Future Trends: Assessing Ontario Natural Gas Market Requirements Through 2020

Prepared for:
Union Gas Limited
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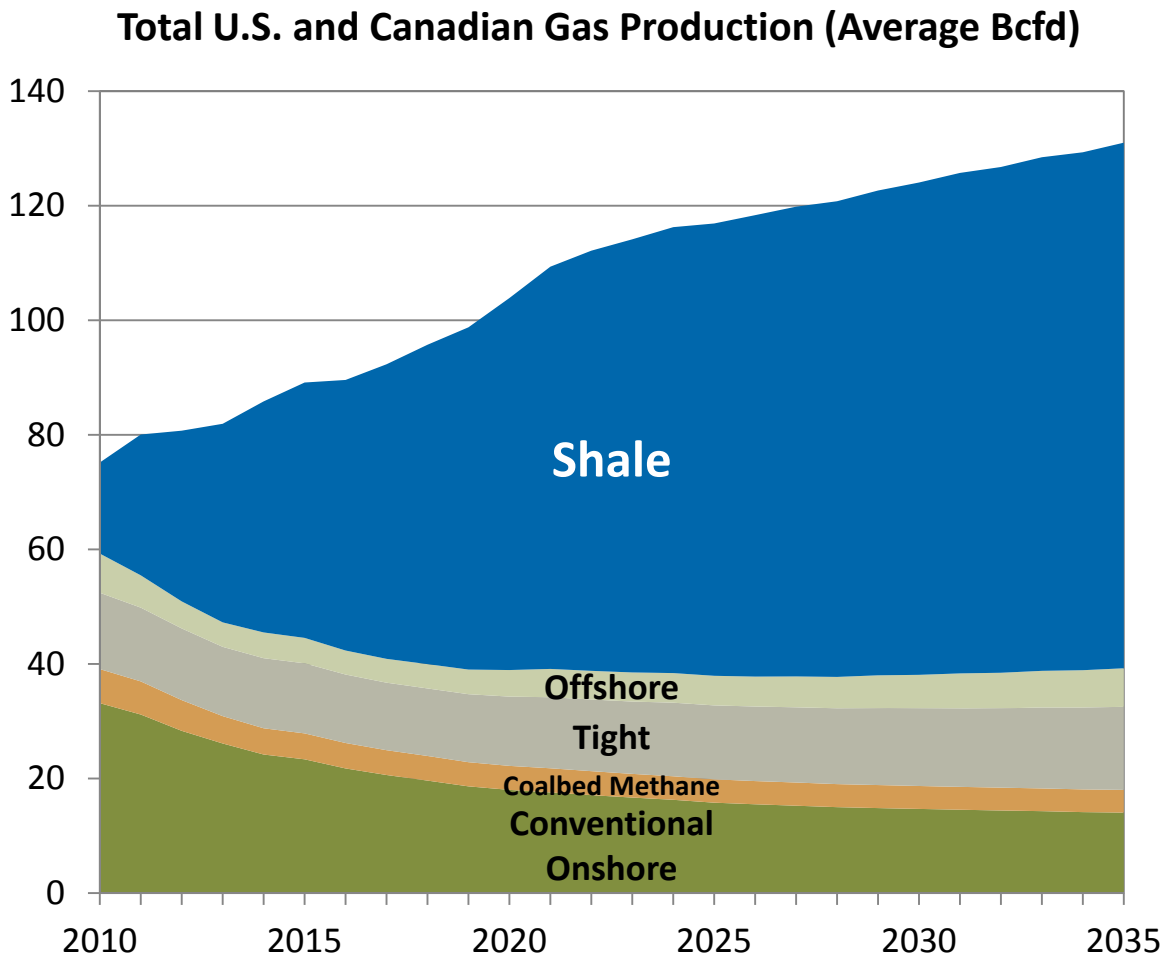
Section 1: Executive Summary

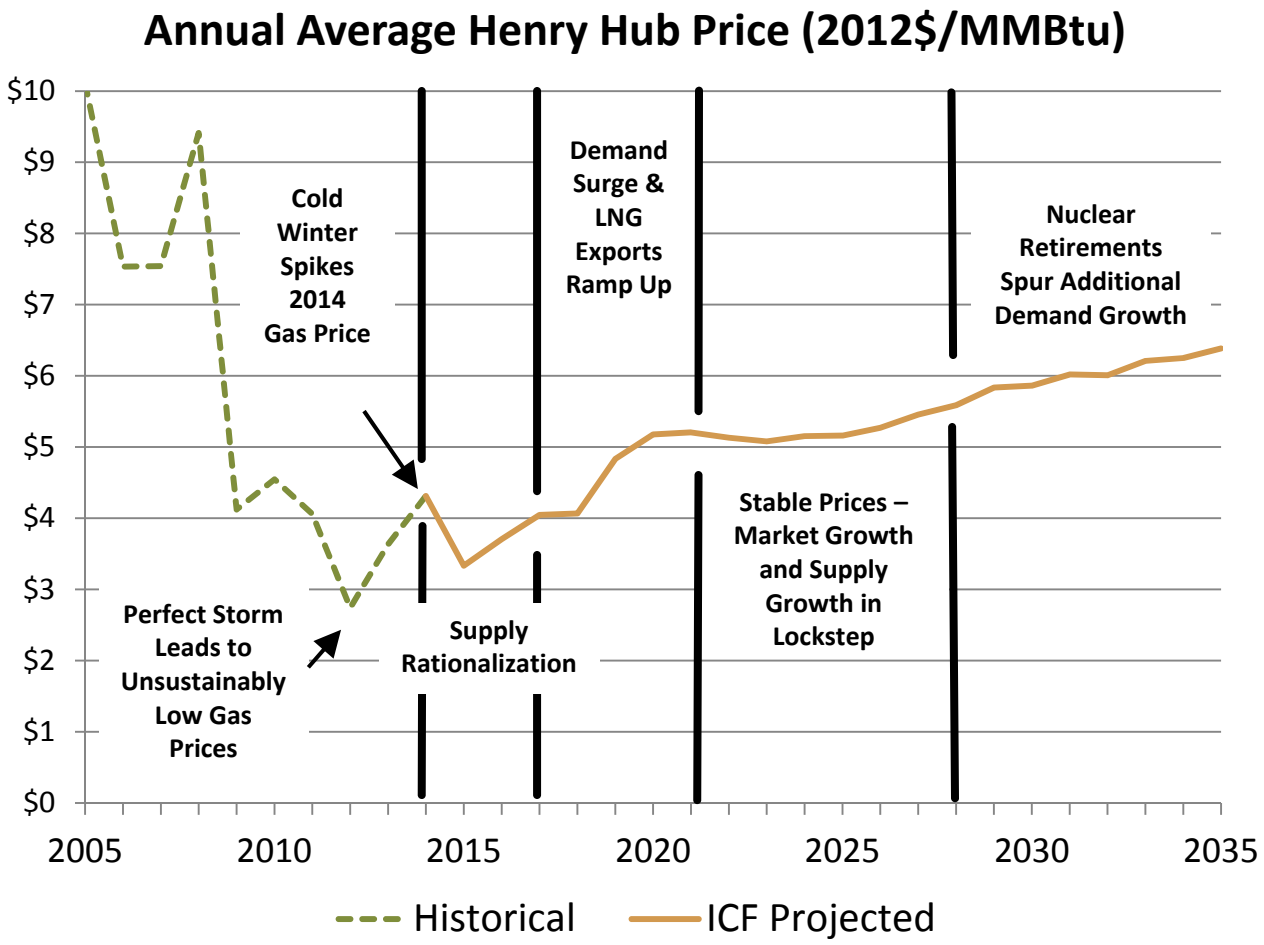
Growth in Shale Gas Production will Continue to Drive Change in North American Gas Markets

- Total gas production is projected to increase by nearly 2% per year.
- Conventional onshore production continues to decline by 2.3% annually, while offshore production remains relatively flat.
- Shale production provides incremental supplies for market growth and replaces declining conventional production.
  - By 2025, shale gas is expected to account for about two-thirds of all U.S. and Canada gas production.



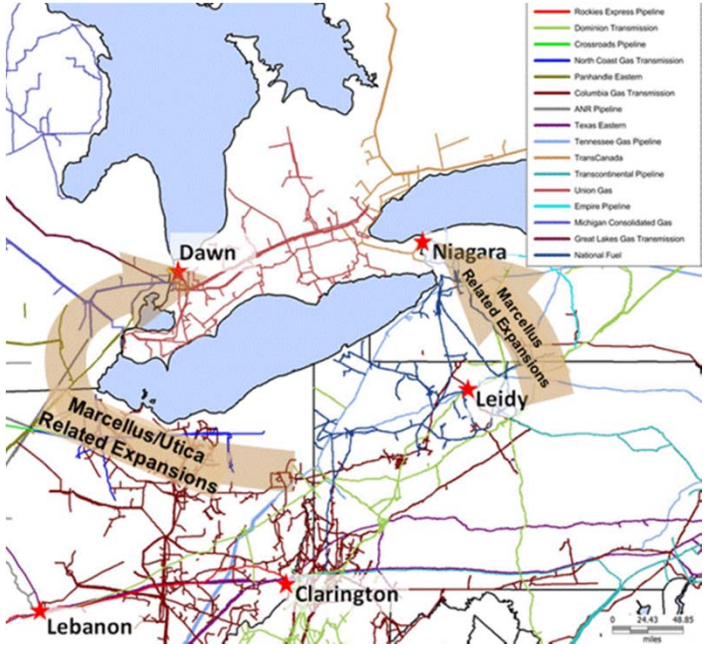
Henry Hub Gas Prices Remain Relatively Low in the Near Term, but Increase as Market Growth Accelerates

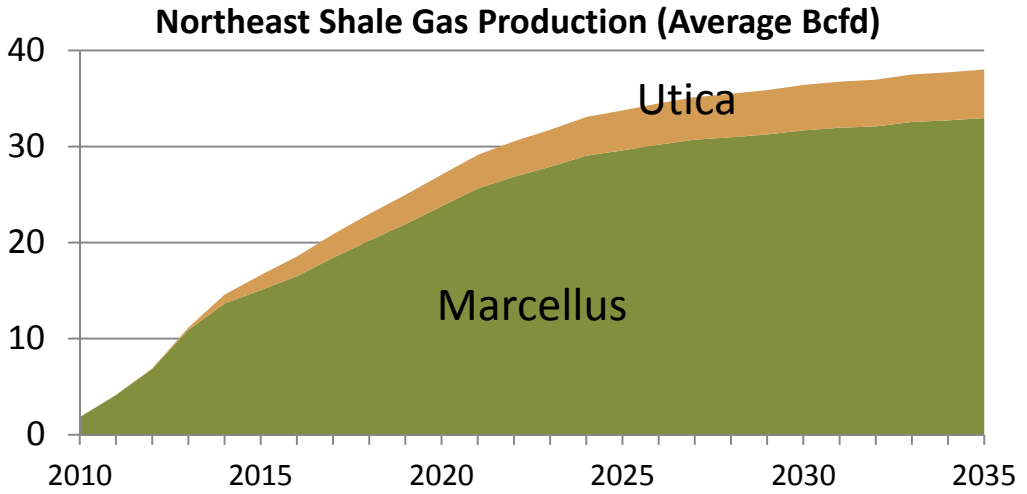
- U.S. and Canadian gas demand growth is expected to accelerate in the next five years due to new LNG export terminals, increased pipeline exports to Mexico, and increased power sector demand.
- Accelerated demand growth is expected to increase Henry Hub prices to $5 to $6 per MMBtu.
- ***$5 to $6 per MMBtu is high enough to support supply development, but not so high as to adversely impact market growth.***



Marcellus/Utica Leads Supply Growth, and New Pipeline Capacity will be Needed to Get These Supplies to Market Areas

- Total Marcellus and Utica gas production is projected to reach 20 Bcfd by 2016, 34 Bcfd by 2025, and 38 Bcfd by 2035.
  - ***Together, these two plays account for over half of incremental North America gas production through 2035.***

