The Future of U.S. Natural Gas
Supply, Demand & Infrastructure Developments

July 9th, 2014

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The Future of U.S. Natural Gas

Outline

- Introduction, Methodology and Overview of Market Approach (Cell Modeling and Cellcast).
- Production and Supply Prospectus.
  - Expectations By Region and Basin
  - Processing and Fractionation Expectations
  - Forecast through 2030
  - Import Picture: Canada and LNG
- Demand: The Future is In Your Hands.
  - Residential, Commercial and Industrial
  - Power Burn
  - Mexico and LNG Export
- Regional Balances Dictate Infrastructure Requirements.
  - Current and Planned Capacity
  - Shifting Dynamics and Future Pipeline Requirements
  - Storage: Why We Need It and Where
- Impact on Natural Gas Price.
  - Forecast through 2030
  - Regional Basis and Volatility
Bentek Expects Production to Increase By 28.3 Bcf/d through 2030.

Pace of Systemic Demand Is a Constraint – Demand Will Have to Start Driving the Bus by 2018.

Incremental Processing Capacity Needs Vary By Basin, Total of 6-8 Bcf/d Necessary.

Midstream Market Participants Eager to Build Pipeline In Certain Regions with 38.8 Bcf/d in Proposed Projects.

Analysis Shows Need for Incremental Infrastructure Projects ≥ 1.1 Bcf/d Than What Has Been Proposed, Specifically to Southwest Markets.

With Demand Increasing in Southeast, the Region Will Need 3 Bcf/d More Storage Deliverability, Most Likely Salt.

CPI Adjusted Natural Gas Prices Remain Under $5.00 thru 2025, Do Not Eclipse $6.00 Before 2030
Introduction, Methodology and Overview
Pipeline Grid is Complicated
The Market Will Always Balance

Cell Model Gas Analysis

- Supply
  - Onshore Production
  - Offshore Production
  - LNG
- Demand
  - Power
  - Res/Comm
  - Industrial
  - Pipe Loss
- Inflows/Outflows
- Imports/Exports
- Storage I/W
- Storage Inventory
- Balancing Item
• Declining Offshore Production
• Shale Emerges in the Barnett/Rockies
Primary Supply Area Changes

Primary Supply Area

Build East

Primary Demand Area
North American Production Shift Changes Midstream Needs

Total Increase: 10.8 Bcf/d

U.S. Production Growth, 2008-2013
- NE Production Dominates
- Declining Rockies, Stagnant Midcon/TX

Go West!

- Pacific Northwest
  -0.9 Bcf/d

- Southern Rockies
  -0.9 Bcf/d

- Midcon Midcontinent
  +0.5 Bcf/d

- Rocky Mountain
  +0.5 Bcf/d

- Northeast
  +1.4 Bcf/d

- Southeast
  +9.9 Bcf/d
Net Long/Short Balances Drive Midstream Decision Making

- Rockies Balance (Bcf/d)
- Southwest Balance (Bcf/d)
- Texas Balance (Bcf/d)
- Northeast Balance (Bcf/d)
- Southeast Balance (Bcf/d)
- MW Balance (Bcf/d)
- MCP Balance (Bcf/d)

Source: BENTEK Cell Cast
Southwestern Energy’s Rig Productivity Gains

Fayetteville Shale

- IP Additions Per Rig Per Yr. (Mcf/d): 144,096 (2014)

Source: Southwestern Energy Financials
Marcellus Basin Rig Productivity Gains

Marcellus

- Drill Time (Days): 20 → 10 (−48%)
- Wells Per Yr. Per Rig: 18 → 10 (−48%)
- Avg. Lateral Length (Feet): 3,805 → 5,584 (+46%)
- 30 Day Ave. Prod Rate (Mcf/d): 6,116 → 7,589 (+24%)
- IP Additions Per Rig Per Yr. (Mcf/d): 102,937 → 271,567 (+164%)
- Drill & Complete Costs ($MM): $7.1 → $7.1 (0%)

Marcellus Basin Rig Productivity Gains

4th Quarter 2010

4th Quarter 2011

4th Quarter 2012

4th Quarter 2013

+94%

+61%

+36%

+164%

0%
Trend in Drilling Leads to more wells with Fewer Rigs

U.S. Horizontal Drilling Dynamics

Source: BENETK & RigData
Plays With High Returns Attract Drilling Rigs

Active rig count: June 6, 2014 / Change in rig count from June 11, 2010
Production Growth Concentrated in the Northeast and Wet Regions

Production Increases Dry Gas Focused Areas
Production Increases Liquids-Rich/Oil Focused Areas
Production Declines

Source: BENTEK, June 2014

Production : June 1, 2014 / Change in Production from June 1, 2010
Historical Lower 48 Production Overview

U.S. Dry Natural Gas Production

Source: BENTEK Supply and Demand Report
Two forecast methodologies:

1) Bentek projections by basin keeps rig count steady at current day levels.

2) Bentek CellCast captures demand and pipeline constraints, incorporating these fundamentals into a balanced forecast.
Flows from the Gulf via Ohio Valley and flows from the Midcon and Rockies Rapidly Getting Booted Out of the Northeast Region

**Midcon/Rockies to NE (Bcf/d)**

- ANR
- REX
- PEPL
- TETCO 24 Leg

**Ohio Valley to NE (Gulf Gas in Bcf/d)**

- Columbia Gulf
- TETCO NLeg30
- Texas Gas
- TGP
- ANR-KY

DRAFT: Not for External Distribution
Northeast Reaches Tipping Point

Production growth displaces inflows to region.

