural gas demand increases in the view of both the EIA and Global Insight. Natural gas demand in the Pacific region including Washington, Oregon, Alaska and California, is expected to grow by 13% from 2007 to 2030 in the EIA Annual Energy Outlook 2008. Global Insight expects a 16% increase in demand of 0.6 tcf from 3.2 tcf in 2007 to 3.8 tcf equivalent to 1.7 billion cubic feet per day (bcf/day).

There are, however, divergent views for **California** demand which contributes three quarters of Pacific demand. California demand as forecast by utilities within their own service territories remains at or below 2007 levels all the way to 2030. Global Insight expects an increase in California natural gas demand of 15% or 0.4 tcf from 2.4 tcf in 2007 to 2.8 tcf in 2030. While the EIA and Global Insight include the impacts from California's renew-

able energy and conservation initiatives, the California utilities are much more aggressive in their forecasts of natural gas demand reductions.

Natural gas demand in the states of **Oregon and Washington** increases by 20% or 0.3 bcf/day from 1.46 bcf/day in 2007 to 1.76 bcf/.day in 2030 in the Global Insight forecast.

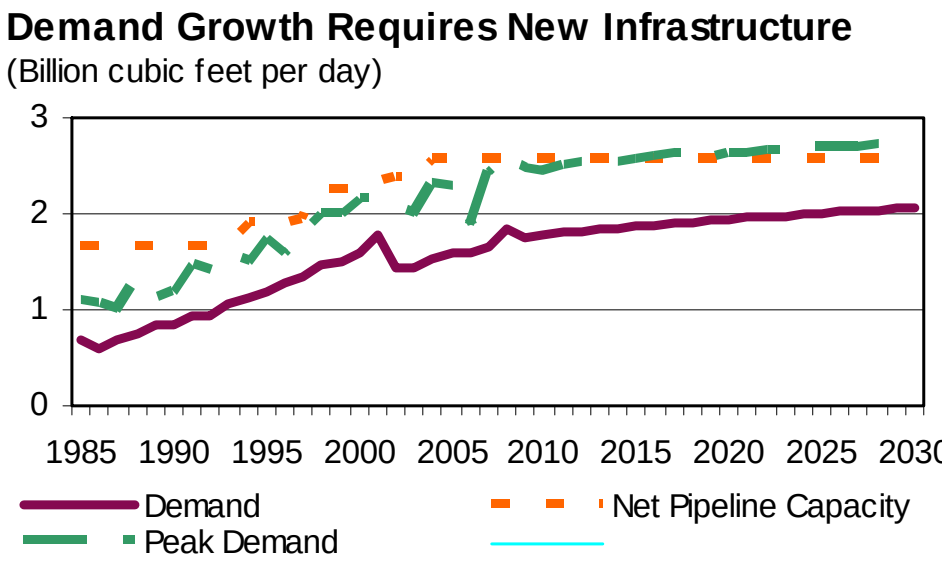


New Infrastructure Required to Meet Demand Growth in the Pacific Northwest

Natural gas supply for the Pacific Northwest faces limitations in meeting the projected demand growth. The primary limitation on Pacific Northwest natural gas supply is from pipeline capacity. Net pipeline capacity available to Washington and Oregon during peak winter periods is about 2.4 bcf/day.

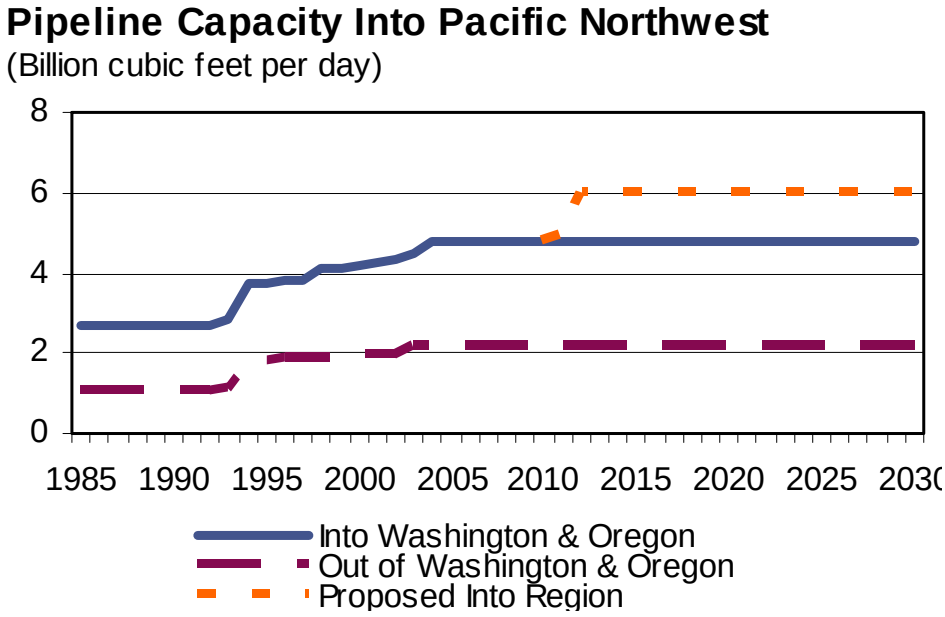
- Total pipeline capacity coming into the states of Washington and Oregon totals 4.7 bcf/day while capacity exiting the region to California and Nevada is 2.3 bcf/day.
- Part of the Northwest pipeline capacity is also used to supply Idaho and the Paiute pipeline with peak demand of 0.3 bcf/day in Idaho and capacity of 0.2 bcf/day to Reno, Nevada.
- The capacity dedicated to the Pacific Northwest is also augmented by whatever California does not use of the 2.3 bcf/day capacity on the Gas Transmission Northwest (GTN) pipeline at its terminus at Malin, Oregon.