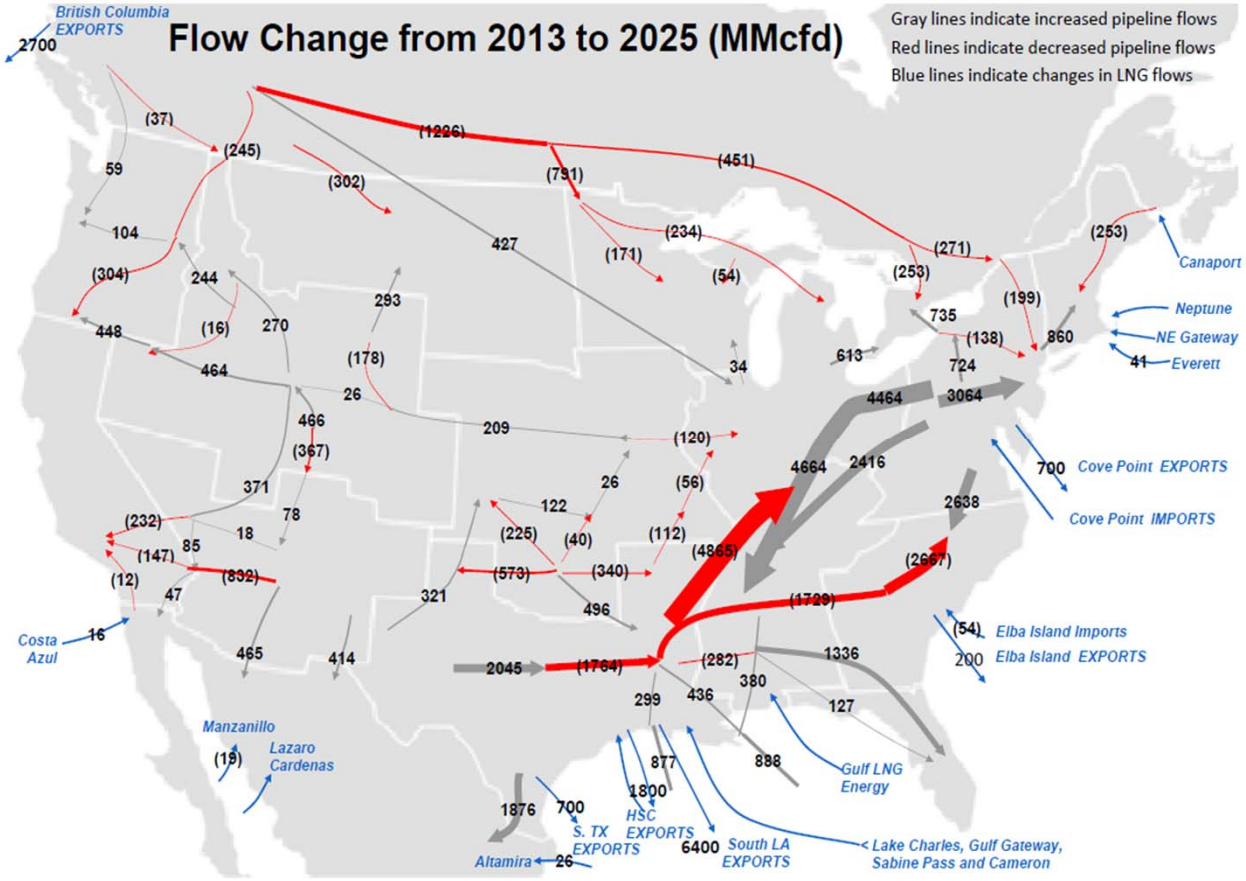




- As Marcellus and Utica production continues to grow, more pipeline capacity will be needed to carry these supplies to market.
- More than 20 pipeline projects are currently planned out of the Marcellus and Utica plays in the Appalachian Basin, including several designed to move supplies to the Midwest U.S. and Ontario
- ***Additional pipeline infrastructure from the Appalachian Basin to new markets will be needed to ensure continued development of Utica and Marcellus resources.***
  - ***Including pipeline infrastructure to and within Ontario.***

Changes in Supply and Demand Will Significantly Change Pipeline Flows Over the Next 12 Years

- Robust gas production growth in the Appalachian Basin will displace gas flows from the gulf coast.
  - By 2020, Appalachian Basin gas may be the least expensive major source of gas in North America.
- Many existing Gulf Coast to northeast pipelines will be converted to deliver gas to the Gulf Coast for LNG exports.
- Declining conventional production in Alberta and increasing gas demand in Western Canada reduces flows to Ontario and Quebec on the TCPL Mainline.
- ***Access to the low cost, reliable gas supplies from the Appalachian Basin will be important for Ontario consumers.***



Projected Ontario Demand Growth

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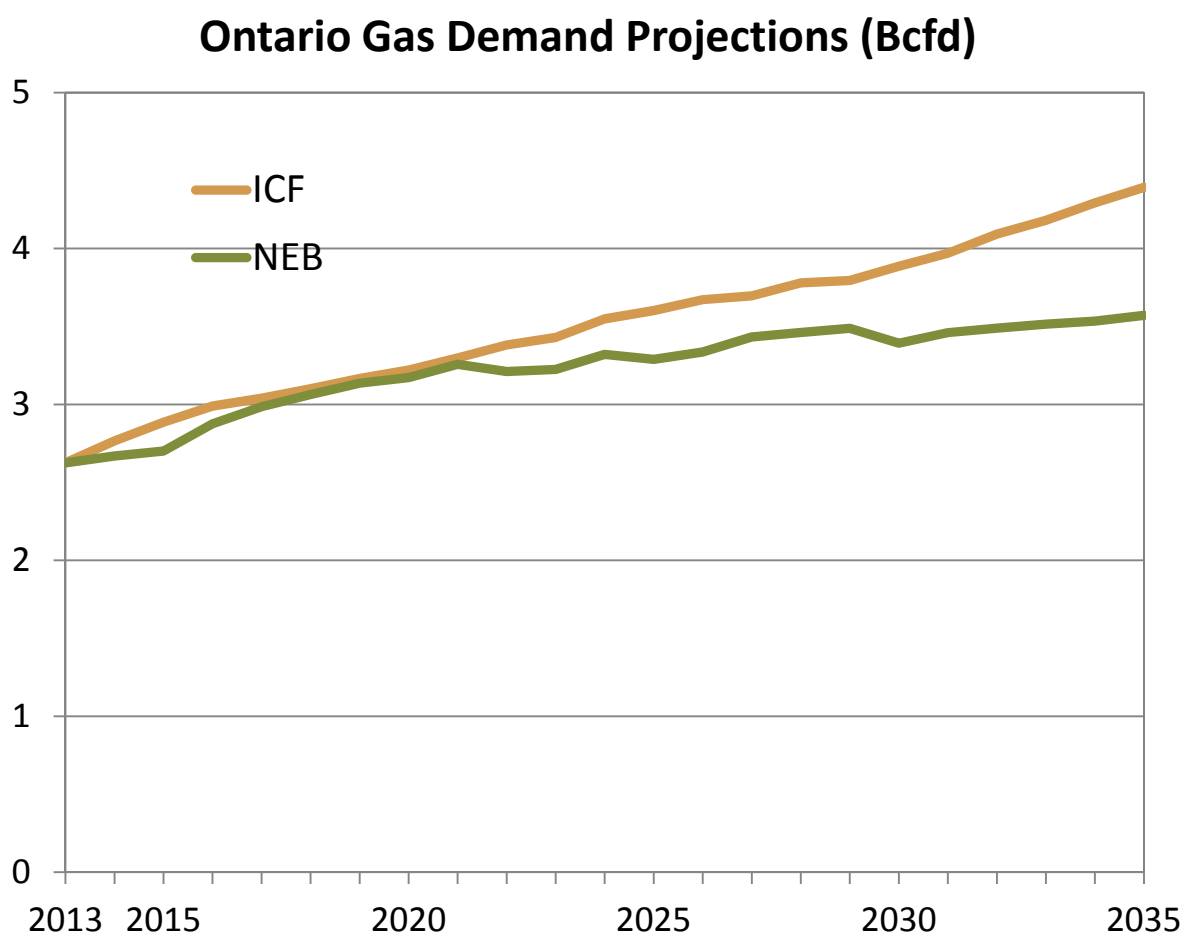
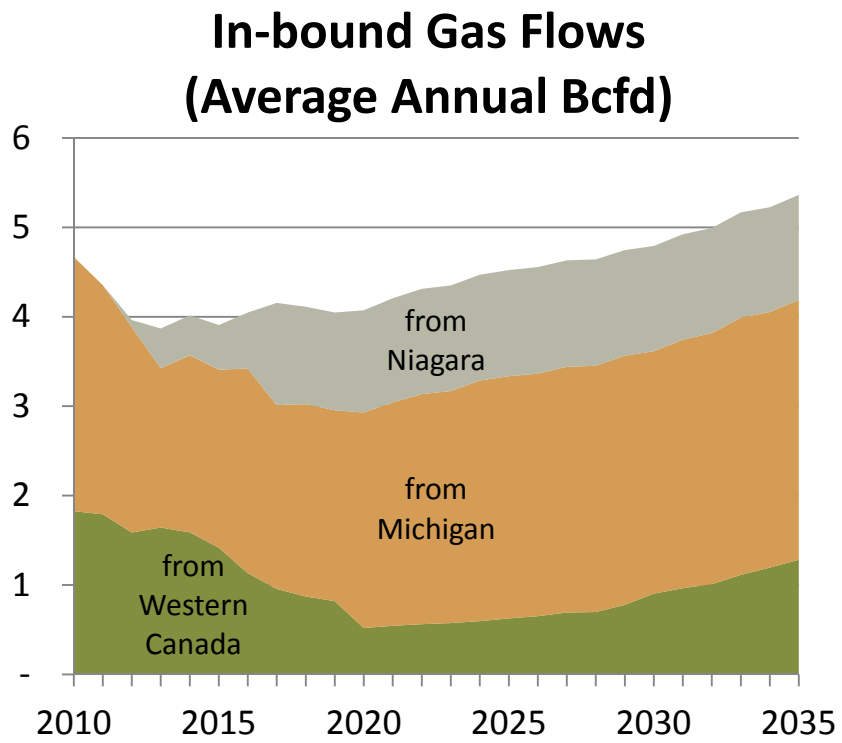
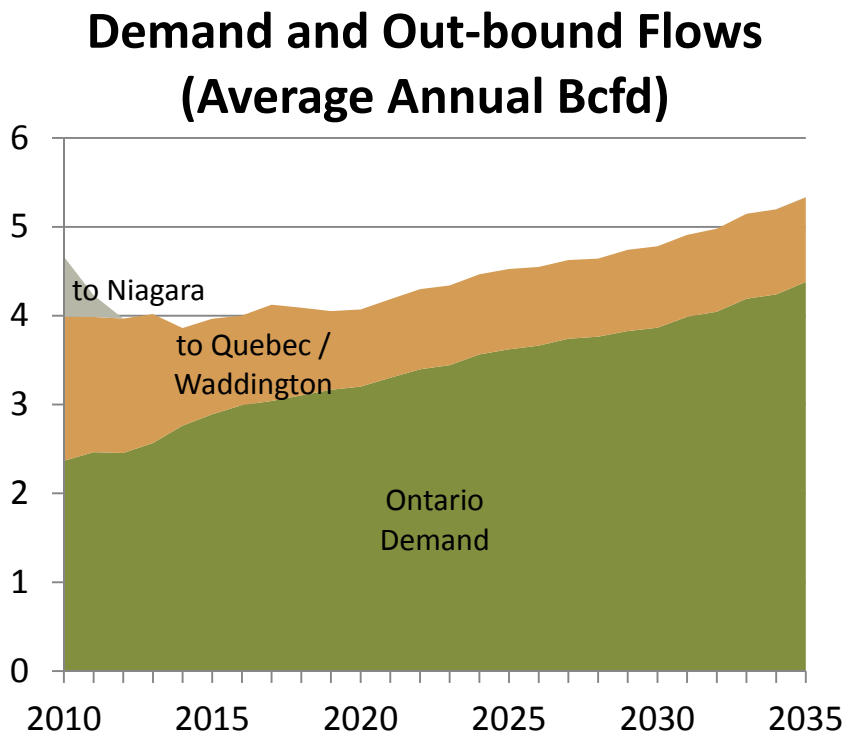
  - The ICF and NEB total gas demand projections are consistent through 2021.
  - After 2021, ICF projects significantly more growth in Ontario power sector gas demand due to higher utilization caused by delays in nuclear refurbishment.
- NEB's projection assumes Ontario's nuclear generation increases after 2021 due to nuclear plant refurbishment, while ICF anticipates longer timelines associated with refurbishment.
  - By 2035, ICF's projection for Ontario nuclear generation is about 30% lower than the NEB projection.
  - Even if no additional units are retired, any delays in the scheduled refurbishments at the Darlington and Bruce stations would reduce available nuclear capacity and generation through 2035, increasing reliance on gas-fired generation.



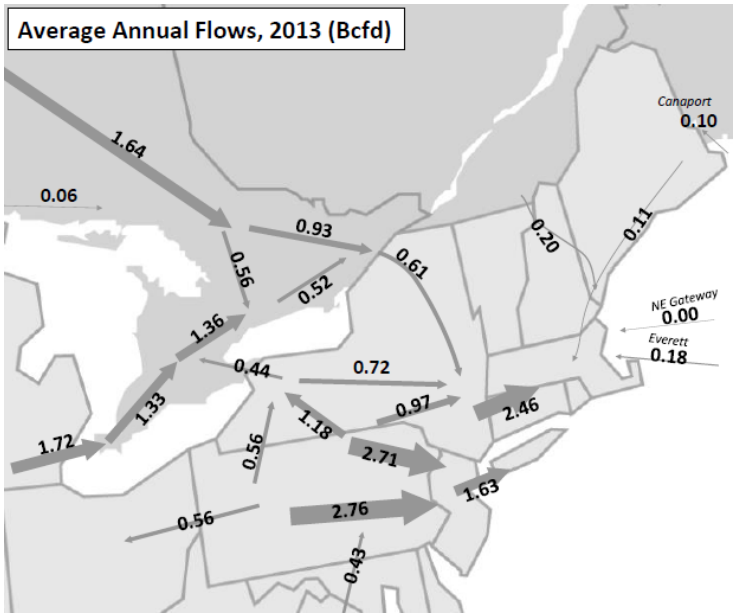
Ontario Will Become Increasingly Reliant on Gas Supplies from the Appalachian Basin

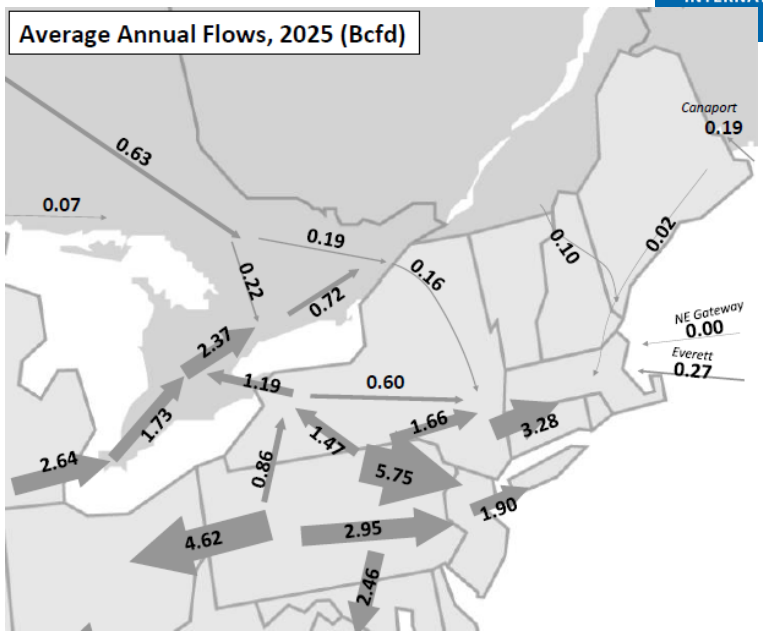




- Based on the projected changes in regional gas supply, demand and infrastructure, ICF's gas model projects that flows from Western Canada into Ontario will decline through 2020.
- ***ICF is projecting that the decline in Western Canadian supply will be replaced by growth in Ontario supply from the Appalachian Basin through Michigan and New York.***
  - ***However, supply will require development of new pipeline infrastructure from the Appalachian Basin to Ontario, and within Ontario from receipt points to consumer market centers.***