Production needs to find a home outside of the region.

Bcf/d


NE PA Dry
SW PA - Wet
SW PA - Dry
Utica Ohio
WV Dry
WV Wet
Backlogged Wells: Drilled but not Producing

- SW PA & WV: 581
- NE PA Dry: 864
- Ohio (Utica): 417

Total Backlogged Wells: 1,862
Expansion projects are critical for production growth, especially during the summer when demand drops well below production levels.
Processing and Fractionation Requirements
Adequate processing capacity through 2020 in most liquids-rich regions, except for Williston

Source: Bentek’s Market Call: North American NGLs, NGL Facilities Databank
Over 70 projects to build or expand processing capacity

Current US gas processing capacity ~ 83 Bcf/d and set to potentially increase by 12 Bcf/d by end-2017

Source: Bentek’s NGL Facilities Databank
Updated July 2014
Over 30 Fractionation Projects

Current US fractionation capacity ~ 4.2 MMb/d and set to grow by 40% to 5.9 MMb/d by end-2015

- Bakken
- Marcellus / Utica
- Eagle Ford/Gulf Coast TX

Map showing fractionation projects with data points for different regions and capacities.
North Dakota Gas Flaring an Issue Due to Processing, Takeaway Constraints

As the result of processing and pipeline constraints, estimated flaring in ND has risen from about 50 MMcf/d at the beginning of 2010 to more than 250 MMcf/d as of July 2013.

- Majority of the flaring is occurring in McKenzie County, which topped 100 MMcf/d in July.
- Northern Border traverses through top three flaring counties, exemplifies the constraints in the region.
New Builds, Expansions Will Add About 400 MMcf/d of Processing Capacity

- **Tioga Expansion**
  - Jan. 2014 – 130 MMcf/d

- **Garden Creek II and III Expansions**
  - Sept. 2014 – 100 MMcf/d
  - March 2015 – 100 MMcf/d

- **Ross New Build**
  - Dec. 2013 – 75 MMcf/d

- **South Heart New Build**
  - Sept. 2014 – 40 MMcf/d
Processing New Builds, Expansions Will Help Sustain Production Growth

Bakken Production and Processing Forecast (Bcf/d)

- Garden Creek III
- Lonesome Creek
- Targa Badlands
- Garden Creek II and South Heart
- Tioga II

Historical
Forecast
Processing Capacity

Four Basins will add 24.5 Bcf/d of Incremental production through 2030

2030 Incremental Production By Basin (Bcf/d)

- Marcellus: 10.7
- Eagle Ford: 5.0
- Anadarko: 4.3
- Utica: 4.2

More Sensitive to Gas Prices

Liquids-Rich Plays

Less Sensitive to Gas Prices

Mostly Dry Gas Plays

Basins:
- Marcellus
- Eagle Ford
- Anadarko
- Utica
- Haynesville
- Permian
- Bakken
- DJ
- Fayetteville
- Other Midcon
- Offshore
- Uinta
- Piceance
- Other West
- Barnett
- Other NE
- Green River
- Other SE Gulf
- San Juan
- East Texas
- Texas Gulf Coast

Taking into account the gas prices, the production from these basins can be categorized as:

- More Sensitive to Gas Prices:
  - Marcellus

- Less Sensitive to Gas Prices:
  - Eagle Ford
  - Anadarko
  - Utica

- Mostly Dry Gas Plays:
  - Haynesville
  - Permian
  - Bakken
  - DJ
  - Fayetteville
  - Other Midcon
  - Offshore
  - Uinta
  - Piceance
  - Other West
  - Barnett
  - Other NE
  - Green River
  - Other SE Gulf
  - San Juan
  - East Texas
  - Texas Gulf Coast
US Production Growth Focused in East, Texas, and Midcon Producing

Note: Forecasts Compare 2013 to 2030 (Bcf/d)

Total US Increase: 28.3 Bcf/d
Canadian Imports Continue Steady Decline

Highlights:
2) Western Can to PNW Steady Through Forecast Period
3) Western Can to MW Market Flows Fall by Over 70%
4) Net Imports From Canada Fall Below 1 Bcf in 2023
5) US Net Exporter in Summer - 2023 and Beyond
**LNG Imports Face Uncertain Future**

**Highlights:**

1) LNG to SE and TX Virtually Zero By 2017.
2) LNG leaving the SE hits 5.9 Bcf/d by 2025.
3) Net LNG Exports Reach 8 Bcf/d by 2022.
Demand: The Future Is In Your Hands
End of a Short-Lived Era: Market-Based Coal to Gas Substitution

Limited potential for coal to gas substitution going forward. Prices and Coal MW to Switch Out are Main Factors.