With demand during winter months reaching 2.6 bcf/day for Washington, Oregon and Idaho and up to a further 0.2 bcf/day sent to Nevada from the Northwest pipeline on the Paiute pipeline, peak demand exceeds the pipeline capacity reserved for the Pacific Northwest. Supply is augmented by storage withdrawals that average 0.25 bcf/day in January and 0.23 bcf/day in February resulting in a tight balance.

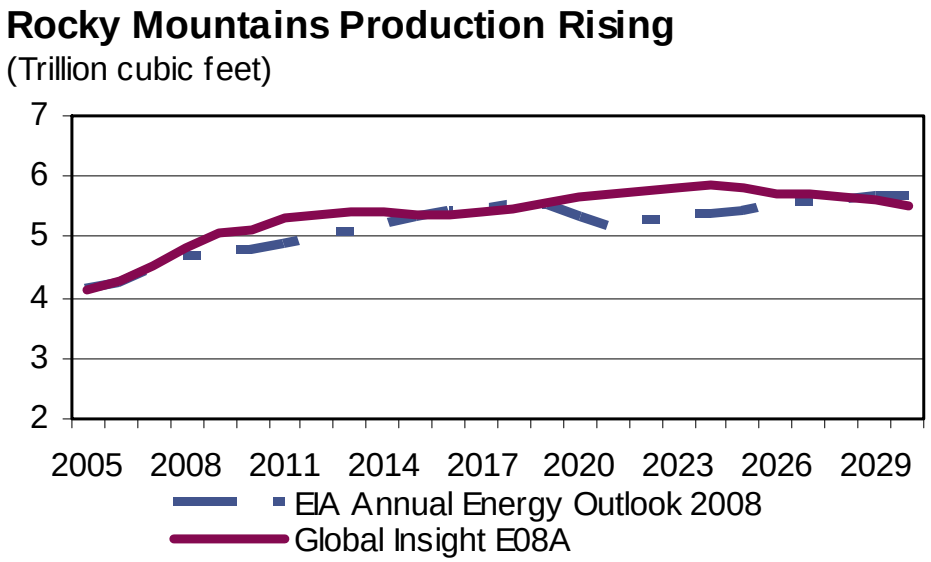


Supply limitations will be overcome by infrastructure expansions in all forecasts, mostly by expansion of pipelines from the Rocky Mountains. At present, the only pipeline serving the Rocky Mountains to the Pacific Northwest is Northwest pipeline from Opal, Wyoming but it has capacity to meet less than one third of annual demand and less than one quarter of peak demand.

Additional pipeline capacity from the Rocky Mountains is expected from either the $3 billion Ruby project of El Paso connecting Opal to Malin, Oregon or the TransCanada Sunstone project which parallels the existing Northwest pipeline from Opal, Wyoming to Stanfield, Washington. In addition, all forecasters expect Arctic pipelines to be built after 2020. Finally, though LNG terminals have been proposed they are not included in all forecasts.



The most likely source of new gas supply for the Pacific Northwest is the Rocky Mountain region where production is expected to increase by all forecasters. The EIA forecast projects an increase of 26% or 1.16 tcf from 4.5 tcf in 2007 to 5.66 tcf in 2030. The Global Insight forecast results in an increase of 22% or 1 tcf from 4.5 tcf in 2007 to 5.5 tcf in 2030.



The Pacific Northwest receives most of its existing supply of natural gas from Canada, a source which will contract in the forecast according to the national Energy Board (NEB). While British Columbia (B.C.) production forecasts vary from small increase to decrease, Alberta production is expected to decline precipitously by every forecaster.

Power Generation Outlook Mixed

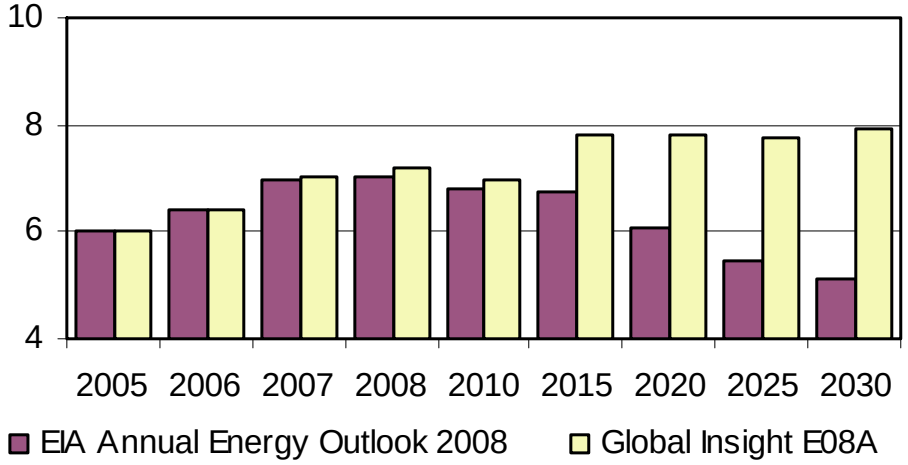
In all the forecasts, natural gas demand growth depends upon the power generation sector and reconciliation of diverse economic, energy and environmental drivers of power generation. Natural gas use for power generation grows because of environmental preferences relative to other fossil fuels. While the share of natural gas in total energy demand has eroded over the past decade, it will rise between 2005 and 2009. After 2010, the surge in renewable sources of energy will result in a trend decline in natural gases share of total energy.