Flows into Ontario from Western Canada Projected to Decline, While Flows from Michigan and New York Increase





- Based on the projected changes in regional gas supplies and demand and anticipated gas infrastructure changes, ICF's gas model projects that flows from Western Canada into Ontario will decline.
- Flows out of the Appalachian Basin increase, and much of this gas makes its way into southern Ontario via Michigan and Niagara. ICF's Base Case includes 1.0 Bcf/d incremental capacity into Dawn, and 0.8 Bcfd of incremental capacity into Ontario through Niagara.
- On an annual basis, outbound flows at Waddington (into Iroquois) decrease due to increased production in the Appalachian Basin and increased connectivity between Appalachia and eastern markets.
- ***Growth in New York and New England peak winter demand is expected be greater than pipeline capacity additions from the Appalachian Basin. As a result, flows from Ontario and Quebec into the Northeastern U.S. on Iroquois, PNGTS and other pipes will remain a critical component of peak period supply in the U.S. Northeast.***

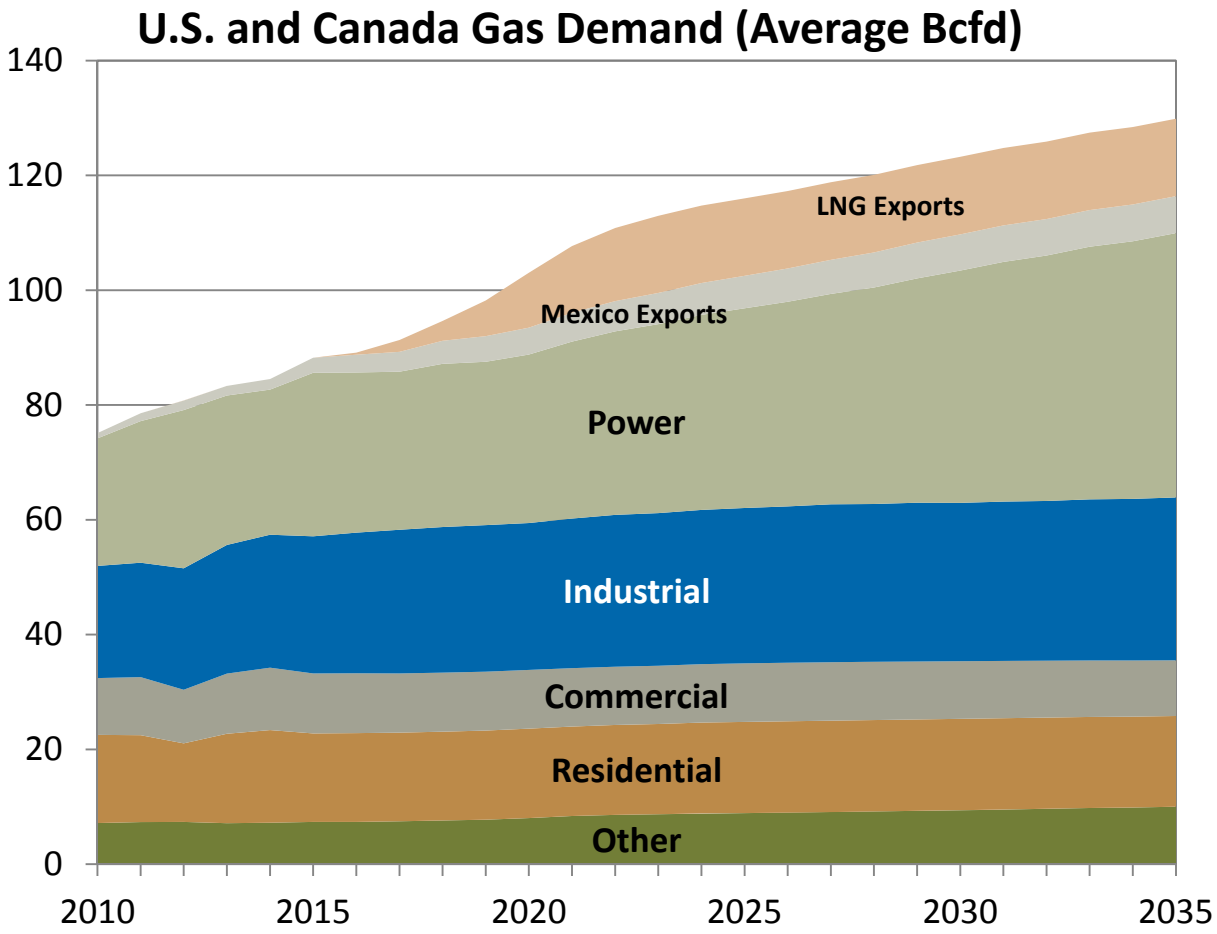
Key Observations on Ontario 2020 Natural Gas Markets

1) Rapid growth in shale gas production will continue to drive change in North American gas markets.
   - Changes in the location of both production and demand will drive rapid changes in natural gas infrastructure and supply patterns.
   - Projected Henry Hub gas prices are likely to average $5-$6 per MMBtu in the longer term; high enough to support the supply development, but not so high as to adversely impact market growth.
2) Natural gas production in the Marcellus and Utica plays in the Appalachian Basin is expected to account for over half of incremental North America gas production through 2035.
   - ICF is projecting the Appalachian Basin to be the lowest cost major source of natural gas supply in North America after 2020.
3) Western Canadian natural gas supply delivered to Ontario will continue to decline through 2020. The decline is expected to be replaced by Appalachian Basin gas.
4) Ontario and the U.S. Northeast markets will continue to be linked.
   - Appalachian Basin production will rely on Michigan and Ontario storage to provide seasonal markets.
   - Growth in New York and New England peak winter demand is expected be greater than pipeline capacity additions from the Appalachian Basin. As a result, flows from Ontario and Quebec into the Northeastern U.S. on Iroquois, PNGTS and other pipes will remain a critical component of peak period supply in the U.S. Northeast.
5) Additional infrastructure through Michigan and New York to Ontario, and within Ontario, will be needed to ensure that Ontario has reliable, economic access to the growth in Appalachian Basin gas.

Section 2:
North American Market Outlook

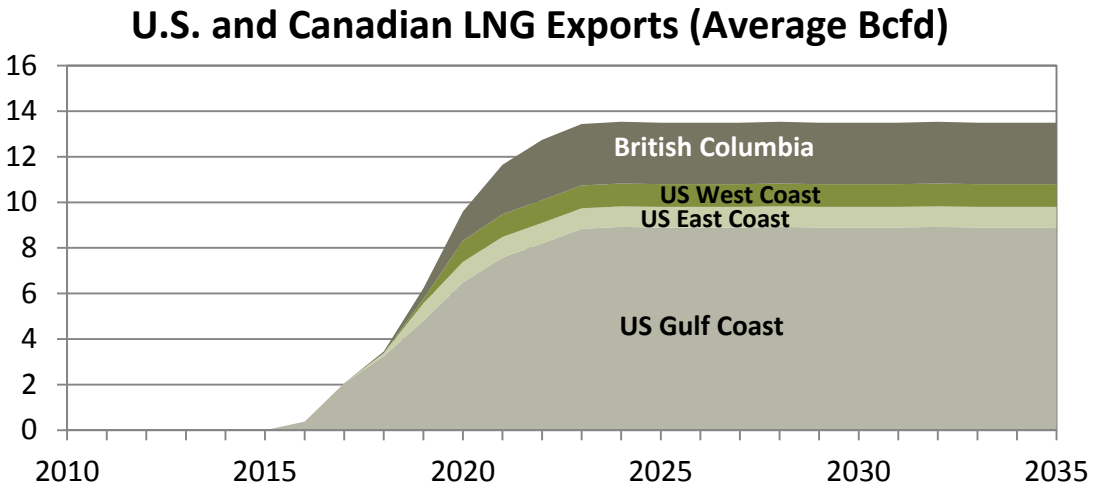
Through 2035, the U.S. and Canadian Gas Demand is Projected to Grow by Over 50%

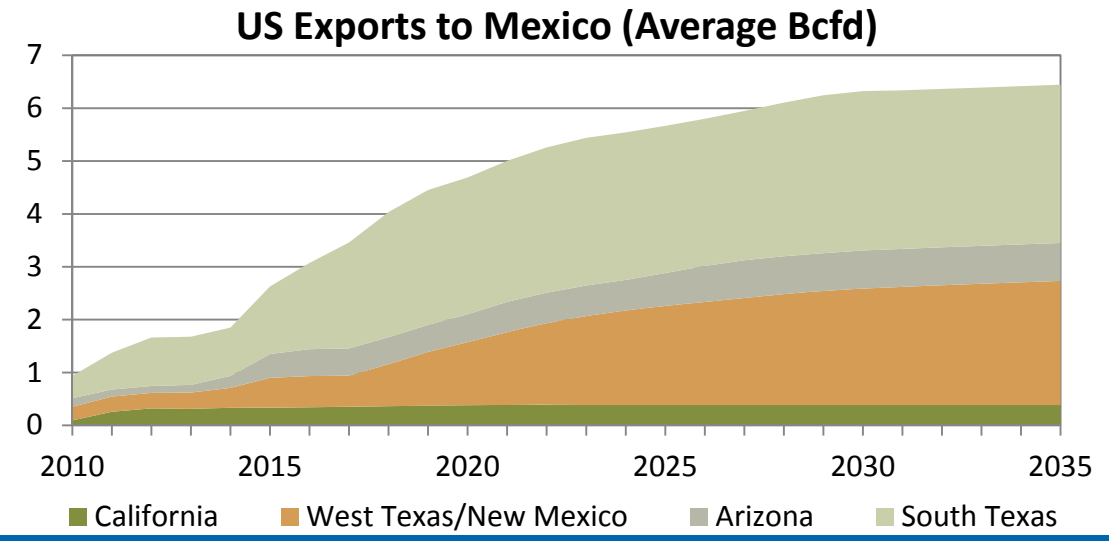
- By 2035, total U.S. and Canada gas demand (consumption plus exports) is projected to increase to almost 130 Bcfd.
- Gas exports via new LNG terminals and by pipelines to Mexico drive market growth through 2035.
  - LNG exports reach 13.5 Bcfd.
  - Exports to Mexico increase to 6.4 Bcfd.
- In response to increasing electricity demand and replacement of retiring coal and nuclear capacity, U.S. and Canada power sector demand increases to over 46 Bcfd by 2035.



Exports are Expected to be Major Drivers of Near-Term Market Growth

- Since 2012, DOE has approved non-FTA exports for 6 U.S. LNG terminals: Sabine Pass, Freeport, Lake Charles, Cove Point, Cameron LNG, and Jordan Cove.
  - ICF's current projection assumes U.S. LNG exports reach 10.8 Bcfd by 2024.
  - Another 2.7 Bcfd of LNG exports are expected from British Columbia.
- Mexican exports have been driven by associated gas production in Texas (providing an ample, low-cost gas supply), and growth in Mexico's power sector.
  - Exports to Mexico are projected to reach 6.4 Bcfd by 2035.





The North American Natural Gas Resource Base Can Support Rapid Market Growth

- ICF estimates that the U.S. and Canada have a total of over 4,000 Tcf of resource that can be economically developed using current exploration and production technologies.
  - At current levels of consumption, this is enough resource for about 150 years.
  - As technologies improve and new discoveries are made, the total gas resource is likely to grow.
- Over 50% of the assumed resource is shale gas.