Source: BENTEK, EIA 923
EPA’s Utility MATS Rule Retires Coal Plants Starting in 2015

Cumulative Power Plant Additions and Retirements By Fuel Type (GW)

- Under Construction
- Proposed and Under Development
- Coal Retirements
- Nuclear Retirement

Avg. nameplate capacity = 180 MW
Avg. plant age = 56 years

- 1.3 Bcf/d at 30% Buildout
- 1.1 Bcf/d
- 3.5 Bcf/d
- 3.0 Bcf/d

* Clean Power Plant Rule could add 10 GW of coal retirements through 2030.
### New Industrial Demand by Facility Type by Year

<table>
<thead>
<tr>
<th>Date</th>
<th>Number of Projects</th>
<th>Chemical</th>
<th>Estimated Demand (MMcf/d)</th>
<th>Other Industrial</th>
<th>Estimated Demand (MMcf/d)</th>
<th>Metals</th>
<th>Estimated Demand (MMcf/d)</th>
<th>Petroleum</th>
<th>Estimated Demand (MMcf/d)</th>
<th>Total Demand (MMcf/d)</th>
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<tbody>
<tr>
<td>2014</td>
<td>237</td>
<td>51</td>
<td>247.31</td>
<td>140</td>
<td>22.73</td>
<td>35</td>
<td>7.22</td>
<td>11</td>
<td>122.99</td>
<td>400.25</td>
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<tr>
<td>2015</td>
<td>105</td>
<td>33</td>
<td>728.63</td>
<td>47</td>
<td>5.50</td>
<td>16</td>
<td>5.86</td>
<td>9</td>
<td>147.50</td>
<td>887.49</td>
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<tr>
<td>2016</td>
<td>43</td>
<td>17</td>
<td>1,110.45</td>
<td>15</td>
<td>56.05</td>
<td>2</td>
<td>0.10</td>
<td>9</td>
<td>894.90</td>
<td>2,061.50</td>
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<tr>
<td>2017</td>
<td>16</td>
<td>12</td>
<td>1,206.85</td>
<td>3</td>
<td>1.66</td>
<td>0</td>
<td>0.00</td>
<td>1</td>
<td>130.00</td>
<td>1,338.51</td>
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<td>2018</td>
<td>6</td>
<td>2</td>
<td>69.75</td>
<td>3</td>
<td>0.37</td>
<td>1</td>
<td>1.00</td>
<td>0</td>
<td>0.00</td>
<td>71.12</td>
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<tr>
<td>2019</td>
<td>1</td>
<td>1</td>
<td>225.99</td>
<td>0</td>
<td>0.00</td>
<td>0</td>
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<td>0</td>
<td>0.00</td>
<td>225.99</td>
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<td>2020</td>
<td>2</td>
<td>0</td>
<td>0.00</td>
<td>0</td>
<td>0.00</td>
<td>1</td>
<td>n/a</td>
<td>1</td>
<td>900.00</td>
<td>900.00</td>
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<td>TBD*</td>
<td>14</td>
<td>7</td>
<td>108.57</td>
<td>1</td>
<td>n/a</td>
<td>4</td>
<td>2.00</td>
<td>2</td>
<td>20.00</td>
<td>130.57</td>
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<tr>
<td>Total U.S.</td>
<td>424</td>
<td>123</td>
<td>3,697.55</td>
<td>209</td>
<td>86.31</td>
<td>59</td>
<td>16.18</td>
<td>33</td>
<td>2,215.39</td>
<td>6,015.43</td>
</tr>
</tbody>
</table>

*As of Jan. 1, 2014

*TBD - Projects announced but with no estimated in-service date

To date: 116 projects in 2014 with incremental 85 MMcf/d of demand capacity (53.8 MMcf/d verified).

Source: BENTEK US Industrial Demand Tracker
### US Gas-to-Liquids Projects

<table>
<thead>
<tr>
<th>Project</th>
<th>Owner</th>
<th>Location</th>
<th>State</th>
<th>Region</th>
<th>Annual Capacity (bbl)</th>
<th>Estimated demand (MMcf/d)</th>
<th>In-service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calumet GTL</td>
<td>Calumet Specialty Products</td>
<td>Karns City</td>
<td>PA</td>
<td>Northeast</td>
<td>511,000</td>
<td>14</td>
<td>2014</td>
</tr>
<tr>
<td>Juniper GTL</td>
<td>SGC Energia</td>
<td>Westlake</td>
<td>LA</td>
<td>Southeast</td>
<td>401,500</td>
<td>11</td>
<td>2015</td>
</tr>
<tr>
<td>Clean Energy Center</td>
<td>Marcellus GTL</td>
<td>Duncansville</td>
<td>PA</td>
<td>Northeast</td>
<td>730,000</td>
<td>20</td>
<td>2015</td>
</tr>
<tr>
<td>Sundrop Fuels</td>
<td>Sundrop Fuels (w/Chesapeake)</td>
<td>Boyce</td>
<td>LA</td>
<td>Southeast</td>
<td>1,428,571</td>
<td>39</td>
<td>2016</td>
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<tr>
<td>Pinto Energy</td>
<td>Pinto Energy</td>
<td>Ashtabula</td>
<td>OH</td>
<td>Northeast</td>
<td>1,022,000</td>
<td>28</td>
<td>2016</td>
</tr>
<tr>
<td>Big Lake Fuels</td>
<td>G2X Energy</td>
<td>Lake Charles</td>
<td>LA</td>
<td>Southeast</td>
<td>4,562,500</td>
<td>125</td>
<td>2017</td>
</tr>
<tr>
<td>Escalera GTL</td>
<td>Escalera Resources / Wyoming GTL</td>
<td>Cheyenne</td>
<td>WY</td>
<td>Rockies</td>
<td>5,475,000</td>
<td>135</td>
<td>2018</td>
</tr>
<tr>
<td>Westlake GTL</td>
<td>Sasol</td>
<td>Westlake</td>
<td>LA</td>
<td>Southeast</td>
<td>35,040,000</td>
<td>960</td>
<td>2020</td>
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<tr>
<td>Nerd Gas</td>
<td>Nerd Gas</td>
<td>TBD</td>
<td>WY</td>
<td>Rockies</td>
<td>3,650,000</td>
<td>100</td>
<td>n/a</td>
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<td>Micro GTL</td>
<td>Greyrock Energy</td>
<td>TBD</td>
<td>TBD</td>
<td>TBD</td>
<td>365,000</td>
<td>10</td>
<td>n/a</td>
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<tr>
<td>miniGTL</td>
<td>Carbon Sciences</td>
<td>TBD</td>
<td>Texas</td>
<td>Texas</td>
<td>365,000</td>
<td>10</td>
<td>n/a</td>
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<tr>
<td><strong>Total U.S.</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>54,212,571</strong></td>
<td><strong>1,470</strong></td>
<td></td>
</tr>
</tbody>
</table>