- In the EIA forecast, natural gas consumption in power generation consumption declines precipitously, especially in those regions that use coal.

- In the Global insight forecast, natural gas consumption in power generation increases to meet baseload requirements in regions that cannot build coal plants and to provide backup to renewable generation.

Views Differ on Power Sector Demand Growth

(Quadtrillion Btus)



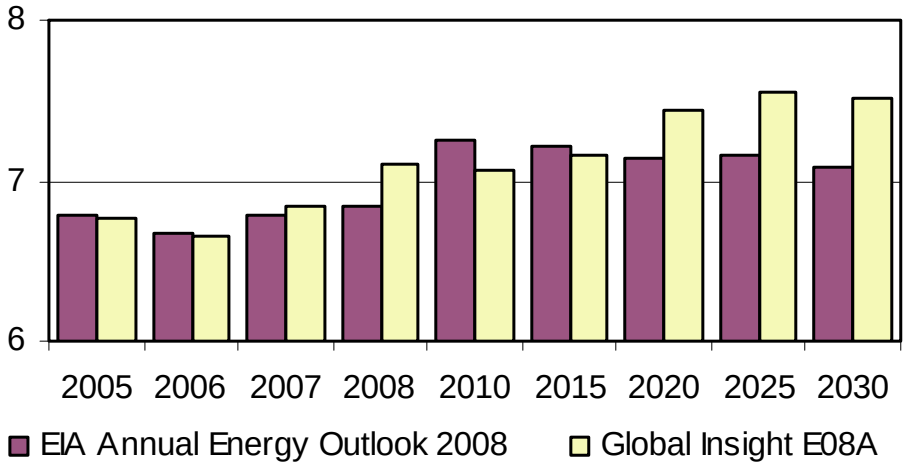
Industrial Natural Gas Demand Benefits from High Oil Prices

Industrial demand growth has resulted from the high oil prices as U.S. products made from natural gas are very competitive in world markets.

- U.S. ammonia production using natural gas is growing by 25% in 2008.
- Petroleum refiners are more intensively converting petroleum streams to products and relying more on natural gas as process fuel.
- U.S. petrochemical producers have a huge price advantage in using natural gas derivatives such as ethane as a feedstock versus the oil based feedstocks used in Europe and Japan.
- Similarly, U.S. industrial production fueled by natural gas can more readily replace imported goods made from petroleum abroad.