U.S. and Canada Natural Gas Resource Base

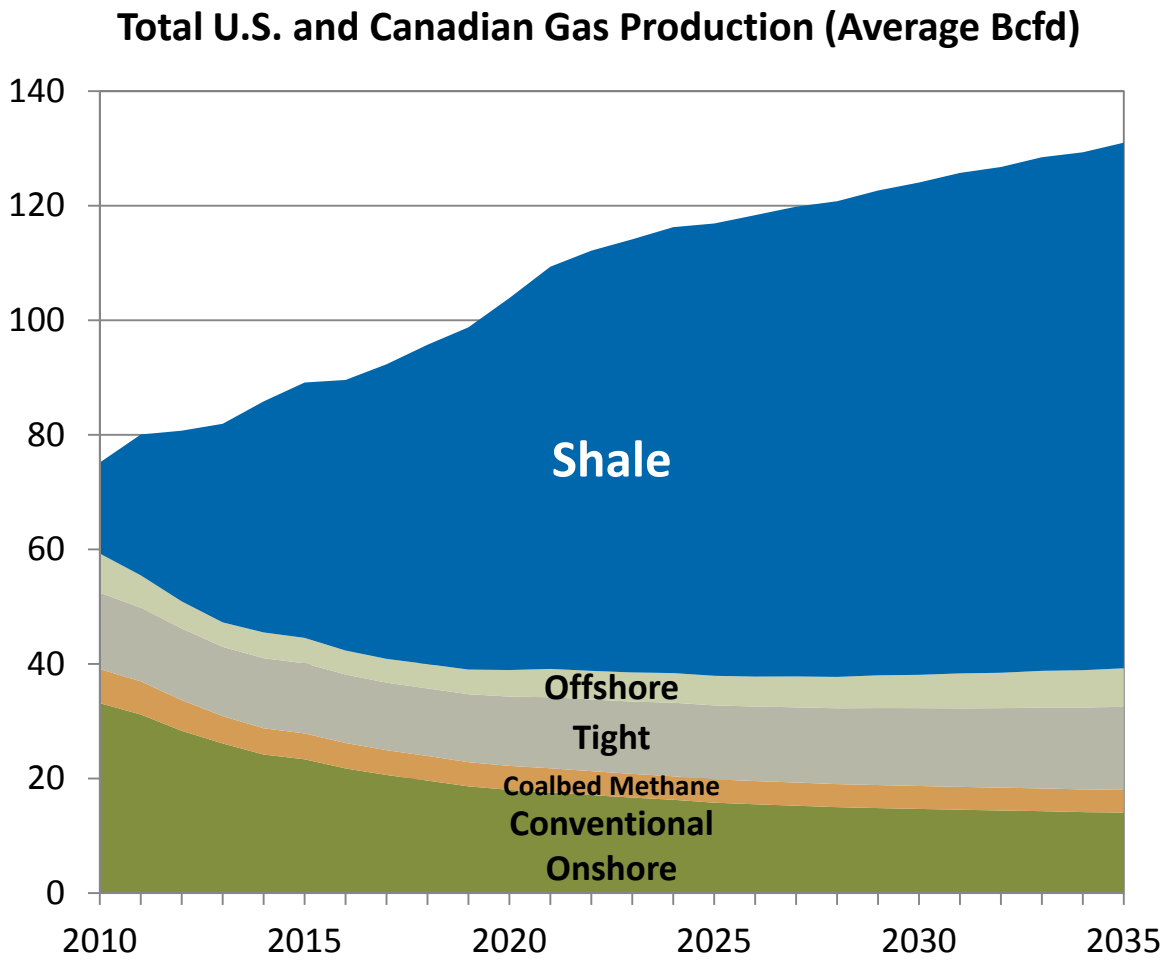
(Tcf of Economically Recoverable Resource, Assuming Current E&P Technologies)

	Proven Reserves	Unproved Plus Discovered Undeveloped	Total Remaining Resource	Shale Resource[1]
Alaska	9.4	153.6	163.0	0.0
West Coast Onshore	2.9	24.6	27.5	0.3
Rockies & Great Basin	81.8	388.3	470.1	37.9
West Texas	20.4	47.7	68.1	17.5
Gulf Coast Onshore	97.6	684.7	782.3	476.9
Mid-continent	65.3	205.0	270.3	133.9
Eastern Interior [2]	45.2	1,053.7	1,098.9	986.1
Gulf of Mexico	10.7	238.6	249.3	0.0
U.S. Atlantic Offshore	0.0	32.8	32.8	0.0
U.S. Pacific Offshore	0.8	31.7	32.5	0.0
WCSB	68.8	664.0	732.8	508.8
Arctic Canada	0.0	45.0	45.0	0.0
Eastern Canada Onshore	0.8	15.9	16.7	10.3
Eastern Canada Offshore	0.3	71.8	72.1	0.0
Western British Columbia	0.5	10.9	11.4	0.0
US Total	**334.1**	**2,860.6**	**3,194.7**	**1,652.5**
Canada Total	**70.4**	**807.6**	**878.0**	**519.1**
US and Canada Total	**404.5**	**3,668.1**	**4,072.6**	**2,171.6**

1. Shale Resource is a subset of Total Remaining Resource
2. Eastern Interior includes Marcellus, Utica, Huron, and Antrim shale.

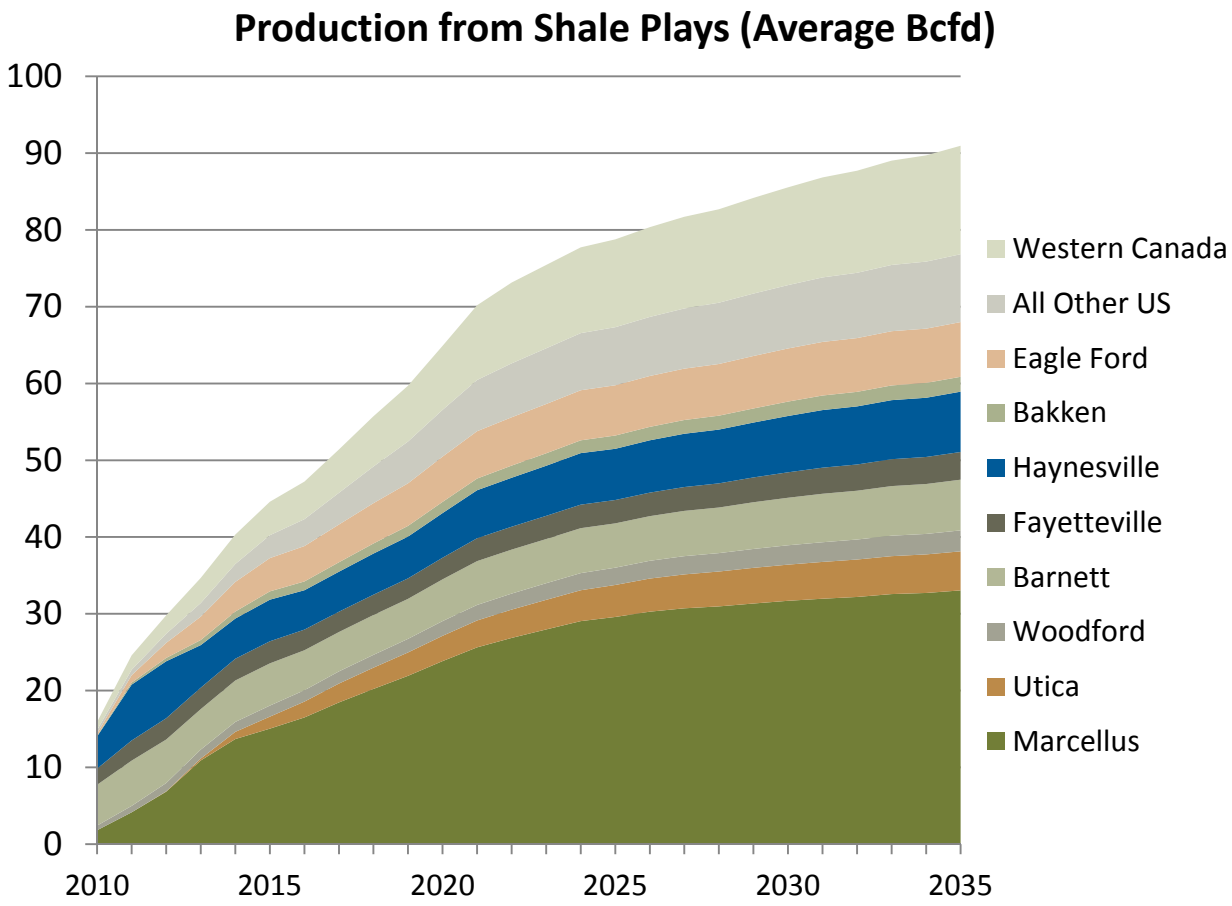
Gas Supply Growth Will Continue to Come from Shale Resources

- Total gas production is projected to increase by nearly 2% per year.
- Conventional onshore production continues to decline by 2.3% annually, while offshore production remains relatively flat.
- Shale production provides incremental supplies for market growth and replaces declining conventional production.
  - By 2025, shale gas is expected to account for about two-thirds of all U.S. and Canada gas production.



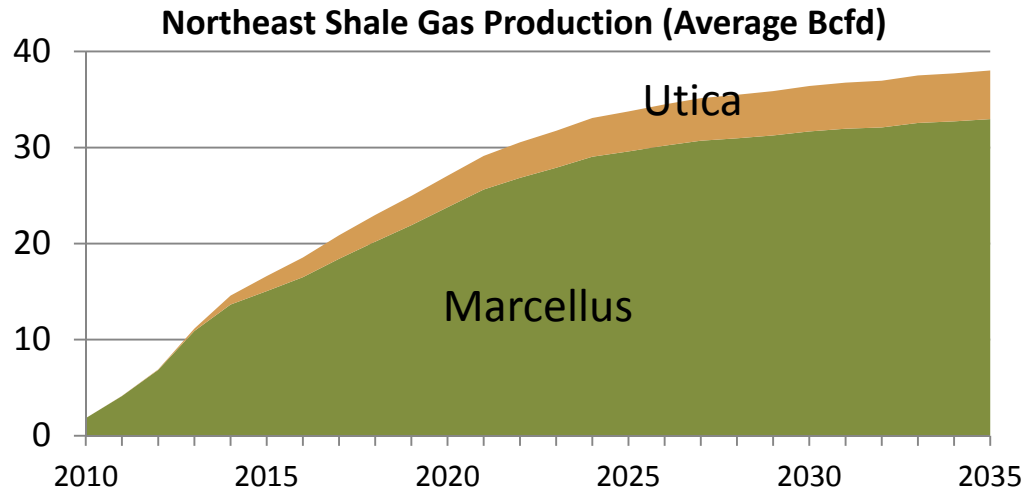
Growth in Shale Gas Production is Widespread

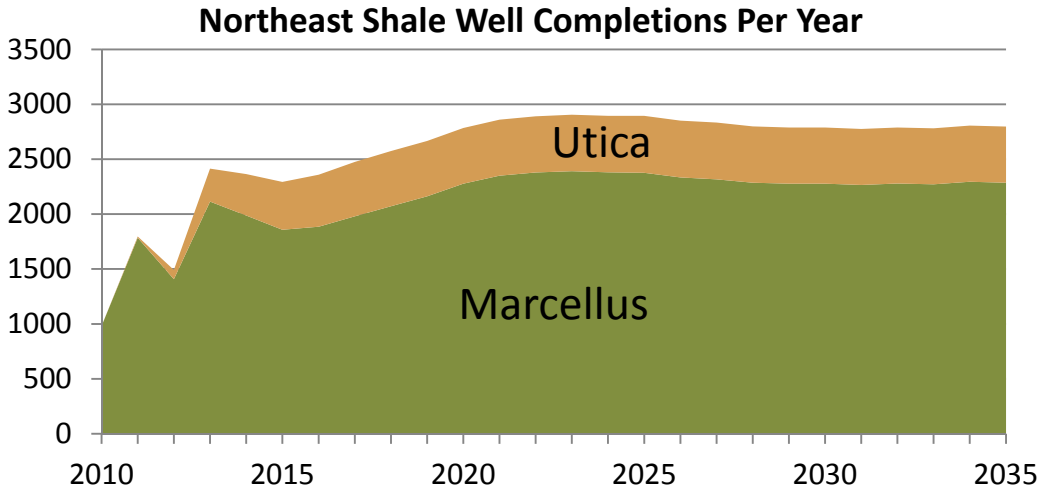
- Total U.S. and Canadian shale gas production is projected to increase from 40 Bcfd in 2014 to nearly 90 Bcfd by 2035.
- Western Canada shale gas production (including Montney and Horn River) is projected to reach over 14 Bcfd by 2035.
  - Growth will be offset by a decline in Alberta conventional production combined with increased Western Canadian gas demand from British Columbia LNG exports and oil sands development in Alberta.
- While producers in the Eagle Ford and Bakken are focused on oil and NGL development, these areas also produce significant quantities of natural gas.
- Production from the Midcontinent shale plays (particularly Haynesville) is expected to grow as the Gulf Coast LNG terminals come online.



The Northeast Shale Plays Will Account for the Majority of Incremental Gas Supplies

- Despite a slight decrease in the Marcellus Shale rig count over the past year, production has continued to increase.
  - More wells are being drilled per active rig, and production per well has continued to increase.
  - Wells in the Utica Shale have had higher gas-to-oil production ratio than expected.
  - Due to the high productivity, production growth can be maintain with only a modest increase in the number of well completions per year.
- Total Marcellus and Utica gas production is now projected to reach 20 Bcfd by 2016, 34 Bcfd by 2025, and 38 Bcfd by 2035.
  - ***Together, these two plays account for over half of incremental North America gas production through 2035.***