With a GTL project, 10 Mcf of natural gas typically equals 1 barrel (42 gallons) of product.

### Large Scale Industrial Additions Include:
- 1.5 Bcf/d of proposed GTL facilities
- 1.3 Bcf/d of Fertilizer facilities (25)
- 1.6 Bcf/d of Methanol facilities (13)
Mexico Plans 42 Gas-Fired Power Projects!!

Mexico's Power Expansion 2014 – 2026
27,446 MW

Mexican Exports from the U.S. (Bcf/d)

2013 Net Exports Double By 2018

New Gas Expansion
Combined Cycle Gas-Fired Power Plants
Existing Mexican Pipelines
Mexican Expansion Pipelines

SW to Mexico
TX to Mexico
11.6 Bcf/d of MOUs have been signed on 17.4 Bcf/d of proposed capacity.

- BENTEK expects 8.8 Bcf/d to reach execution phase (through 2023).
- LNG Exports could average 8 Bcf/d in 2020.

Gulf Coast Export Terminals:
- Freeport LNG – 1.76 Bcf/d
- Lake Charles – 2 Bcf/d
- Sabine Pass – 2.4 Bcf/d
- Cameron – 1.6 Bcf/d

North East Exports: Cove Point – 0.75 Bcf/d (5.6 mtpa)

Source: BENTEK
Freight Truck Use to Drive Increased Demand in Transportation Sector

After 2019:
- 2% growth for LD Vehicles
- 14,150 inc. freight trucks per year
- 13% inc. buses
- 50% inc. freight rail
- 10% inc. shipping
In 2012, NG consumption only makes 0.2% of total energy consumed in these sectors, but by 2025 it will grow to 2.7%.
Growth in Power Burn Critical, with LNG and Mexican Exports Buttressing Production Forecast

Lower LNG, Mexico or Power influences production levels.
Southeast Leads Demand Growth Followed by Northeast and Texas

Total US Increase: 19.9 Bcf/d

Note: Forecasts Compare 2013 to 2030 (Bcf/d)

Source: BENTEK Cell Cast
Regional Balances Dictate Infrastructure Requirements
North American Supply and Demand Balances

Note: Forecasts Compare 2013 to 2030 (Bcf/d)

Go West Young Man!

United States: 8.1 Bcf/d Long

DRAFT: Not for External Distribution
NE annual demand cannot maintain balance with production growth, thus displacing inbound flows from Canada/Midcon/Southeast. Following Winter 14-15, Northeast must export more and more gas out of the region.
More than 23 Bcf/d of announced capacity expansions in the Northeast by 2017

2014-2017 Pipeline Expansion Projects Map

**Wet Marcellus/Utica**
- 16.7 Bcf/d
  - 3 Greenfield Projects
  - 11 Reversal Project
  - 5 Bi-directional
  - 2 Expansions/modifications

**NE PA Dry**
- 6.5 Bcf/d
  - 1 Greenfield Project
  - 6 Expansions/modifications

**Pipeline**
- TGI
- Empire
- ANR
- DTI
- PNGTS
- Iroquois
- Iroq
- National Fuel
- REX
- TCO
- TETCO
- TGP
- Transco

*Capacity (MMcf/d)*
Northeast Supply and Demand Balance

2013-2030 Change in Bcf/d

Net Long 12.4 Bcf/d

- Total Supply: 16.1
- Production: 16.2
- LNG Imports: -0.1
- Power: 3.2
- Industrial: 0.2
- ResComm: -0.5
- Pipe Loss: 0.1
- LNG Exports: 0.7
- Total Demand: 3.6
NE Region Takeaway vs. Production (Bcf/d)

- TGP Rose Lake – 0.23 Bcf/d
- Transco NE Connector 0.1 Bcf/d
- Constitution - 0.65 Bcf/d
- TGP Niagara – 0.158 Bcf/d
- TCO east side – 0.31 Bcf/d
- AGT AIM – 0.342 Bcf/d
- DTI/IRQ NIMO – 0.275 Bcf/d
- Transco Leidy SE – 0.525 Bcf/d
- AGT Atlantic Bridge - 0.1 Bcf/d
- Spectra New England – 1 Bcf/d
- TGP NE Energy Direct - 2.2 Bcf/d
- Transco Atlantic Sunrise - 1.7 Bcf/d

NE PA Dry Forecast vs. Pipeline Capacity

- NE PA Dry
- Pipeline Takeaway
New England Market Challenged By Low Demand Growth Over Time

Region Dependent on Inflows to Satisfy Demand (No Storage)

