Outlook for the North American and Ontario Natural Gas Markets

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- North American Natural Gas Market Overview
  - Recent Market Trends
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Gas prices are expected to remain lower for the remainder of 2016, but have the potential to rise sharply in 2017.

- Low oil prices, high storage inventories, relatively weak demand, and a large inventory of drilled-but-uncompleted wells in the Marcellus/Utica shales are likely to keep prices low for the remainder of the year.
- As inventories of drilled-but-uncompleted wells are drawn down, gas supplies will tighten, prices will rise, and price volatility will increase.

In the long-term, steady demand growth will cause prices to rise.

- Current price levels are not sustainable, but continued drilling productivity increases will limit gas price increases.
- Gas is expected to continue to gain market share in the power sector.
- Long-term power sector gas demand is driven by coal and nuclear plant retirements and electricity demand growth.
- Exports to Mexico continue to grow at a robust pace, and U.S. LNG exports rise as oil prices recover.

Seasonal price spreads are expected rebound from recent floors when prices start increasing and when additional LNG exports start in 2018 and 2019.
Gas production from oil wells continues to moderate in response to relatively low oil prices, as producers realign their portfolios, focusing on more productive plays.

- The Marcellus and Utica shale will continue to be the primary source of new gas production; however, drilling is likely to continue to shift to drier parts of the plays if oil prices remain relatively low for a longer duration.
- Canadian production growth will come entirely from shale and unconventional resource development.

Natural gas flow patterns change significantly as Marcellus/Utica production continues to increase.

Midstream infrastructure development facing headwinds, but is still needed to accommodate growing gas production.

- Development will be mostly focused on linking Marcellus/Utica supplies to regions with market growth.
- Extended low oil prices could compromise infrastructure development.

Price volatility is likely to increase as demand strengthens. Regional volatility is expected to remain high in the Northeast consuming markets during winter when gas use peaks.
Between June 2014 and February 2016, oil prices dropped by over 70%.

- High inventories
- Weak global demand
- Geopolitical factors

ICF projects a slow recovery to $75/bbl, based on the equilibrium marginal production cost of $75/bbl.

- Lower oil price reduces gas development from oil-directed plays like Permian and Bakken, but have minimal impact on gas-directed plays like Marcellus.
US gas rig count in May 2016 was down 74% compared to average 2014 levels.

- Total operating gas rigs in the U.S. has decreased from 372 in January 2014 to 85 as of May 20, 2016.
- Rig activity down everywhere, but the most dramatic declines have been the in Midcontinent plays (e.g., Woodford, Barnett).

Improvements in rig efficiency partially offset the decline in rig activity.

Reduced drilling activities will result in slower production growth over the next 6 to 12 months.
ICF’s Near-term Gas Price Projection

- Projected gas prices rise from $1.90 to almost $3 per MMBtu by the end of 2016, averaging about 10 cents below recent futures prices.
- Through the end of 2018, ICF’s Q2 price projection average is slightly lower than the current future strip.
  - Slow projected growth in demand.
  - Storage inventory overhang
ICF’s Long-term Price Projection

- After 2017, prices are likely to rise and be more volatile as producers continue to reduce capex and demand ramps up.
  - However, low production costs will keep a lid on price increases. Prices likely to stay below $4 per MMBtu through 2020.
- Long-term prices are expected to range between $4 and $5 per MMBtu.
  - Gas prices of $4 to $5 per MMBtu are sufficient to foster supply development, but not so high as to throttle the demand growth.
  - Long-term demand growth will be shaped by future environmental policies and their impact on power sector gas demand.

![Annual Average Henry Hub Price Graph]

Nuclear Retirements
Mild Winters Yield Lower Prices
Producer Cut-backs Tighten Supply
Demand Surge and LNG Exports Ramp Up
Stable Prices – Market Growth and Supply Growth Synchronized
Cold Winter Pops 2014 Gas Price
Historical
ICF Projected
Demand growth for natural gas is driven primarily by growth in export markets (LNG and Mexican exports) over the next five years.

Gas will continue to gain market share from coal in the power sector.