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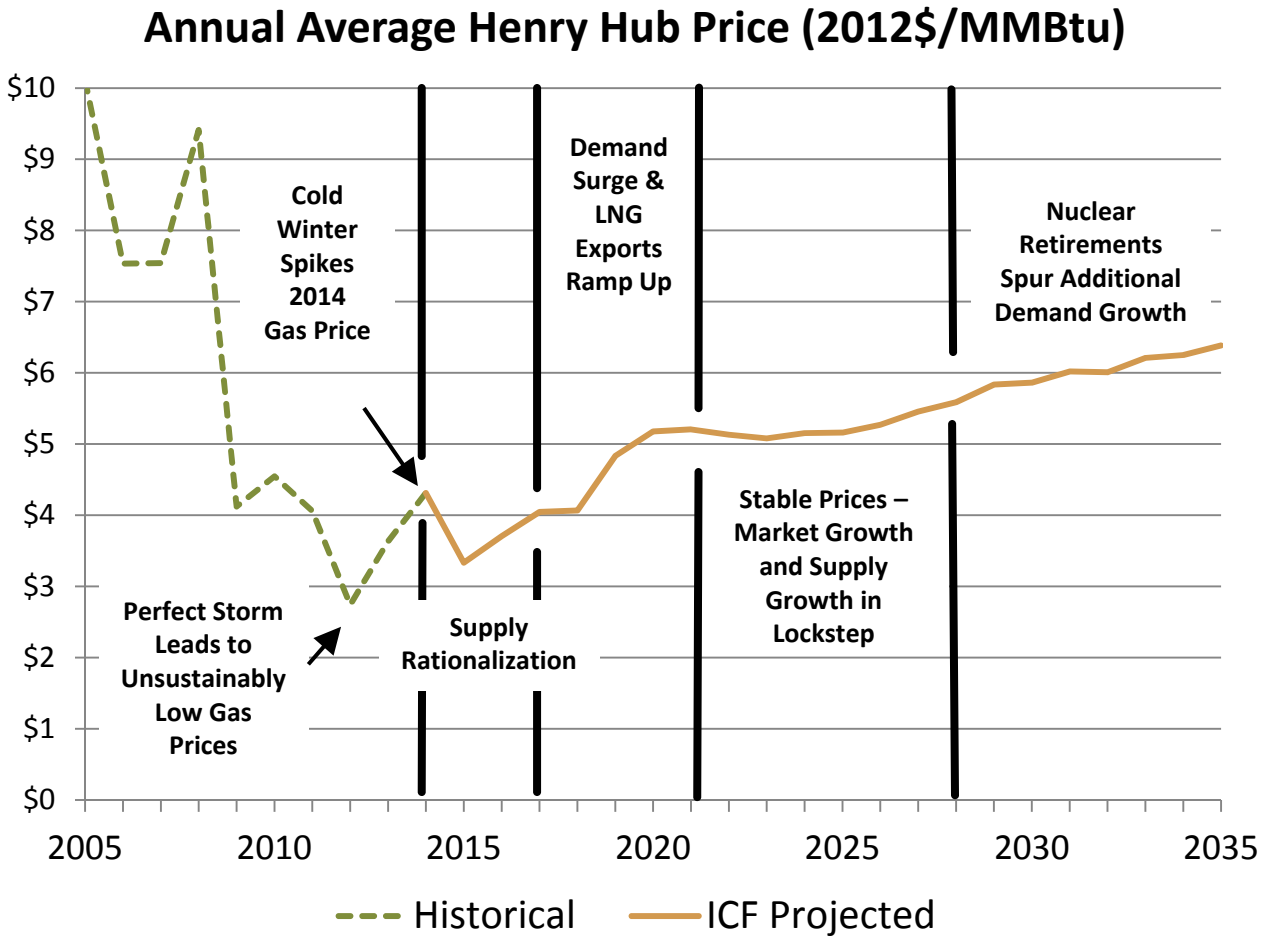

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- Despite major cuts in gas-directed drilling over the past year, productivity continues to increase in the shale plays (especially the Marcellus and Utica), which has helped hold down prices.
  - Near-term gas prices get a boost from the cold winter and subsequent storage refill.
- Regional shifts in gas supply and demand throughout North American are the principal drivers of future gas infrastructure needs.
  - New transportation services will be needed to support both demand and supply growth, but supply and demand shifts also change the utilization of existing infrastructure.
  - Transportation infrastructure out of the Appalachian Basin to new markets, including Ontario, will be critical in the development of North American markets.

Marcellus and Utica Growth Drives Bulk of Near-Term Pipeline Expansions

- As Marcellus and Utica production continues to grow, more pipeline capacity will be needed to carry these supplies to market.
  - New capacity is being added, and many of the pipelines that traditionally moved gas into the Northeast have announced plans to reverse.
- Currently, more than 20 projects to build new capacity or reverse existing capacity have been proposed for completion by the end of 2017.
  - Planned capacity additions from these projects totals over 16 Bcfd, but since many of these projects feed into each other, the incremental capability to transport gas out of Marcellus and Utica is closer to 9 Bcfd.
- Of the proposed projects, several are geared toward moving Marcellus/Utica to the Midwest U.S. and Ontario.
  - ANR East
  - NEXUS Gas Transmission
  - Rover Pipeline
- Expansion through Niagara is also possible

Changes in Supply and Demand Will Significantly Change Pipeline Flows Over the Next 12 Years

- Robust gas production growth in the Appalachian Basin will displace gas flows from the gulf coast.
  - Appalachian Basin gas is likely to become the least expensive major source of gas in North America before 2025.
- Many existing Gulf Coast to northeast pipelines will be converted to deliver gas to the Gulf Coast for LNG exports.
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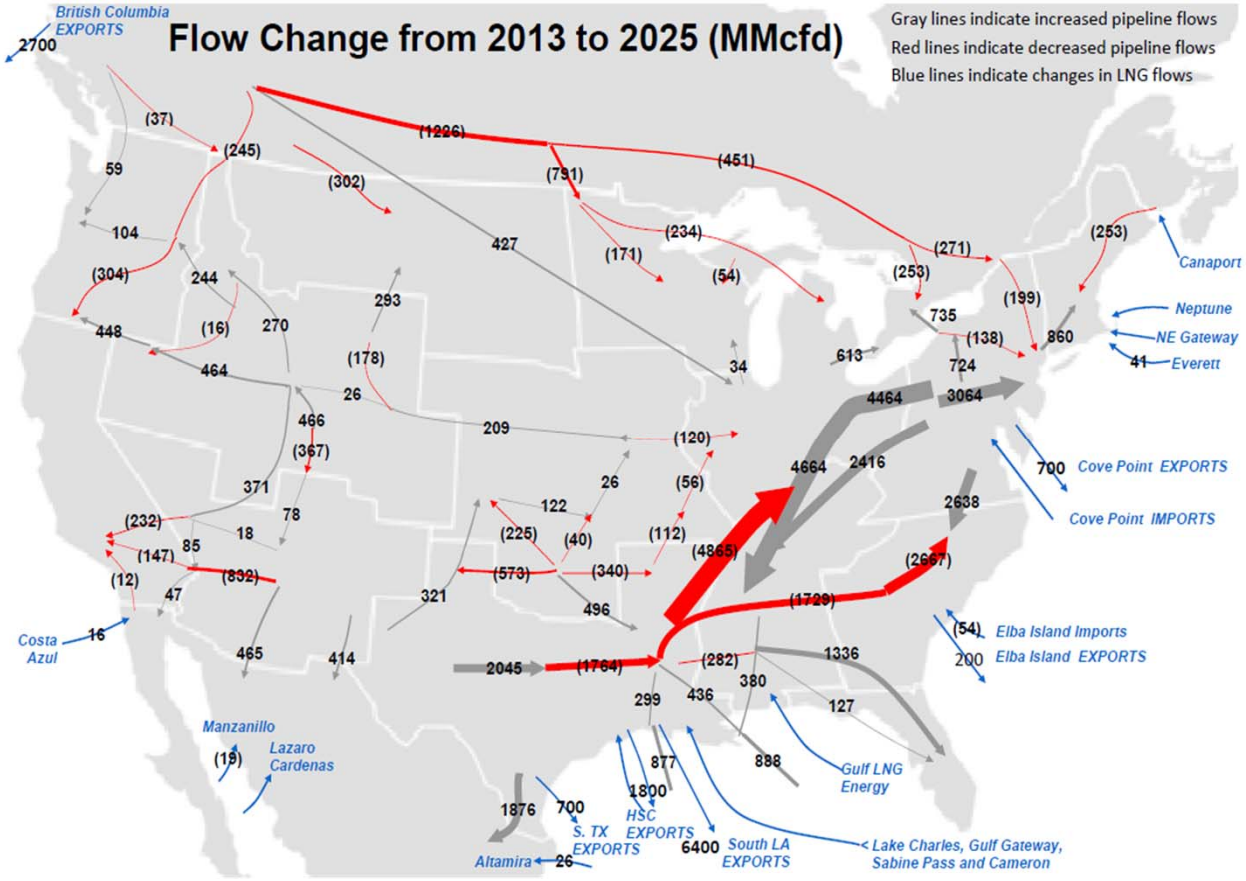


Basis Trends are Influenced by Regional Supply and Demand Shifts, but Also Reflect Added Gas Infrastructure

Average Basis (2012$/MMBtu)

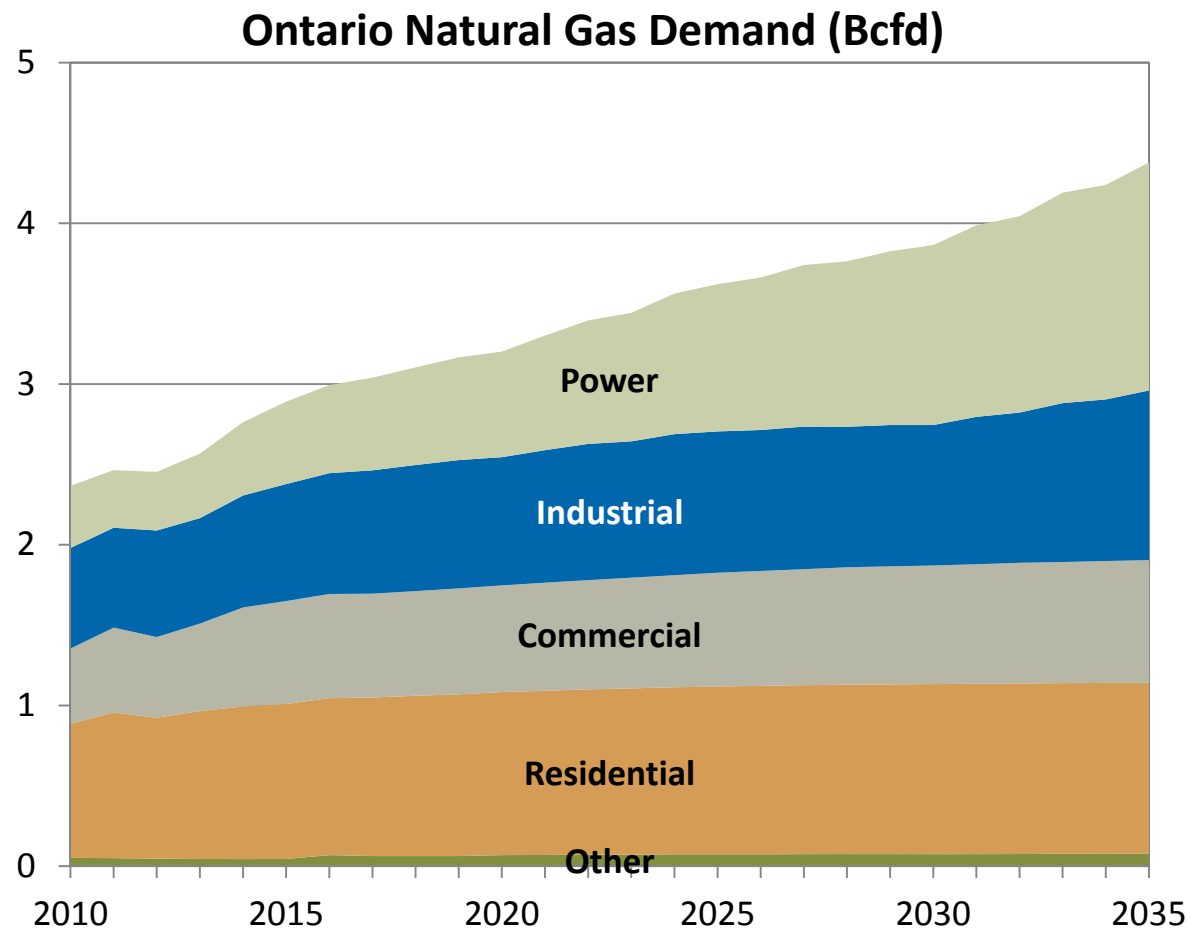
	Historical			Projection	
	2012	2013	2014*	2015 to 2025	2026 to 2035
Henry Hub to NYC	0.91	1.98	4.02	1.94	2.64
Henry Hub to New England	1.20	3.26	4.05	1.86	1.85
Henry Hub to Dominion South Point	0.10	-0.07	-0.79	-0.60	-0.76
Henry Hub to Chicago	0.10	0.12	1.25	0.04	-0.12
Henry Hub to Dawn	0.32	0.34	1.92	0.25	0.12
Henry Hub to Florida	0.54	0.25	0.34	0.40	0.59
Henry Hub to SoCal	0.26	0.23	0.33	-0.03	-0.10
Henry Hub to Opal	-0.07	-0.07	0.01	-0.34	-0.61
Henry Hub to AECO	-0.35	-0.63	-0.15	-0.49	-0.56
AECO to Dawn	0.67	0.97	2.08	0.74	0.68
AECO to Chicago	0.44	0.76	1.41	0.52	0.44

* 2014 includes both historical and forecast data; basis values in 2014 are impacted by the extreme cold in January and February.

Section 3:
Ontario Market Outlook

By 2035, Ontario Gas Use is Projected to Increase by 1.6 Bcfd, Primarily Due to Increased Power Sector Demand

- Ontario gas demand is projected to grow at an average rate of 2.5% per year through 2035.
- Most of the projected growth is in the power sector.
  - By 2035, power sector demand is projected to reach 1.4 Bcfd.
  - Electric load growth, nuclear retirements/ refurbishments, and backstopping renewable power generation all contribute to natural gas demand growth.
- Residential/commercial demand is projected to grow at less than 1% per year.
  - ICF's projection for residential/commercial gas demand is very similar to NEB's projection.