Pipeline Expansions Through 2018

0.0
2.0
4.0
6.0
8.0

New England Demand Vs. Capacity (Bcf/d)

Demand vs. Capacity in Bcf/d (across Hudson River)


7.6 Bcf/d
9.5 Bcf/d
2.8 Bcf/d
0.9 Bcf/d

7.6 Bcf/d
9.5 Bcf/d
2.8 Bcf/d
0.9 Bcf/d

New England Demand Vs. Capacity (Bcf/d)
Intense Competition Into New England

New England Demand Vs. Westbound Capacity Expansions (Bcf/d)

- Constitution 0.6 Bcf/d
- Atlantic Bridge 0.1 to 0.6 Bcf/d
- AIM 0.3 Bcf/d
- NE Energy Direct 0.8 to 2.2 Bcf/d
- New Spectra Project 1.0 Bcf/d (date tbd)
Why Transco Z6 NY and NNY blow out?

NYC Constraint Lifted; +800 MMcf/d; NNY still constrained

TGP Station 321 Flows

Transco Station 515 Flows

TETCO Linden Flows

Transco 190 Flows

Transco Station 515
Transco Leidy
TETCO
Transco Atlantic Seaboard

Capacity

Bcf/d

0.0
0.5
1.0
1.5
2.0

8/1/2013
9/1/2013
10/1/2013
11/1/2013
12/1/2013
1/1/2014
2/1/2014
3/1/2014

Bcf/d

0.0
0.5
1.0
1.5
2.0

1/1/2012
1/1/2013
1/1/2014

Bcf/d

0.0
0.5
1.0
1.5
2.0
2.5

1/1/2012
1/1/2013
1/1/2014
New England Sees Similar Spikes Due to Constraints, Lack of LNG

- **Canaport Send out**
  - MMcf/d
  - 1-Nov-11 to 1-Nov-13

- **Compressor Station 245**
  - Throughput vs. Capacity
  - 5/1/11 to 11/1/2013

- **Everett Send out**
  - MMcf/d
  - 1-Nov-11 to 1-Nov-13
  - Algonquin-LNG, Tennessee - LNG

Map showing locations:
- Dracut
- Mendon
- RI

Source: PLATTS, McGRAW HILL FINANCIAL, BENTEK Energy
Northeast Buildout Greater than Forecast Flows

Announced Pipeline Expansions

Total of 17.1 Bcf/d Proposed Out of Region

- NE to SE 1.2 Bcf/d Overbuilt
- NE to MW 1.1 Bcf/d Overbuilt
- NE to E. Can 0.9 Bcf/d Underbuilt

Cellcast Expects 11.5 Bcf/d to Flow

- NE to SE 1.2 Bcf/d (with Peak)
- NE to MW 1.1 Bcf/d
- NE to E. Can 0.9 Bcf/d
- Cellcast Flows Expected By 2030 (with Peak)
- 0.6 Bcf/d (0.9 Bcf/d)
- 0.0 Bcf/d
- 7.6 Bcf/d
- 3.1 Bcf/d (4.5 Bcf/d)
- 9.5 Bcf/d
- 4.7 Bcf/d (6.1 Bcf/d)
Southeast Demand Growth Requires More Inflows

Southeast Turns Importer from Northeast

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Southeast Inflows from Midcon Producing

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Southeast Outflows to Midcon Market

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<td>3/1/2029</td>
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Southeast Expansions Primarily Focused Internal to the Region

Announced Pipeline Expansions

- Total of 12.3 Bcf/d Proposed Into Region
  - *SE to TX 0.6 Bcf/d Overbuilt*
  - *MW to SE projects facilitates NE flow backfill from REX*
  - *Southeast Expansions within region total 5.3 Bcf/d*

Demand Expected to Increase 9.7 Bcf/d

Cellcast Flows Expected By 2030 (with Peak)
Southwest Supply and Demand Balance

2013-2030 Change in Bcf/d

- Total Supply: -0.2
- Production: -0.2
- Power: 0.7
- Industrial: 0.2
- ResComm: 0.2
- Pipe Loss: 0.0
- Total Demand: 1.2

Net Short: 1.3 Bcf/d
Southwest is Market to Chase, But Pipeline Constraints Will Limit Flows

- **PG&E Redwood Path**: 88% | 2.0 Bcf/d
- **Kern River (Veyo)**: 87% | 2.4 Bcf/d
- **Transwestern (W. Thoreau)**: 81% | 1.2 Bcf/d
- **El Paso North ML (San Juan West)**: 62% (2.2 Bcf/d)
- **El Paso South ML (Cornudas)**: 77% (2.3 Bcf/d)

*Source: BENTEK West Observer*
Constraints Into Southwest Evident

- PNW (Canada) Flows to SW at Capacity
- SW Inflows from Rockies at Capacity
- SW Inflows from Texas Rising

Platts McGraw Hill Financial BENTEK Energy
**Mexico Attracting Attention**

**SW to MEX Balancing Act:**
Existing Open Capacity = 1.2 Bcf/d
**Will be 1.4 Bcf/d in 2030**, while flows average **1.2 Bcf/d/d in 2030**

**Delta TX to MEX:**
Timing on projects is key variable with Aqua Dulce (**2.1 Bcf/d at end of 2014**) biggest question mark
Existing open capacity = **1.8 Bcf/d**
**Will be 4.3 Bcf/d in 2030**, while flows average **3.0 Bcf/d at peak.**

---

**Existing Capacity (open)**

**Announced Pipeline Expansions**

**Cell Model Flows Expected By 2030**
(with Peak)
The Rest of the Country through 2030

PNW & Rox:
- Oregon and Washington both proposing massive pipelines to primarily serve proposed LNG projects.