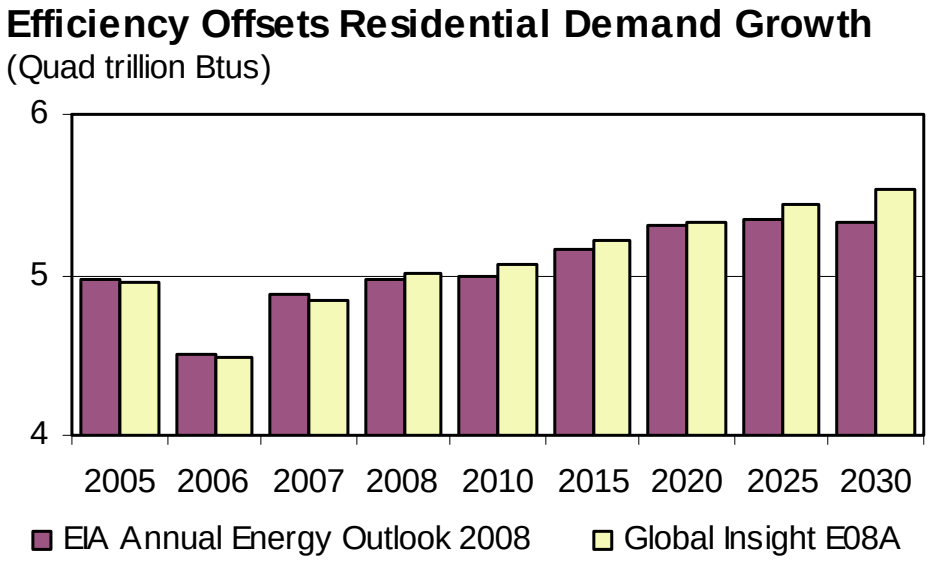
Industrial Demand Growth is Modest

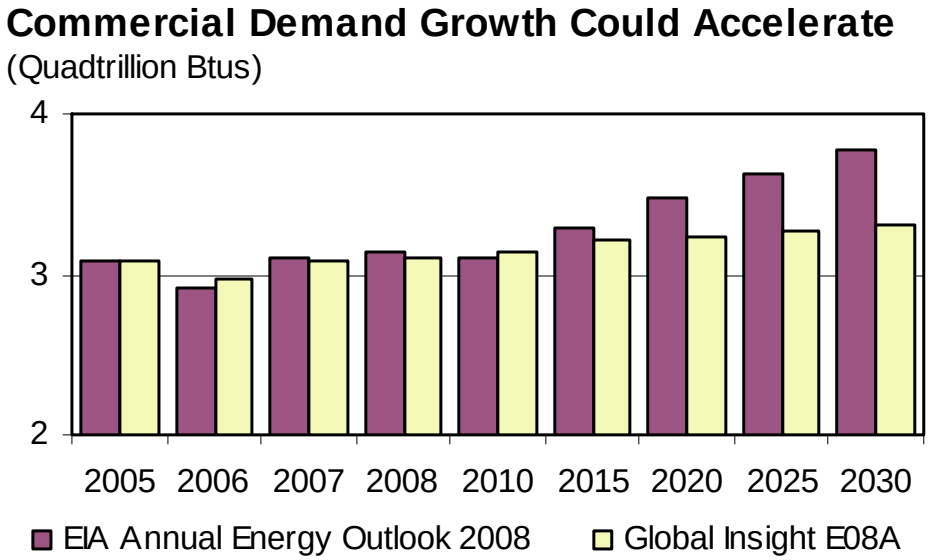
(Quadtrillion Btus)



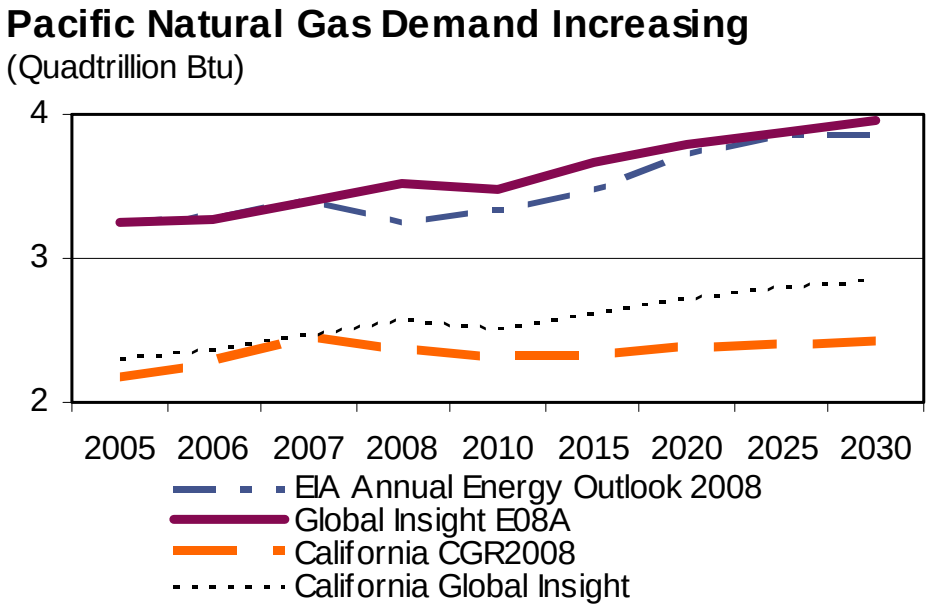
Residential and Commercial Natural Gas Demand Will Increase Slowly.

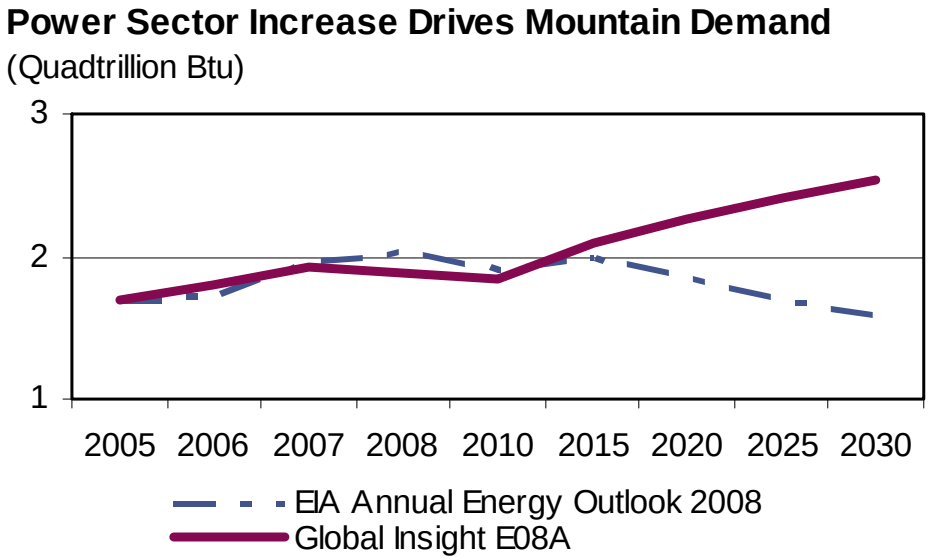
Demand growth for residential and commercial energy is driven down by the proliferation of Demand Side Management programs at the state level, more stringent appliance efficiency standards at the federal level and a decrease in energy intensity of typical applications. This results in significantly slower demand growth rates than in the 1990s, when energy prices were much lower.