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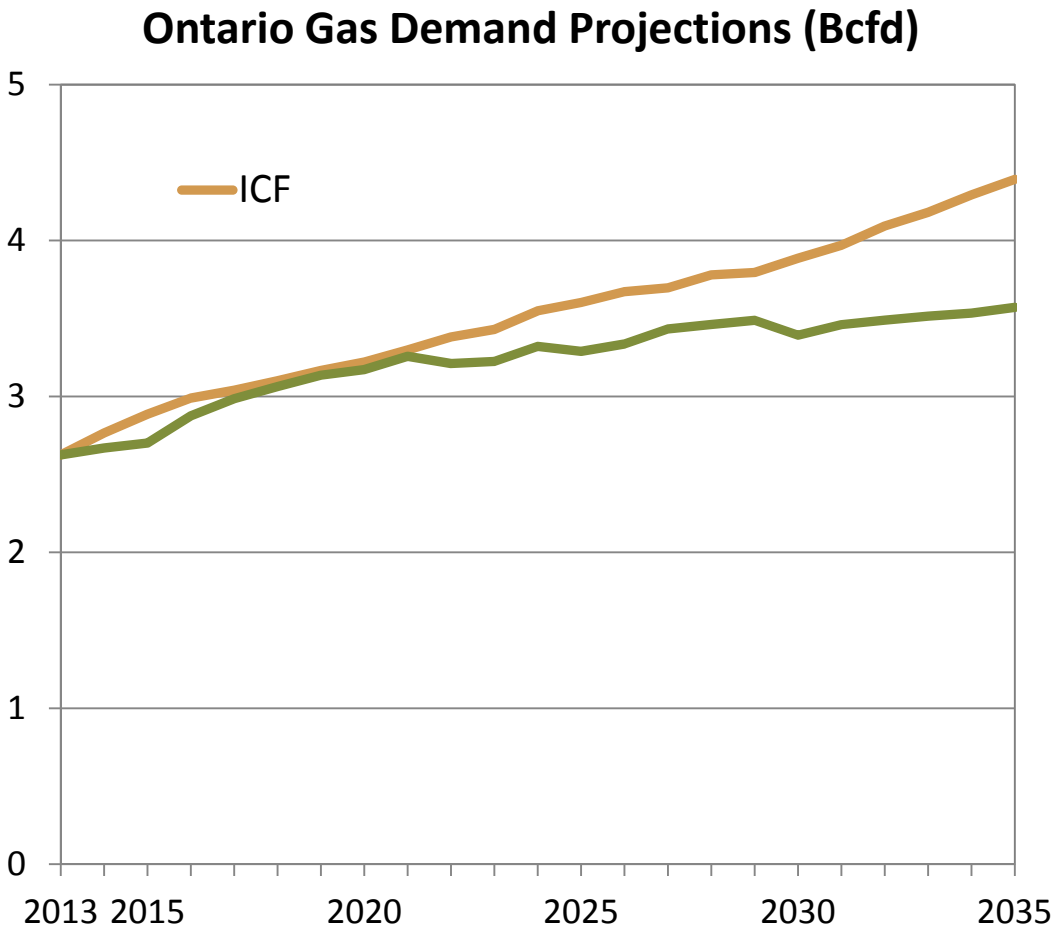
- NEB's projection assumes Ontario's nuclear generation increases after 2021 due to nuclear plant refurbishment, while ICF anticipates longer timelines associated with refurbishment.
  - By 2035, ICF's projection for Ontario nuclear generation is about 30% lower than the NEB projection.
  - Even if no additional units are retired, any delays in the scheduled refurbishments at the Darlington and Bruce stations would reduce available nuclear capacity and generation through 2035, increasing reliance on gas-fired generation.

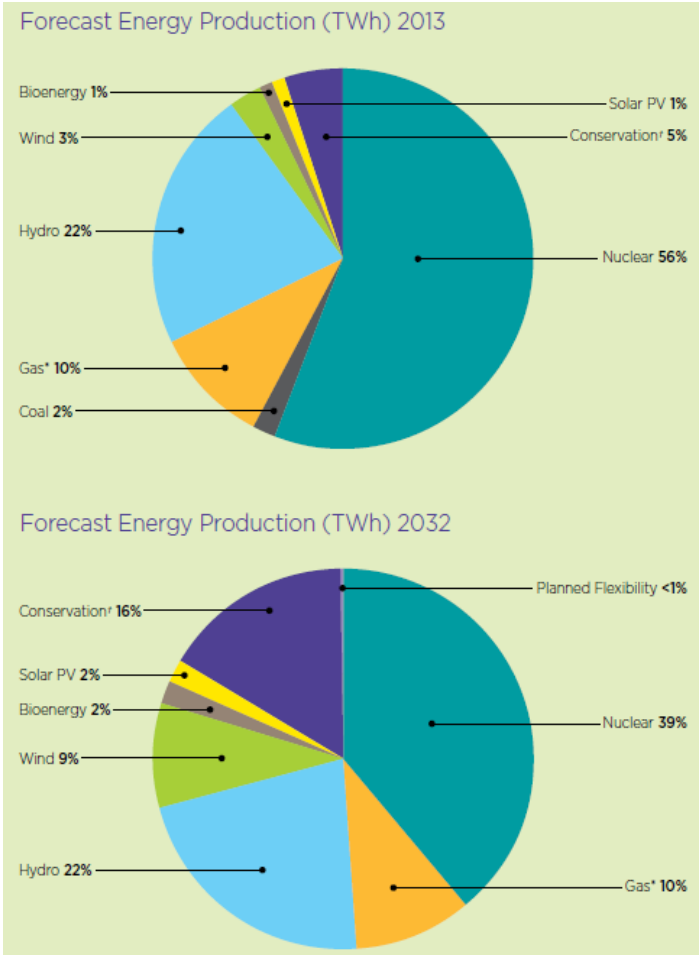


The Phase-out of Coal-Fired Capacity has Already Increased Ontario's Power Sector Gas Demand

- In April 2014, Ontario became the first jurisdiction in North America to fully eliminate coal as a source of electricity generation.
- About 10 GW of new natural gas-fired generation has been added to replace the retired coal capacity.
  - From 2007 to 2012, gas-fired generation increased from about 10% to over 20% of Ontario's total generation.
- Ontario's wind capacity has also grown from 400 MW of six years ago to about 2,000 MW today.
  - While wind replaces some of the generation from retired coal plants, the increased use of wind creates additional need for gas-fired generation capacity to backstop the renewables.
  - By 2030, wind is projected to provide 10 percent of the province's electricity demand.

The Ministry of Energy's Long-Term Energy Plan Emphasizes Conservation and Energy Efficiency

- In December 2013, the Ontario Ministry of Energy released an update of its Long-term Energy Plan (LTEP), which projects electricity demand and supply through 2032.
- The LTEP projects electricity demand will increase by an average of 1.2% per year, but emphasizes that energy efficiency will offset much of the demand growth, and demand response will meet a greater share of peak load.
  - The LTEP projects increased conservation and energy efficiency to provide the equivalent of about 30 TWh per year by 2032.

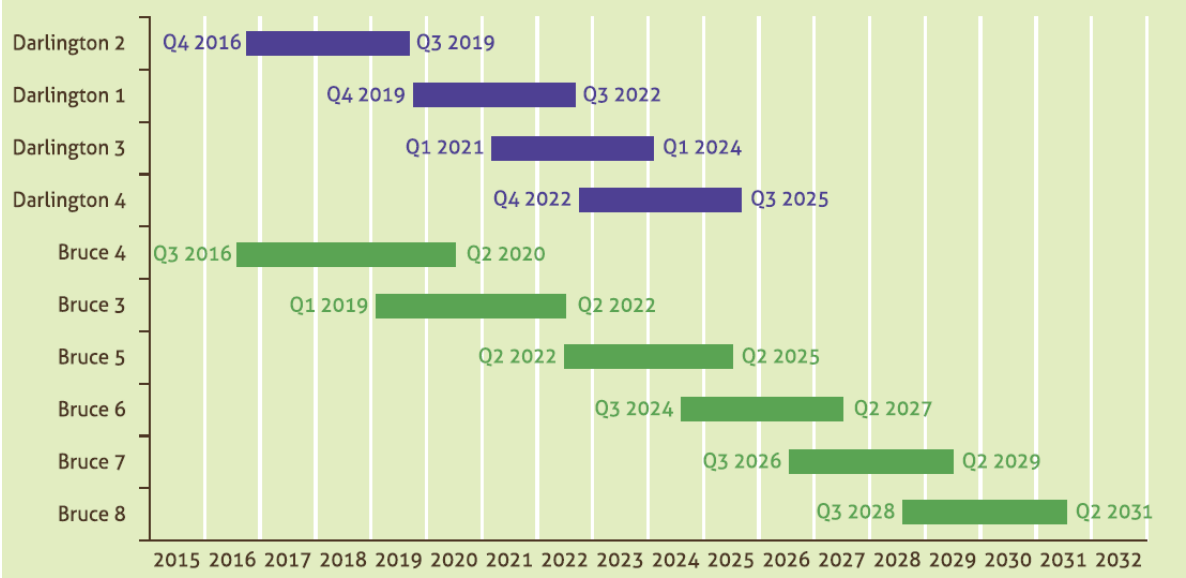


Source: Achieving Balance - Ontario's Long-Term Energy Plan, Ontario Ministry of Energy, December 2013.

Potential for Additional Gas Demand if the Schedule for Nuclear Plant Refurbishments Slips

- The majority of Ontario's electricity demand is currently supplied by it's three nuclear stations: Pickering, Darlington, and Bruce.
  - In 2013, nuclear accounted for nearly 60% of Ontario's electricity supply.
- The 4 units at Pickering (total of 2100 MW) are scheduled for retirement by 2020.

Planned Ontario Nuclear Refurbishments

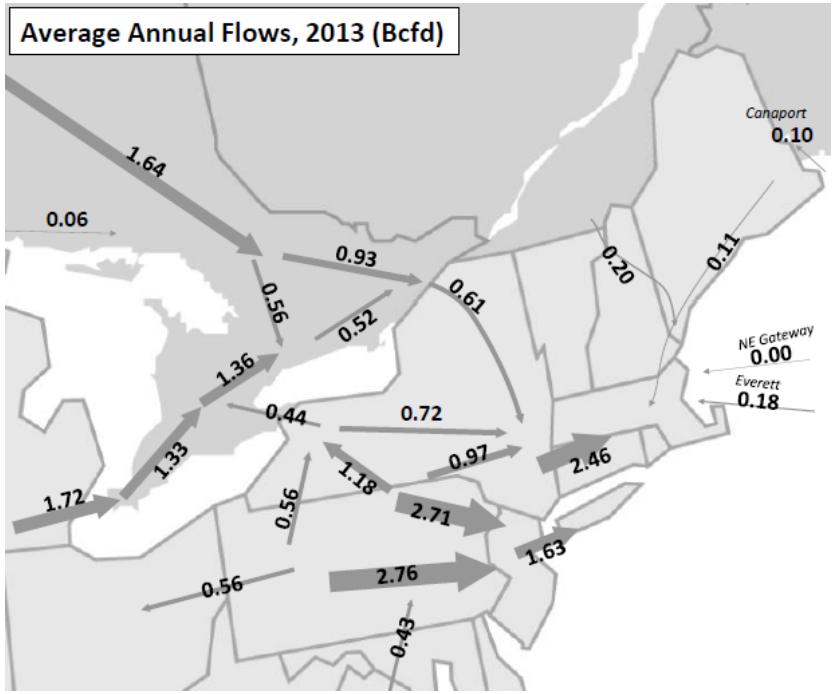


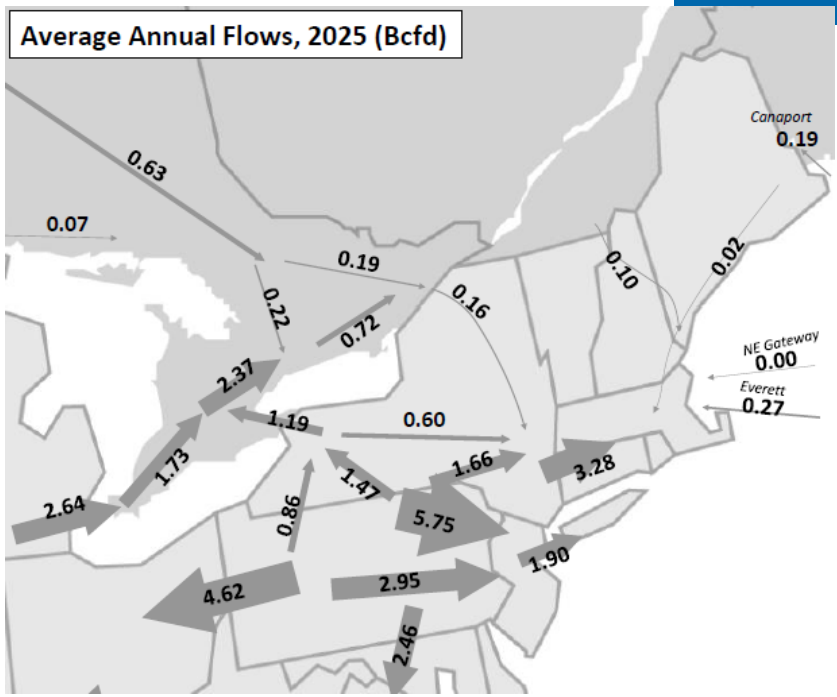
Source: Achieving Balance - Ontario's Long-Term Energy Plan, Ontario Ministry of Energy, December 2013.

- By 2020, the Ontario Ministry of Energy projects that nuclear generation will decline by 23 TWh per year, 22% below the 2013 level.
- Plans to build additional nuclear capacity have been deferred, and the remaining nuclear units at the Darlington and Bruce Stations will require extensive refurbishment to continue operating.
  - Any delays in the proposed refurbishment schedule could result in increased power sector gas consumption through higher utilization of existing facilities.