Midcon Mkt and Prod:
- Some activity around Bakken.
- Expansion to support local KS/MO demand.

Texas and SW:
- No proposed projects from West TX to SW/Cali due to current underutilized capacity. Bentek believes this region will be constrained and underserved beginning in 2023.
- All internal TX pipeline build to support power or LNG demand.
- No inter regional pipeline expansions to Cali or SW.

**PNW**
- 2.2 Bcf/d In Region

**Rox**
- 0.4 Bcf/d In Region

**Midcon Mkt**
- 0.5 Bcf/d In Region

**Midcon Prod**
- 0.2 Bcf/d In Region

**Southwest**
- 0.0 Bcf/d In Region

**Texas**
- 3.2 Bcf/d In Region
East Canada Expected to Be Net Long 1.6 Bcf/d by 2030

East Canada Supply & Demand Changes (2013-2030)

- **Total Supply**: 1.7 Bcf/d
- **Production**: 0.3 Bcf/d
- **LNG Sendout**: (0.1) Bcf/d
- **Net Imports from US**: 1.5 Bcf/d
- **Power, Industrial, ResComm Demand**: 0.0 Bcf/d
- **LNG Exports**: 0.1 Bcf/d
- **Total Demand**: 0.1 Bcf/d

Net Long 1.6 Bcf/d
West Canada Expected to Be Net Short 4.3 Bcf/d by 2030

### West Canada Supply & Demand Changes (2013-2030)

<table>
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<tr>
<th>Component</th>
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<tr>
<td>Production</td>
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<tr>
<td>LNG Sendout</td>
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<tr>
<td>Power, Industrial, ResComm Demand</td>
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<td>Net Exports to U.S.</td>
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<td>-1.0</td>
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<td>LNG Exports</td>
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<tr>
<td>Total Demand</td>
<td>-2.9</td>
<td>3.1</td>
<td>5.2</td>
</tr>
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</table>

West Canada is expected to be net short 4.3 Bcf/d by 2030.
West Canada and PNW Proposed LNG Export Projects

Total proposed LNG projects sourcing supply:

27.24 Bcf/d of capacity proposed
Existing Import + Proposed Export

Canadian Exports:
- BC Canada – 0.25 Bcf/d (1.8 mtpa)
- Prince Rupert LNG – 2.88 Bcf/d (21.6 mtpa)
- Pacific Northwest - 2.63 Bcf/d (19.68 mtpa)

Source: BENTEK
Demand Growth Compared to Intra Regional Expansion

Source: BENTEK Pipeline Project Tracker

- PNW: 2.2 Bcf/d In Region +0.3 Bcf/d
- Rox: 0.4 Bcf/d In Region +0.2 Bcf/d
- Midcon Mkt: 0.5 Bcf/d In Region +1.7 Bcf/d
- Midcon Prod: 0.2 Bcf/d In Region +0.3 Bcf/d
- Northeast: 9.2 Bcf/d In Region +3.6 Bcf/d
- Texas: 3.2 Bcf/d In Region +2.9 Bcf/d
- Southeast: 5.3 Bcf/d In Region +9.7 Bcf/d
- Southwest: 0.0 Bcf/d In Region +1.2 Bcf/d

Total Intra-Region Expansion = **20 Bcf/d**

Intra-Region Expansions Greater than Demand in All Regions Except Southwest and MCM.

Source: BENTEK Pipeline Project Tracker
Net Long/Short Balance 2030 vs. 2013

Source: BENTEK Cell Cast
Capacity in 2013 and Announced Inter Regional Expansions

Total U.S. Announced Inter-Regional Expansions = 23.0 Bcf/d
Announced Expansions Vs. Peak Flows in 2030

Source: BENTEK Cellcast

Announced Inter-regional Expansions Inadequate in SW Corridor by Minimum 1.1 Bcf/d
So What Does This All Mean?

- **20 Bcf/d** Intra Region Expansions Adequate to Serve Demand and Production In All Regions Except SW and Midcon Market Area.

- Midcon Market Area Covered by 5.6 Bcf/d Northeast Capacity Inflows by 2030.

- **23.0 Bcf/d** of Inter Region Expansions Cover Peak 2030 Flows in All Corridors Except TX to SW.

- At Least **1.1 Bcf/d** of Incremental Expansion Needed to SW Market.

- Total NG Infrastructure Additions Needed by 2030 = **44.4 Bcf/d**.
Storage Requirements

A – Salt Caverns  B – Aquifers  C – Depleted Reservoirs
Tight Markets Put Pressure on Existing Storage Capacity

U.S. Net Short 5.5 Bcf/d in Winter 13/14 Driven By Weather and Associated Res/Comm Demand

Entered withdrawal season with surplus.

US Ends March Nearly 800 Bcf Below 5 Yr. Min

Assumes 13.9 Bcf/d Injection (Last Year Avg = 11.5 Bcf/d)
5 out of 15 largest withdrawals on record occurred this winter.