- In the near term, shift from coal to gas is due to low gas prices.
- In the long term, ICF assumes the U.S. will adopt some form of carbon policy, forcing more coal units to retire.
ICF’s current projection assumes U.S. LNG exports peak at about 10 Bcfd by 2025, and decline to about 8 Bcfd by 2035.

Total U.S. LNG exports are estimated based on both Firm and Spot LNG exports using the methodology outlined below.

- ICF has reviewed the current contracted capacity for each of the US LNG facilities and estimated firm take away export volumes based on contracts.

- Spot LNG export volumes are estimated based on gas-to-oil price ratio, world LNG demand growth and US market share of contestable LNG demand.
  - LNG exports from British Columbia are delayed until 2026 and reach 1.4 Bcfd by 2028.

U.S. exports to Mexico will continue to grow, driven by increases in U.S. production and growth in Mexican gas use.

- Mexican gas demand is driven by replacement of oil-fired generation.
Total gas production increases by nearly 2% per year.

- By 2023, shale gas production accounts for over 70% of all U.S. and Canada gas production.

Other unconventional gas production remains fairly constant:

- Tight gas increases modestly while CBM declines.

Conventional production continues to decline by over 2.5% annually.

Offshore production exhibits modest increases.
Changes in Pipeline Flows Over the Next Decade

- Robust Marcellus & Utica gas production growth displaces flows from the Gulf Coast such that many Gulf Coast to Northeast pipelines reverse flow by 2017.
- Marcellus gas will reach Eastern Canada through Michigan and New York.
- Declining conventional production in Alberta and increasing gas consumption for oil sands development and LNG exports from British Columbia reduce eastward flows from Western Canada.

Source: ICF International
Outlook for the Ontario Market
Compared to the winter of 2014/15, average spot prices were 40% to 70% lower this winter.
What was different this past winter?

- **Weather**
  - The winter of 2015/16 was the warmest on record for both the U.S. and Canada.

- **Storage**
  - At the end of the 2015 injection season, storage inventories were at record highs in both the U.S. and Canada.

- **Supply**
  - Continued growth in production, mostly from the Marcellus and Utica, contributed to a looser supply/demand balance.
A lot of additional pipeline capacity in the planning stages, but how much will be build?

<table>
<thead>
<tr>
<th>Project(s)</th>
<th>From</th>
<th>To</th>
<th>Capacity (MMcfd)</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>To Ontario from Outside the Province</strong></td>
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<td></td>
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<tr>
<td>Rover/Nexus *</td>
<td>Marcellus/Utica</td>
<td>Vector Pipeline</td>
<td>1,050</td>
<td>2017</td>
</tr>
<tr>
<td><strong>Within Ontario</strong></td>
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<td></td>
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<tr>
<td>TCPL Kings North</td>
<td>Parkway</td>
<td>Maple</td>
<td>347</td>
<td>2016</td>
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<tr>
<td>TCPL Niagara Expansion</td>
<td>Niagara/Chippewa</td>
<td>Parkway</td>
<td>380</td>
<td>2017</td>
</tr>
<tr>
<td>Union Dawn to Parkway 2016</td>
<td>Dawn</td>
<td>Parkway</td>
<td>430</td>
<td>2016</td>
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<td>Union Dawn to Parkway 2017</td>
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<td>Parkway</td>
<td>480</td>
<td>2017</td>
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<td>TCPL Vaughn Loop</td>
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<td>Maple</td>
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<td>TCPL Niagara Expansion</td>
<td>Niagara/Chippewa</td>
<td>Parkway</td>
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<td>2017</td>
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<td>Eastern Mainline Expansion</td>
<td>Parkway</td>
<td>Iroquois/Waddington</td>
<td>672</td>
<td>2020</td>
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<td><strong>To Northeast/New England</strong></td>
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<td></td>
<td></td>
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<tr>
<td>Dominion New Market Expansion</td>
<td>Marcellus Interconnects</td>
<td>Upstate New York</td>
<td>112</td>
<td>2016</td>
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<td>Constitution</td>
<td>Northeast Pennsylvania</td>
<td>Wright, New York</td>
<td>650</td>
<td>Planned 2016, but delayed indefinitely</td>
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<tr>
<td>National Fuel Northern Access</td>
<td>Pennsylvania</td>
<td>Western New York</td>
<td>497</td>
<td>2017 (delayed, was 2016)</td>
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<td>Atlantic Bridge</td>
<td>Marcellus</td>
<td>New England &amp; Maritimes</td>
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<td>2017</td>
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<tr>
<td>Access Northeast</td>
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<td>New England</td>
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<td>2018</td>
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<td>Penneast Pipeline</td>
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<td>2018</td>
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<td>Millennium Upgrade</td>
<td>Marcellus Interconnects</td>
<td>New York</td>
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<td>2018</td>
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</tbody>
</table>