Section 4:
Ontario Natural Gas Supply

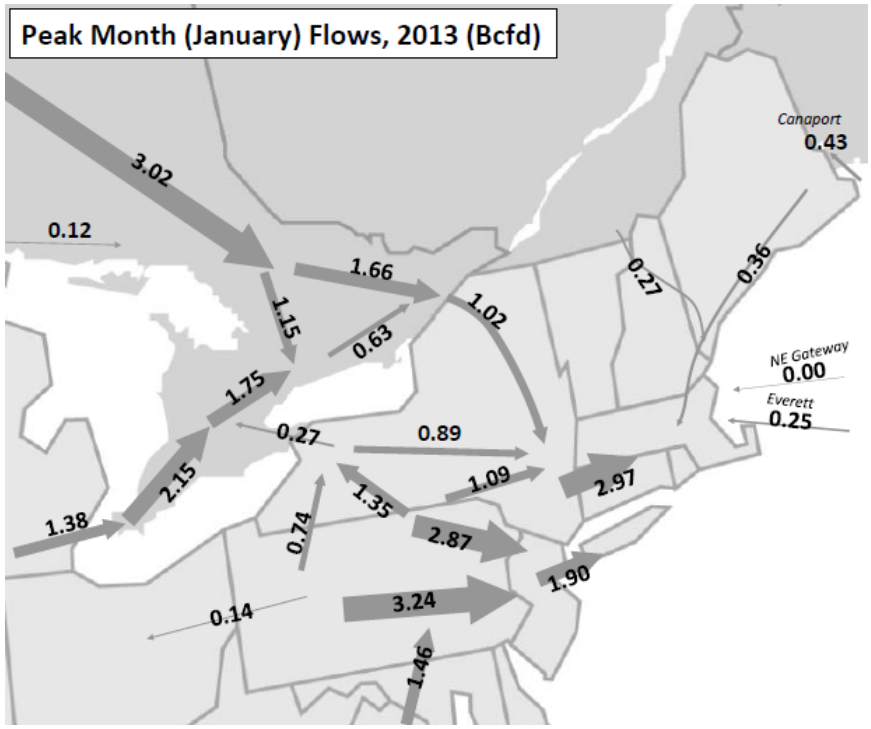
Flows into Ontario from Western Canada Projected to Decline, While Flows from Michigan and New York Increase

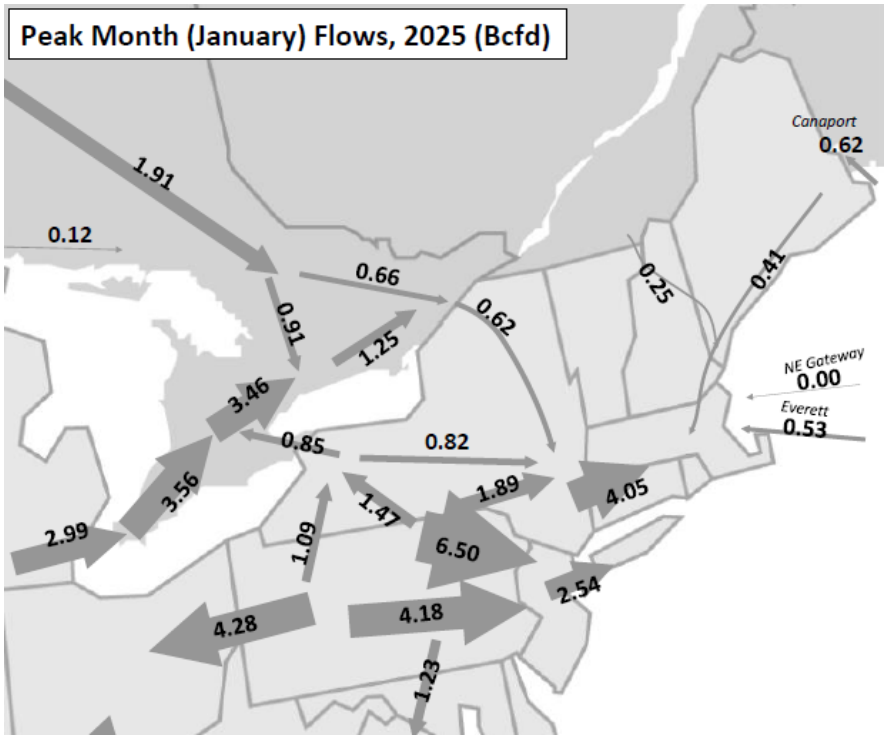




- Based on the projected changes in regional gas supplies and demand and anticipated gas infrastructure changes, ICF's gas model projects that flows from Western Canada into Ontario will decline.
- Flows out of the Appalachian Basin increase, and much of this gas makes its way into southern Ontario via Michigan and Niagara.
  - ICF's Base Case includes 1.0 Bcf/d incremental capacity into Dawn, and 0.8 Bcfd of incremental capacity into Ontario through Niagara
- On an annual basis, outbound flows at Waddington (into Iroquois) decrease due to increased production in the Appalachian Basin and increased connectivity between Appalachia and eastern markets.

Ontario Pipeline Flows During Peak Winter Periods are also Changing



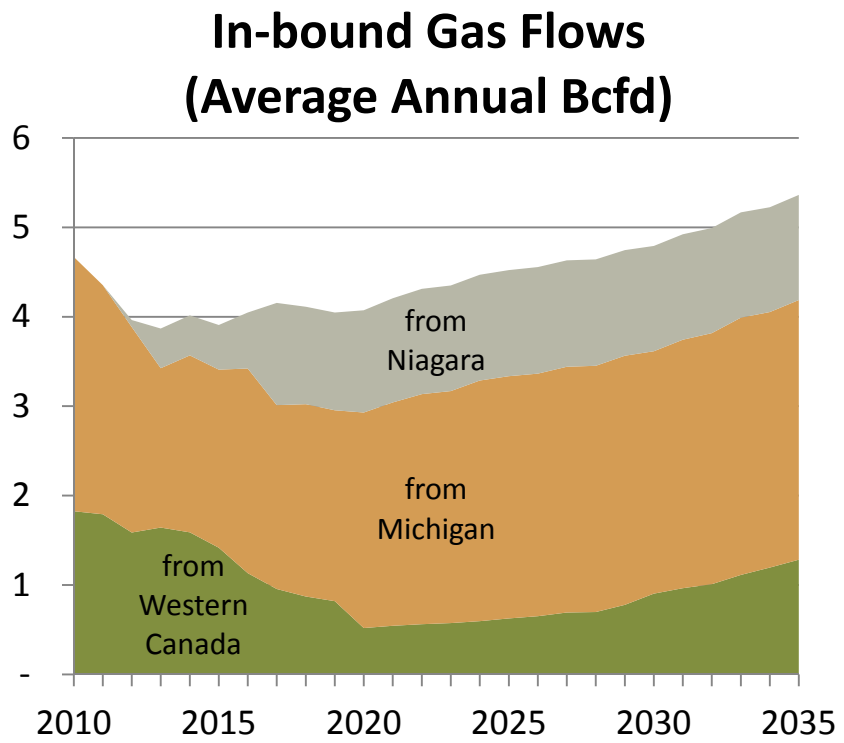


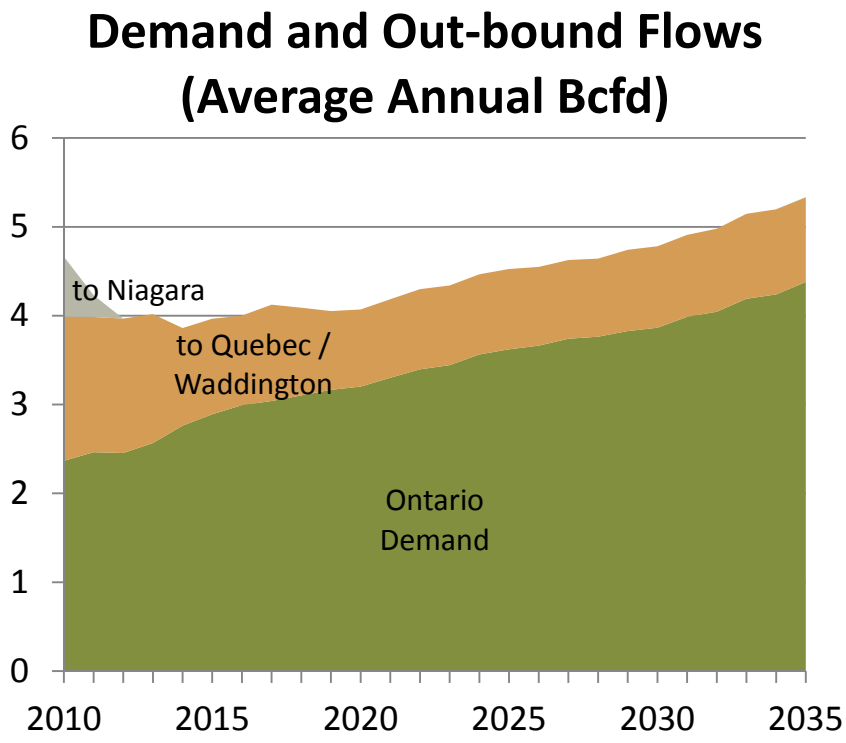
- Peak period flows from Western Canada into Ontario also decline during peak periods and are offset by an increase in flows through Michigan and New York.
- During peak months, outbound flows at Waddington decline somewhat due to displacement by Appalachian Basin. However, outbound flows at Waddington into Iroquois will remain a critical component of peak period supply in the U.S. Northeast, particularly on peak demand days.

Peak Winter Flows from Ontario/Quebec into the Northeast U.S. Remain High

- While there are ample gas supplies nearby in Marcellus and Utica, pipeline capacity from these plays into New England remains constrained during winter months.
  - Gas demand growth (mostly from increases in the power sector) has outpaced increases in new supplies into the region.
  - New pipeline construction requires firm contract commitments, but since there is no mechanism in the New England power market to allocate these costs, pipeline capacity lags behind demand.
  - Pipeline construction will also face significant opposition.
- Interruptible capacity becomes very scarce during peak winter periods, causing extreme spikes in New England spot prices.
  - During the winter of 2013/14, the Algonquin City Gate daily spot peaked at over $75 per MMBtu on several days.
- The price signals in the New England market are seen at Waddington and prompt gas flows into Iroquois, thereby having an impact on Ontario market prices. Capacity constraints in Ontario can place upward pressure on prices at Waddington and into New England.

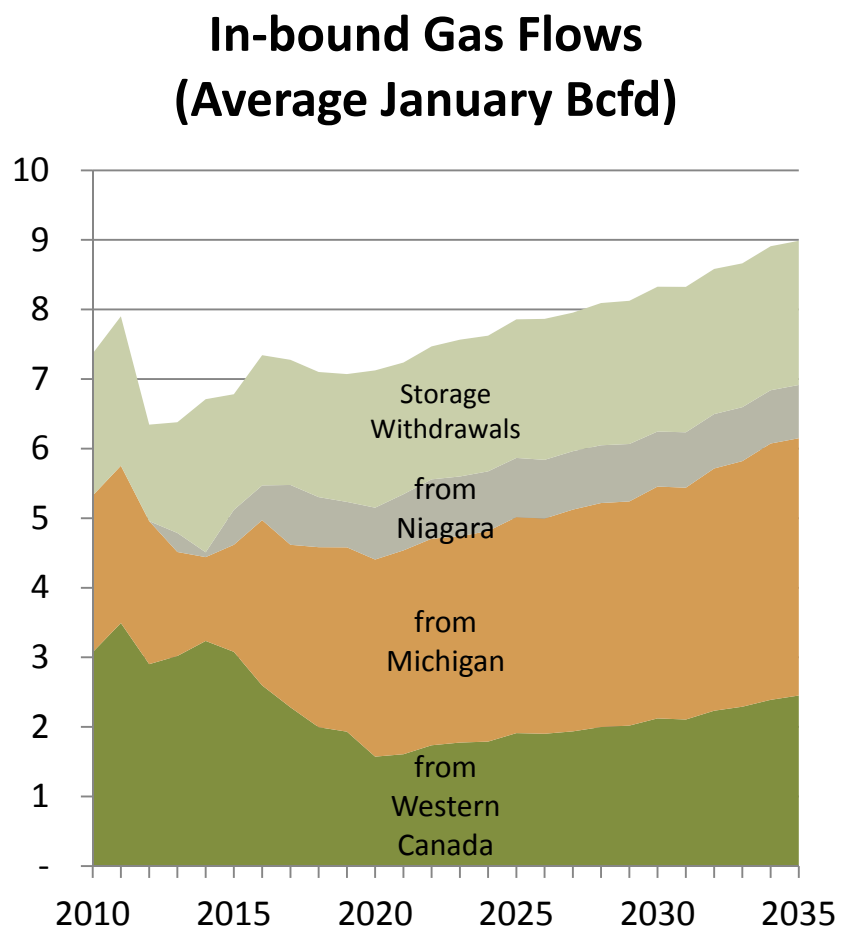
Ontario Will Become Increasingly Reliant on Gas Supplies from the Appalachian Basin

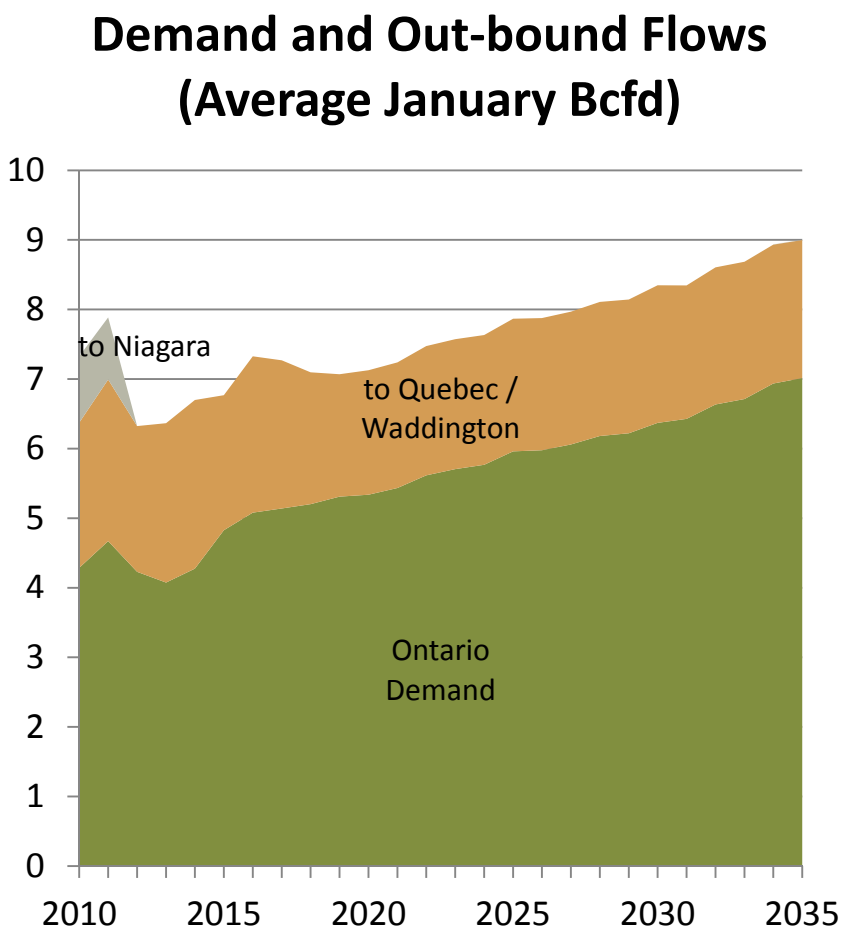




- Based on the projected changes in regional gas supply, demand and infrastructure, ICF's gas model projects that flows from Western Canada into Ontario will decline through 2020.
- ICF is projecting that the decline in Western Canadian supply will be replaced by growth in Ontario supply from the Appalachian Basin through Michigan and New York.
  - However, supply will require development of new pipeline infrastructure from the Appalachian Basin to Ontario, and within Ontario from receipt points to consumer market centers.