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Natural Gas Storage Characteristics

- **Capacity**
  - Base Gas (cushion gas)
  - Working Gas

- **Usage**
  - Base Load
  - Peaking

- **Injection/Withdrawal Capacity**
  - Cycles or “Turns”
  - Ratchets

- **Ownership**
  - Independent storage operators (producers/merchants)
  - Local distribution companies (LDC’s) or other utilities
  - Pipeline companies
Natural Gas Storage: 3 Types

**Salt Dome: Egan**

**Aquifer: Blue Lake**

**Depleted Field: Clay Basin**
Gas Storage Pricing and Value

**Seasonal Valuation** – the difference between the average summer-winter forward price (the spread, or strip spread) for some future period. This is called the “intrinsic” value of a storage facility.

Calculate intrinsic value for summer 2014 vs. winter 2014/15.

April 7th, 2014 NYMEX Summer Strip (May-Oct) = $4.48

April 7th, 2014 NYMEX Winter Strip (Nov-Mar) = $4.65

Spread = $0.17

**Volatility Valuation** – based on the magnitude of daily fluctuations in natural gas pricing, called the “extrinsic” value of a storage facility.

Measurable using option-based economics primarily determined by price volatility.

To capture extrinsic value, a storage facility must be able to switch between injection and withdrawal frequently and quickly (salt domes!).

---

**NYMEX Strips ($/MMbtu)**

- May: $4.70
- June: $4.60
- July: $4.50
- August: $4.40
- September: $4.30
- October: $4.20
- November: $4.10
- December: $4.00
- January: $3.90
- February: $3.80
- March: $3.70

---

**Day**

- **1**: $4.60
- **2**: $4.40
- **3**: $4.20
- **4**: $4.00
- **5**: $3.80
- **6**: $3.60
- **7**: $3.40
- **8**: $3.20
- **9**: $3.00
- **10**: $2.80
Narrow 5-Year range shows Equilibrium, Tightening Market.

Go Forward Inventories Will Widen 5 Year Average Considerably
Storage Inventory

US Storage Inventory

US will enter withdrawal season 2014, 0.5 Tcf below 5 Yr Avg

November Inventories will be kept 100-200 Bcf below the current 5 Yr Avg

April’14 – almost 1 Tcf below 5 Yr Avg
The majority of storage deficit this winter will be in the producing region.

Until LNG exports start, inventories will stay below the 5 year avg.

Storage build-up, as production growth outpaces demand growth 2019-2021, while LNG is ramping up.
US will enter withdrawal season below the 5 year avg.

Valleys stay higher due to baseload production growth, but overall storage acts very similarly.
Power Demand Growth Changes

Storage Patterns

2nd withdrawal season in the summer due to higher power demand.

TX & SE Storage Inventory

Bcf


SE  TX
Power demand growth changes storage patterns

US Storage Inventory

2nd withdrawal season not as pronounced in the rest of the country
Storage Capacity by Field Type

EIA West Region (~0.7 Tcf)
- 96% Depleted Field
- 4% Aquifer

EIA East Region (~2.3 Tcf)
- 83% Depleted Field
- 16% Salt Dome
- >1% Aquifer

EIA Producing Region (~1.6 Tcf)
- 71% Depleted Field
- 29% Aquifer

Total Design Capacity ~ 4.6 Tcf
Total Operational Capacity ~ 4.2 Tcf
Storage Additions By Region and Type

EIA Producing Region Existing: ~1,600 Bcf
Additional Proposed: 161 Bcf
That’s Only ~ 1 Bcf/d Incremental During the Winter!

EIA West Region Existing: ~700 Bcf
Additional Proposed: 6 Bcf

EIA East Region Existing: ~2,300 Bcf
Additional Proposed: 7.5 Bcf

New Design Capacity ~ 4,775 Bcf
or less than 3.8% Growth

NGS Windy Hill (6 Bcf Dep. Res.)
DTI Alleghany (7.5 Bcf Dep. Res.)
Black Bayou (15 Bcf Salt)
LA Storage (24 Bcf Salt)
Bobcat Gas Sto. (30 Bcf Salt)
Tallulah Gas Sto. (24 Bcf Salt)
Miss. Hub Exp. (15 Bcf Salt)
Leaf River (12 Bcf Salt)
D’Lo Gas Storage (24 Bcf Salt)
Golden Triangle Exp. (16.6 Bcf Salt)
Southeast Leads Demand Growth Followed by Northeast and Texas

+5.0 Bcf/d
+0.1 Bcf/d
+1.7 Bcf/d
+3.6 Bcf/d
+0.3 Bcf/d
+0.2 Bcf/d

Note: Forecasts Compare 2013 to 2030 (Bcf/d)

SE/TX Increase: 12.6 Bcf/d!

Source: BENTEK Cell Cast
So What Does This All Mean?

- Northeast 29-30 Winter Demand averages 25.3 Bcf/d.
- Total Supply Available to Northeast is 28.0 Bcf/d.

- Southeast 29-30 Winter Demand averages is 26.2 Bcf/d.
- Total Supply Available to Southeast is 22.7 Bcf/d (including Northeast Inflows).