* Where there are multiple projects competing to add capacity on the same path, the capacity shown is the total amount expected by 2018.
New capacity in the U.S. and Ontario will allow greater access to Marcellus/Utica gas

- Over the past 3 years, capacity expansions by Tennessee, Dominion, National Fuel, and Empire have made it easier to move Marcellus gas to Niagara and Parkway.

- If completed, new pipelines proposed by Spectra (NEXUS) and ET (Rover) would allow additional Marcellus and Utica production to move to Dawn.

- Capacity expansions within Ontario will also allow greater access to Marcellus/Utica supplies.
If approved, TCPL’s Energy East project would remove about 1.2 Bcfd of capacity from service on the Mainline from Alberta to eastern Ontario.

– TCPL also proposes to add some new capacity in eastern Ontario, but in net capacity into Ontario would be about 600 MMcfd below what is currently contracted;

– During two of the last three winters, all of the current capacity was used on peak winter days.

TransCanada proposes to remove existing 42-inch pipeline in North Bay Short Cut

TransCanada proposes to replace capacity with 36-inch Eastern Mainline Project built along the Montreal Line
Outlook for the Ontario Market

- **Near-term (next 2 to 4 years)**
  - The Mainline settlement assures TransCanada's commitment to add pipeline capacity in the Eastern Triangle, providing shippers with better access to Dawn and Niagara supplies.
  - Renewal provisions give TransCanada more certainty over capacity requirements, but also continued pricing discretion.
  - So, TransCanada will build additional capacity in the Eastern Ontario Triangle to meet demand, *but at what cost?*

- **Long-term (2020 and beyond)**
  - TCPL’s Energy East project, now planned for 2020, will reduce available capacity in the Eastern Ontario Triangle.
  - Continued growth in Marcellus/Utica production and new pipeline in the Northeast will provide free up some supplies, but *not completely replace* the capacity lost due to Energy East.
    - For shippers holding firm capacity, the effects will be relatively modest, although the impacts are likely to include higher long term pipeline capacity costs.
    - Shippers who do not hold firm capacity will be exposed to higher prices and greater price volatility.
Most of Ontario’s Demand Growth Comes from the Power Sector

- ICF projects total Ontario gas use will increase by approximately 0.9 GJ/d (0.8 Bcfd) by 2025.
  - Consistent with recent NEB forecasts.
- Demand growth is led by the power sector, and is primarily due to nuclear retirements and refurbishments.
The Ontario Ministry of Energy Long-term Energy Plan (LTEP) projects the province will meet future electricity needs primarily through a combination of conservation (reducing the growth of consumption) and increased renewable generation.

- New capacity is natural gas.
- All Pickering units are scheduled to retire by 2024.
- Maintaining nuclear’s ~40% share of total generation requires the refurbishment of 10 units between 2017 and 2033.

Regional Flow Changes: Flows From Western Canada Continue to Decline, but Opportunities for New Supplies Are Increasing

Annual Average Pipeline Flows, MMcfd
Regional Flow Changes: (continued)

January Average Pipeline Flows, MMcfd

January Flows, 2015 (MMcfd)

January Flows, 2025 (MMcfd)
The Future for Dawn Storage

- Growth in Marcellus production has held down the intrinsic value of storage at Dawn.
  - Rapid growth of Marcellus supplies increases winter gas deliverability, thereby holding down winter prices and reducing seasonal price spreads at Dawn.
  - Falling prices tied to the production growth also have held down seasonal price spreads.

- Going forward 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.

- And, reversal of natural gas price trends (from falling prices to rising prices) will lead to additional seasonal value of storage.

- 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.
Thank You!

Questions?