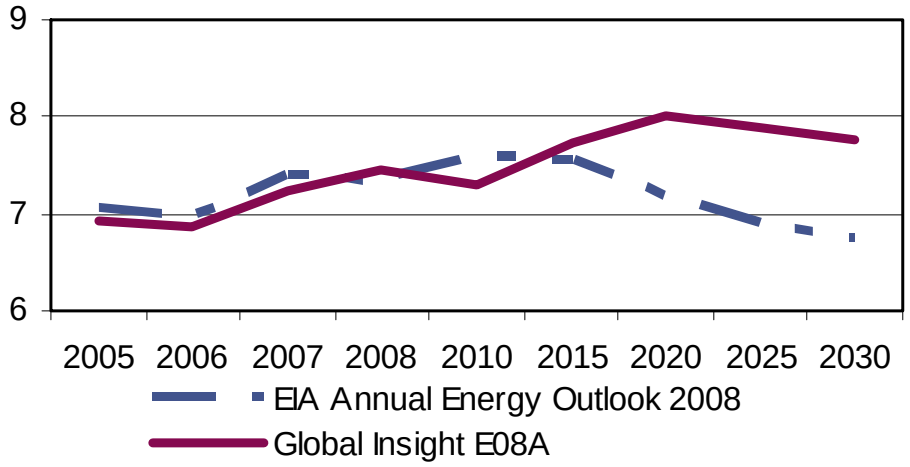
Regional Natural Gas Demand Comparison





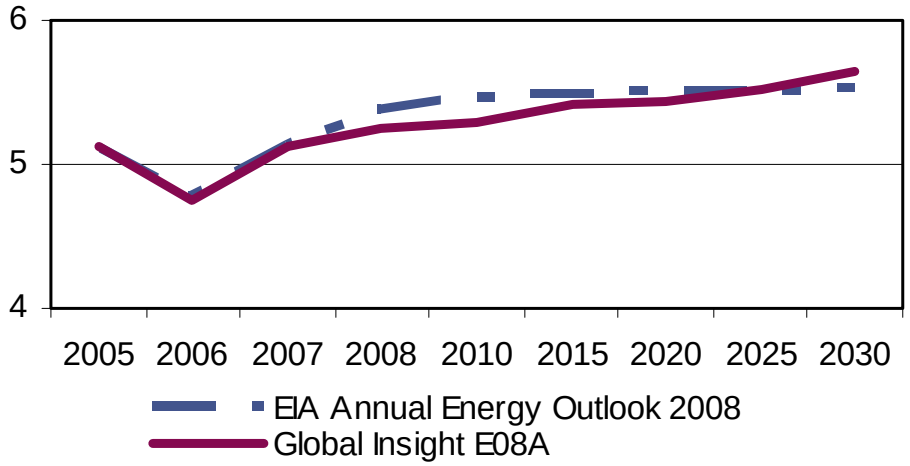
Power Sector Increases South Central Demand

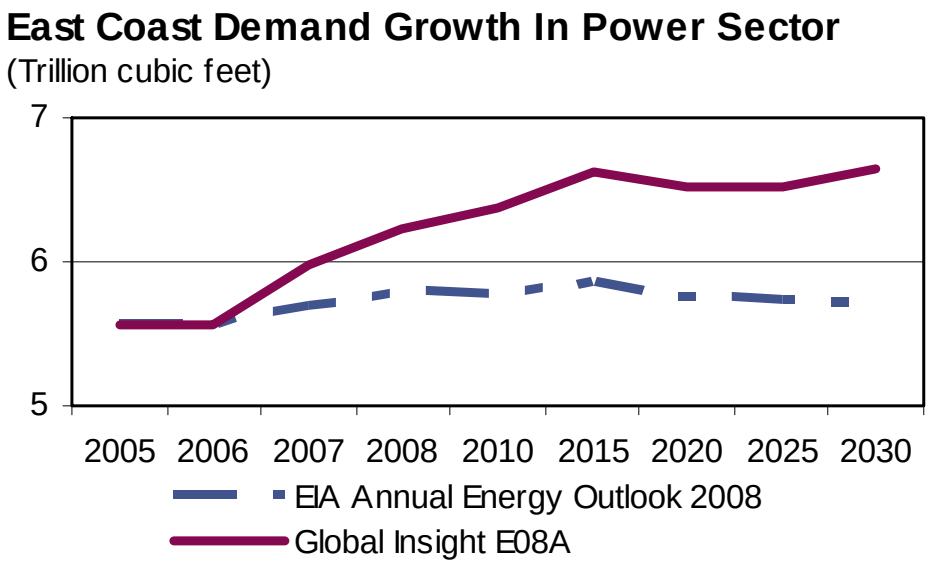
(Trillion cubic feet)



Slow Growth in North Central Demand

(Trillion cubic feet)