Ontario's January Gas Balance (Peak Month)

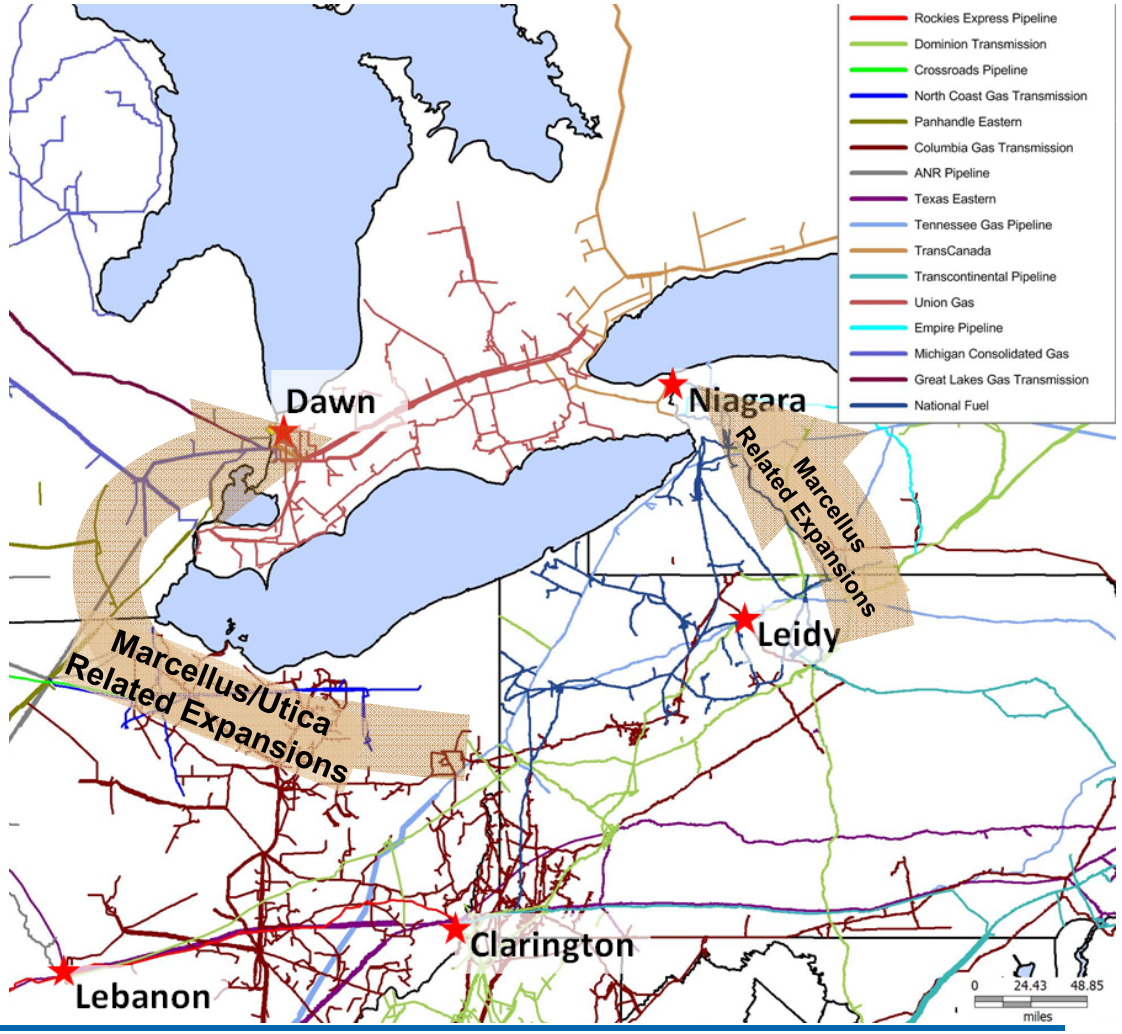




Section 5:
Ontario Infrastructure

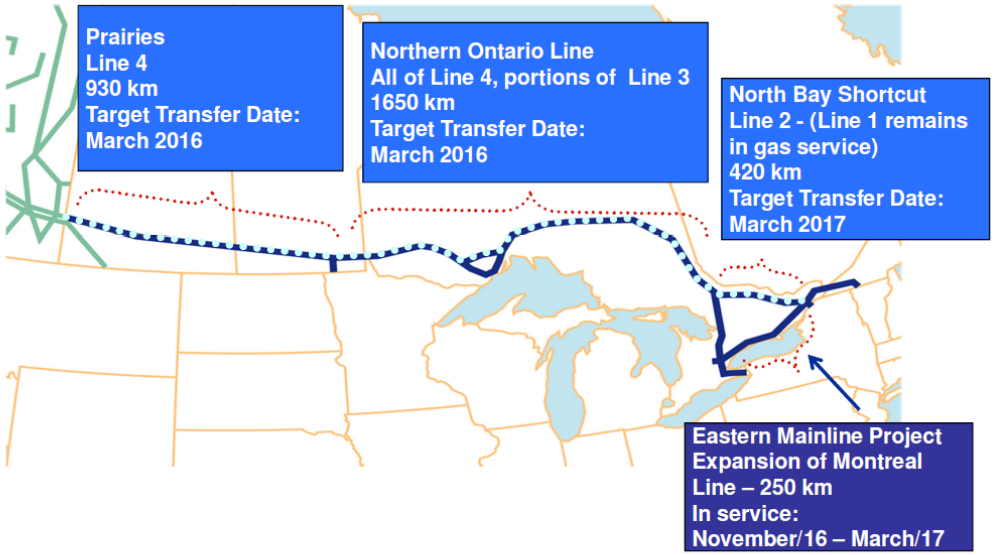
New Pipeline Capacity Will Be Needed to Allow More Appalachian Basis Gas to Move to Ontario Markets

- Over the past 2 years, capacity expansions by Tennessee, Dominion, National Fuel, and Empire have made it easier to move Marcellus gas to western New York and to the Niagara border point.
- Three proposed pipelines (ANR East, NEXUS, and Rover) would allow additional Marcellus and Utica production to move from Ohio to Michigan and Dawn.
- Additional capacity into Ontario through Niagara is also possible.
- Additional pipeline capacity within Ontario will be needed to make effective use of these new supplies.
  - From Dawn and Niagara to the Ontario demand centers.



Potential Impacts of the TransCanada Energy East and Eastern Mainline Projects

- Combined, the TCPL Energy East and Eastern Mainline projects would reduce gas transportation capacity in the Eastern Ontario Triangle (EOT) by about 0.6 PJ/d
  - Energy East would remove 1.2 PJ/d of natural gas transportation capacity from service in Eastern Ontario.
  - The Eastern Mainline Project would add about 0.6 PJ/d of capacity to the EOT.



Source: TransCanada, October 2014

- Currently, on peak winter days, the natural gas pipeline capacity in the Eastern Ontario Triangle is fully utilized.
  - Including both firm and non-firm services on TransCanada.
- The decline in gas capacity will put additional pressure on Eastern Ontario gas markets, potentially leading to higher prices during peak demand periods.
  - Continued growth in demand in Eastern Canada will lead to additional firm capacity requirements in the EOT.
  - The U.S. Northeast will continue to rely on the Iroquois Pipeline and PNGTS to meet gas requirements during peak winter periods, leading to demand for firm and non-firm transportation capacity on the EOT.

The Future for Dawn Storage Development

- Increased access to Marcellus production will tend to hold down the intrinsic value of storage at Dawn while production in the Appalachian Basin is growing faster than demand in the U.S. Northeast, Ontario and Quebec.
  - Rapid growth of Marcellus supplies increases winter gas deliverability, thereby holding down winter prices and reducing seasonal price spreads at Dawn.
- However, growth in Ontario power generation gas demand will likely increase the extrinsic value of storage.
  - Gas generators ramp up and down quickly, requiring rapid response from the gas system.
  - As a result, storage deliverability will be in demand to meet this need.
- The availability of storage in Ontario, and limited growth in storage in the Appalachian basin will ensure that Ontario and Northeastern U.S. markets will remain closely linked.
  - The need for access to storage for Appalachian basin production will lead to increased storage utilization, and to increased pipeline utilization between Ontario and the Appalachian Basin.

Section 6:
Conclusions and Key Observations

Key Observations on Ontario 2020 Natural Gas Markets

1) Rapid growth in shale gas production will continue to drive change in North American gas markets.
   - Changes in the location of both production and demand will drive rapid changes in natural gas infrastructure and supply patterns.
   - Projected Henry Hub gas prices are likely to average $5-$6 per MMBtu in the longer term; high enough to support the supply development, but not so high as to adversely impact market growth.
2) Natural gas production in the Marcellus and Utica plays in the Appalachian Basin will account for over half of incremental North America gas production through 2035.
   - ICF is projecting the Appalachian Basin to be the lowest cost major source of natural gas supply in North America after 2020.
3) Western Canadian natural gas supply delivered to Ontario will continue to decline through 2020. The decline is expected to be replaced by Appalachian Basin gas.
4) Ontario and the U.S. Northeast markets will continue to be linked.
   - Appalachian Basin production will rely on Michigan and Ontario storage to provide seasonal markets.
   - Growth in New York and New England peak winter demand is expected be greater than pipeline capacity additions from the Appalachian Basin. As a result, flows from Ontario and Quebec into the Northeastern U.S. on Iroquois, PNGTS and other pipes will remain a critical component of peak period supply in the U.S. Northeast.
5) Additional infrastructure through Michigan and New York to Ontario, and within Ontario, will be needed to ensure that Ontario has reliable, economic access to the growth in Appalachian Basin gas.

Appendix:
Key Assumptions Behind ICF Market Projection

Key Assumptions Behind ICF's Market Projection

The market projections provided in this presentation are based on results from the *Gas Market Model* (GMM), ICF's proprietary model of North American gas markets. Key assumptions behind the ICF market projection are provided below.

- For the balance of 2014 and all of 2015, U.S. GDP growth assumptions are based on the Wall Street Journal's September 2014 Survey of Economists; from 2016 forward, ICF assumes a real dollar growth rate of 2.6% per year. Canadian GDP is projected to increased at 2.5% per year throughout the forecast.
- Projected weather is consistent with average seasonal patterns over the past 20 years.
- Long-run oil price (refiner's average cost of crude) is assumed to be $100 per barrel (in 2012$).
- U.S. electricity demand growth averages 1.2% per year; Canadian growth averages about 1.3% per year.
- ICF's projection reflects one plausible outcome of U.S. EPA's proposals for new emissions regulations, including Mercury & Air Toxics Standards Rule (MATS), water intake structures (often referred to as 316(b)), coal combustion residuals (CCR, or ash), and the Clean Power Plan (CAA Section 111(d)). It includes a charge on CO2 reflecting the time it may take for direct regulation of CO2 to be implemented.
  - These assumptions for U.S. environmental regulations generally favor the continued retirement and replacement of coal capacity with gas capacity.
- Renewable capacity increases to meet state and provincial renewable portfolio standards.
- U.S. nuclear plants are assumed to have a maximum life span of 60 years; this assumption results in nearly 25 GWs of retirements between 2028 and 2035.
- For Canada, ICF assumes that, per current plans, all nuclear units at the Pickering Station are offline by 2020. While the remaining nuclear capacity is expected to be maintained, planned refurbishment of all the units at the Darlington and Bruce stations will remove substantial portions of the nuclear capacity from service starting in 2016.

Key Assumptions Behind ICF's Market Projection (continued)

- ICF estimates the economically recoverable natural gas resources in U.S. and Canadian natural gas total over 4,000 trillion cubic feet (Tcf).
  - Shale gas resources account for over 50% of the resources.
- Gas supply development is expected to be consistent with recent levels, with no significant restrictions on permitting and fracturing beyond the current restrictions.
- No Arctic gas supply projects (specifically no Alaska or Mackenzie Valley gas pipelines) are included in the projection.
- Pipeline capacity expansions over the next 4 to 5 years are consistent with announced projects. In the long-term, pipeline capacity is expanded when the market projection indicates the need for additional capacity (i.e., increased basis).
- Pipeline capacity changes include development of TransCanada's Energy East and Eastern Mainline Expansion projects.