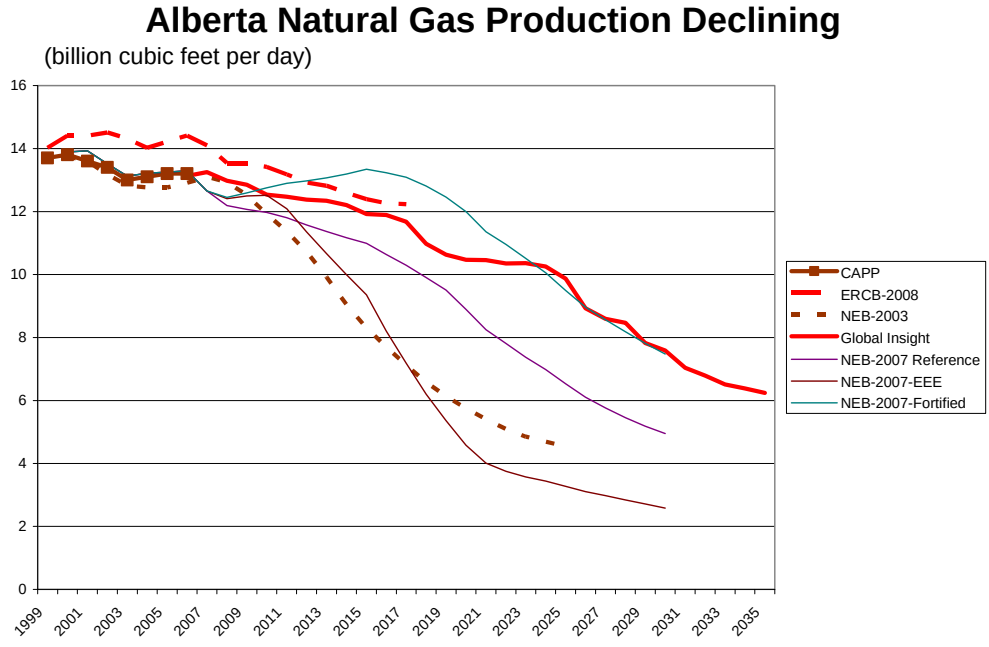



East Coast Demand Growth In Power Sector
(Trillion cubic feet)
7
6
5
2005
2006
2007
2008
2010
2015
2020
2025
2030
EIA Annual Energy Outlook 2008
Global Insight E08A

NATIONAL ENERGY BOARD ENERGY SUPPLY AND DEMAND 2007

National Energy Board forecast was released in 2007 and expressed the following conclusions.

- Demand for natural gas is growing. In the reference case, gas demand rises 45% between 2005 and 2030 on the strength of gas used in oil sands and electricity generation. Energy demand growth depends upon population, the Canadian economy and energy prices.
- Conventional natural gas from the Western Canadian Sedimentary basin is declining. Though some of the production decline will be offset by development of unconventional resources, the decline is accelerated in those cases where lower gas prices cannot absorb the high costs of producing unconventional gas or developing the north.
- There may be more natural gas imports than exports by 2030. This happens more rapidly in the case where imports cost less than developing and bringing northern gas and unconventional gas to market.
- Gradual declines in western Canada conventional natural gas production could lead to the development of additional northern, offshore and unconventional gas sources and to imports of LNG. Relatively flat to declining overall production and growing natural gas demand for use in oil sands extraction and electricity generation could eventually diminish Canada's role as a natural gas exporter.

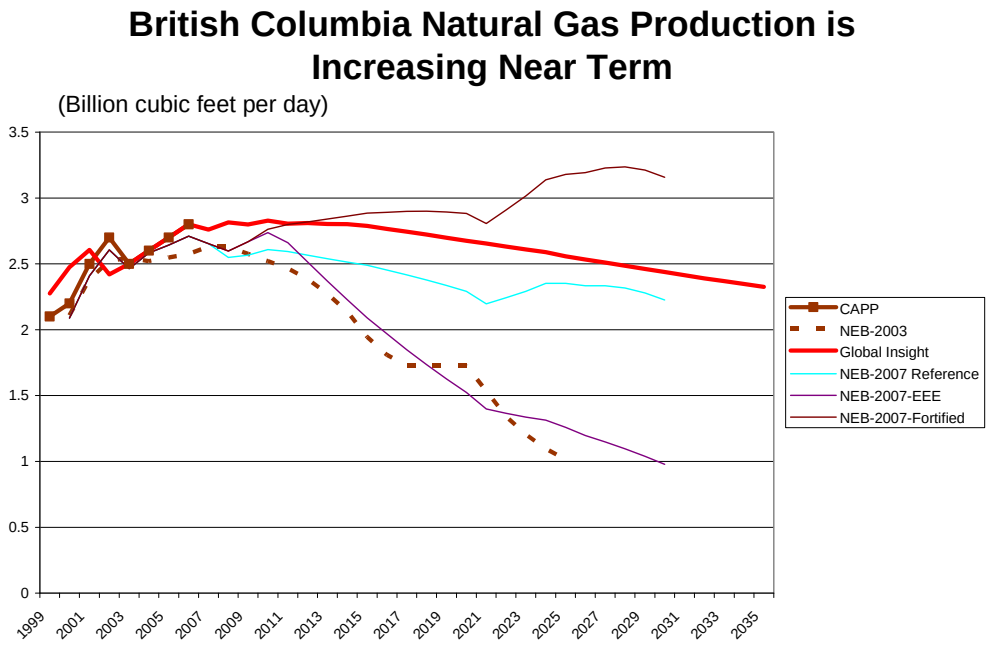


The NEB analyzed three scenarios, Reference/Continuing Trends, Fortified Islands and Triple E for a balancing of Energy, Economic and Environmental goals.

Northeast B.C. Shale Resources to be Developed

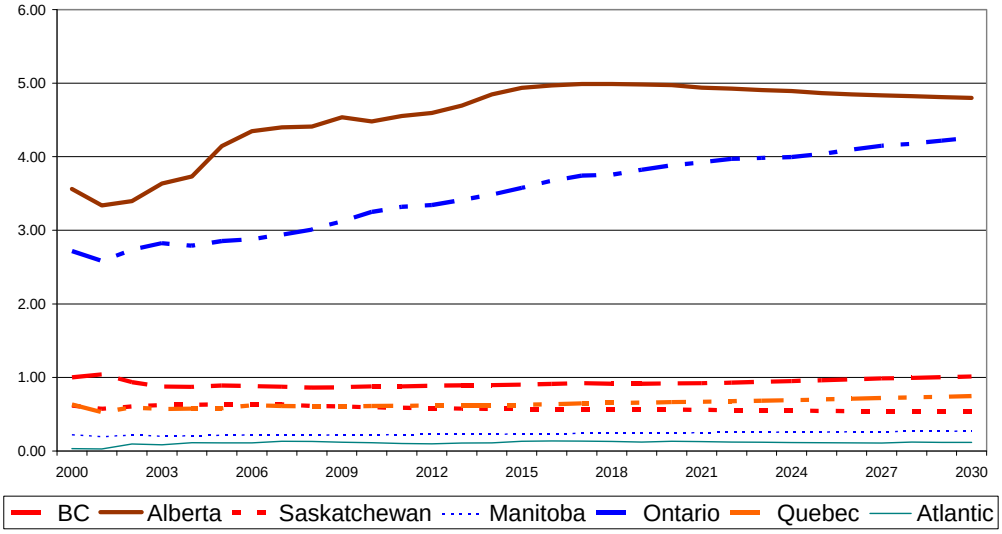
The Montney and Horn River shale resource in Northeast B.C. is expected to be developed by 2011. The high cost of shale gas development in a remote area of B.C. coupled with the lack of infrastructure will delay development. Resource estimates are expansive with several companies suggesting from 2 tcf to 5 tcf or more of gas resource on land holdings. The B.C. Ministry of Energy, Mines and Petroleum Resources estimates a potential capacity of 250 tcf to 1000 tcf of gas-in-place of which producible gas would be a much lesser amount. Also, B.C. received 2 billion dollars from lease sales in 2008 which indicates a large and valuable resource base.

- The Global Insight forecast includes a significant contribution from the Horn River and Montney shale gas.
- The NEB forecasts were developed in 2007 and with preliminary information on shale gas development in B.C. projected production above 2 tcf per year compared to a decline to 1 tcf per year in the 2003 report



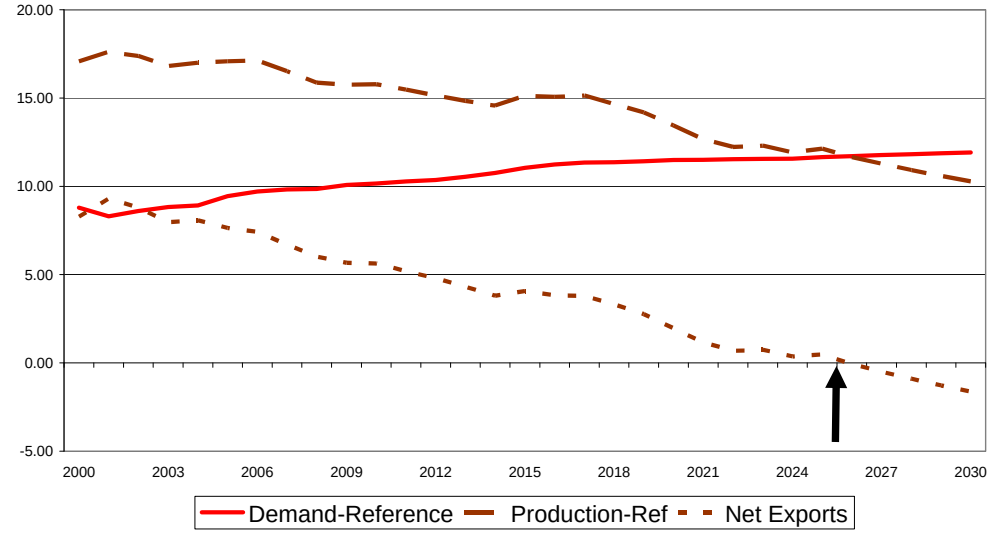
2007 NEB Reference Case - Canadian Natural Gas Demand Growth is in Alberta and Ontario

(Primary Demand - Billion cubic feet per day)

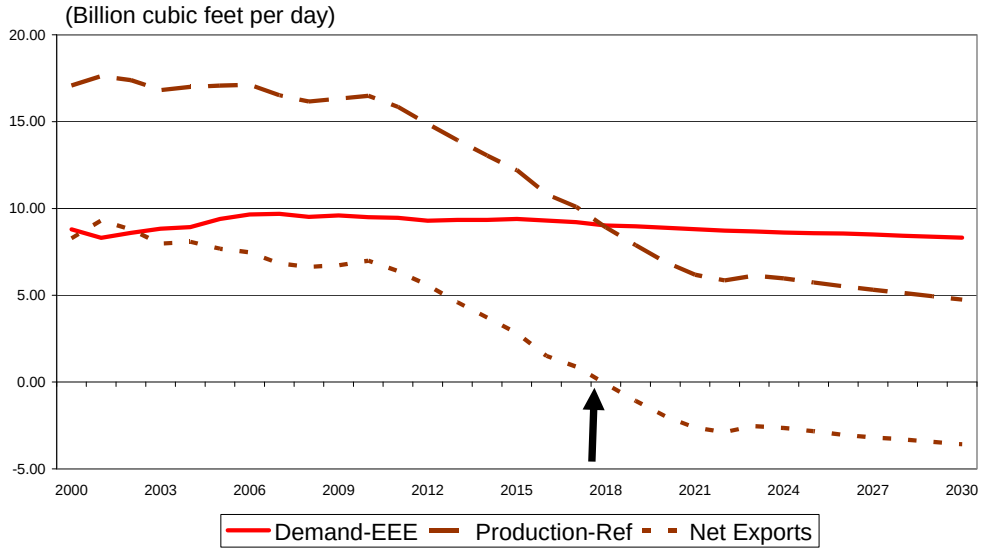


2007 NEB Reference Case - Net Exports Cease in 2026

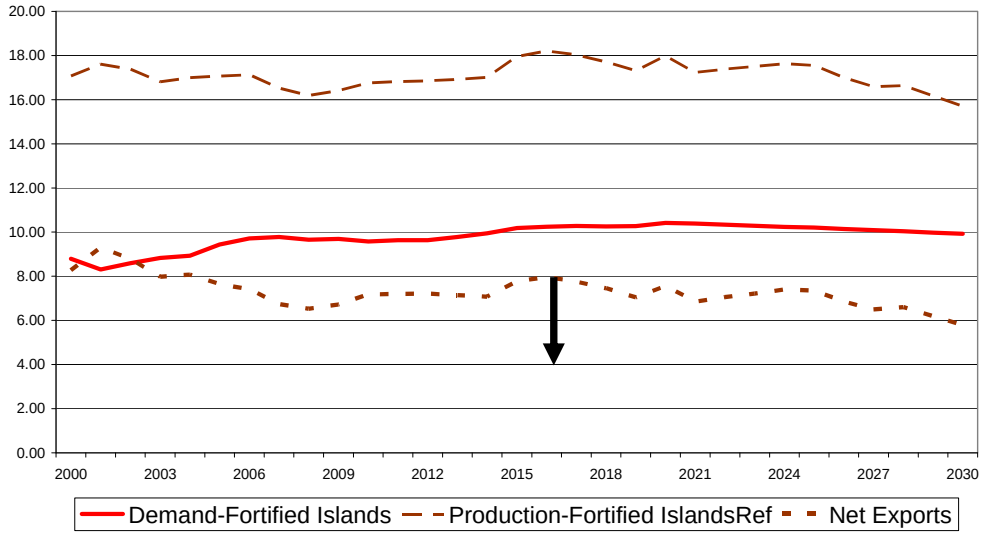
(Billion cubic feet per day)



2007 NEB Triple E Case - Net Exports Cease in 2018

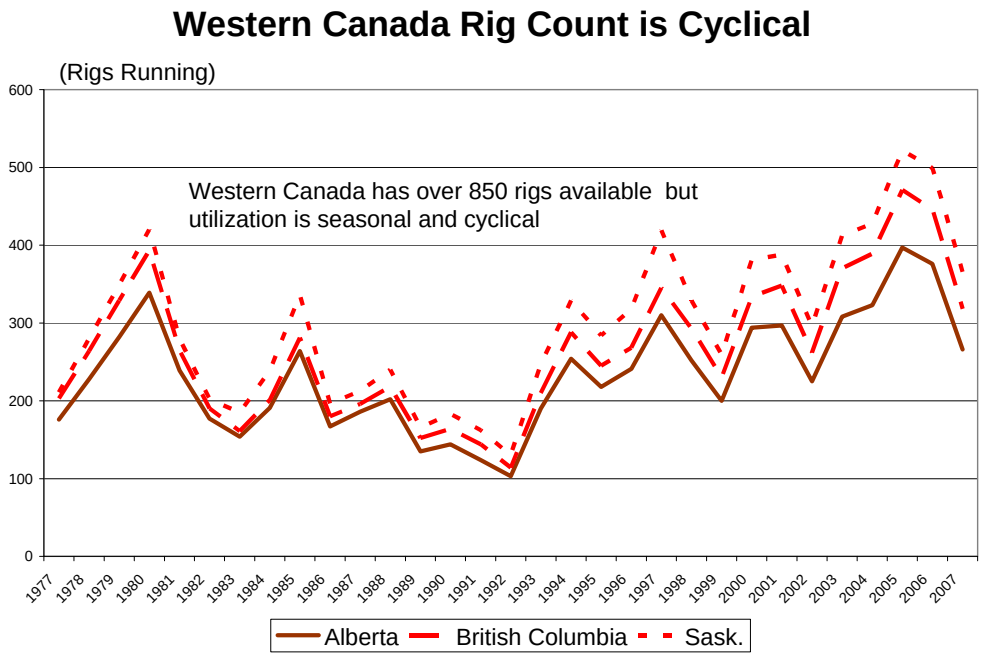


2007 NEB Fortified Islands Case - Net Exports Decline Slowly After 2017



Canadian Drilling Activity is Very Low Relative to Capacity

- Existing Canadian natural gas supply reflects the drilling of 9,000 to 15,000 natural gas wells per year in western Canada.
- The Canadian rig stock reached 872 in 2007 with the capability of drilling more than twice as many wells as the 9636 gas wells drilled in that year.
- Rig utilization fell to 43% in 2007 from 71% in 2005.
- Gas wells drilled fell from 15,895 in 2005 to 9,636 in 2007. The Canadian Association of Oil Drilling Contractors forecasts an increase in drilling in 2008.



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