- Inter Regional Expansions to the SE provide 10.1 Bcf/d gas on 9.7 Bcf/d of Incremental Demand, Which Leaves ~ 0.5 Bcf/d of Incremental Gas Available to Southeast in 2030.
- That’s Tight if Northeast Has any more Colder than Normal Winters in Store, or if all Proposed Inter Regional Expansions are Not Built...
Impact on Natural Gas Price

Nominal Henry Hub Avg. vs. NYMEX ($/MMBtu)

- NYMEX Avg. (May 21)
- BENTEK Fcst (May 2014)
- Real Nat Gas Price
US Supply and Demand Balance

2013-2030 Change in Bcf/d

- Total Supply: 23.6 Bcf/d
- Production: 28.3 Bcf/d
- LNG Imports: 20.0 Bcf/d
- Can Imports: -4.6 Bcf/d
- Power: -0.1 Bcf/d
- Industrial: 3.3 Bcf/d
- ResComm: -0.5 Bcf/d
- Pipe Loss: 0.3 Bcf/d
- LNG Exports: 8.3 Bcf/d
- Total Demand: 8.5 Bcf/d

Net Long: 3.6 Bcf/d
Bentek Expects Nominal Prices to Crest $7 in 2022 Due to Demand Buildup

Bentek and Forward Curve Agree Average Price Stays Below $5 thru 2020.

Bentek Expects Real Prices to Average $4.66 through 2030

Lack of Trading Volume Past 2026
Net Long/Short Balance 2030 vs. 2013 and Basis Movement

Source: BENTEK Cell Cast
Risks to the Forecast and Open Questions?

Emergence of new plays and improved efficiencies.

Environmental concerns over fracking, water use and other concerns.

Marketed gas production decrease due to associated gas declines/price weakness in domestic ultralights and condensate.

LNG – production will swing either way depending on pace of development.

Potential for Mexican exports to be higher.

Potential for Industrial to be higher.

Power could absorb incremental demand lost from LNG, Mexico or Industrial.

Infrastructure build out delays (both pipeline, processing and end user).
Conclusions and Takeaways

- Bentek Expects Production to Increase By 28.3 Bcf/d through 2030.
- Pace of Systemic Demand Is a Constraint – Demand Will Have to **Start Driving the Bus by 2018.**
- Incremental Processing Capacity Needs Vary By Basin, Total of **6-8 Bcf/d Necessary.**
- Midstream Market Participants **Eager** to Build Pipeline In Certain Regions with **38.8 Bcf/d in Proposed Projects.**
- Analysis Shows **Need for Incremental Infrastructure Projects ≥ 1.1 Bcf/d** Than What Has Been Proposed, **Specifically to Southwest Market.**
- With Demand Increasing in Southeast, the Region Will Need **3 Bcf/d More Storage Capacity Deliverability**, Most Likely Salt.
- CPI Adjusted Natural Gas **Prices Remain Under $5.00 thru 2025,** Do Not Eclipse $6.00 Before 2030
Cellcast Methodology: Production Projections

- BENETEK performs projections based on individual basins/plays and are based on current drilling activity. 66 unique reporting areas with type curves developed for each class of well (Oil, gas, & CBM) and by orientation (vertical & horizontal).
- The areas are analyzed from the well level up, using well class and orientation as well groups.
- Each group is fitted with a type curve in order to predict future production trends in the area from new and existing wells.
- Each well is then assigned a production profile going forward and all wells are then aggregated to the area level.
- Each area is then aggregated to a basin, regional and national level projection.
All wells in a basin or region are then aggregated and the projection from existing wells is determined. The same type curve for new drilling is applied and the new “production wedge” will be added forming the total production projection.
Cellcast Methodology: Production Forecasting

- Infrastructure Constraints
- Producer Guidance
- IRR
- Project Announcements
- Trend Analysis
- Demand
- Well Inventory

Projections → Forecast

BENETEK Market Call Forecast Vs Actual

<table>
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<tr>
<td>Jan 2013</td>
<td>0.5 Yrs</td>
<td>0.572%</td>
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Cellcast Methodology: Demand Forecasting

• Detailed review of historical trends.

• The three main drivers of demand are weather, market share (fuel switching), and market growth.

• BENTEK performs forecasts by demand component by cell region.

• 10 year population weighted normal temperatures structured by cell region.

• Future demand growth/decline is predicted by researching capacity additions/retirements.

• Substitute fuel price spreads and capacity limitations influence fuel switching potential.
Demand Sector Assumptions and Methodology

- **Power:**
  - Utilize generation estimations from individual ISOs to forecast total power stack.
  - To estimate total generation growth or decline, Bentek analyzes historical trends and balancing authority outlooks presented in FERC 714 data.
  - For Nuclear, Wind, Solar, Hydro, forecasts are based on seasonal shapes of utilization and account for new infrastructure.
  - For All Other (coal, NG, oil), use an annual change to generation based on retirement or net new builds. Shape is created based on monthly norms for annual sums.
  - Assumes price responsive demand response as storage inventories adjust seasonally.

- **Industrial:**
  - Tracks announced industrial expansions from Industrial End Users Expansion tracker with assumed gas consumption added.
  - Uses fixed growth rate for periods out beyond announced project time-frame.
  - Assumes set utilization rates for new, near term projects.
  - Uses diminishing utilization rates for projects further out in the forecast period.

- **Res/Comm:**
  - Assumes small growth rate based on weather-normalized demand per region.
  - Includes new demand from transportation sector, which is assumed to be small but still contribute to overall growth.
Cellcast Methodology: Demand Forecasting

- 10 Year Normal Weather
- Historical Burn per Degree
- Capacity Additions
- Capacity Retirements
- Substitute Fuel Price Spreads
- EPA Regulations
- Economic Indicators
- Market Share
- Regression Analysis
- Initial Demand Forecast
- Market Growth
Cellcast Methodology: US LNG Export Criteria

**Success Criteria**

- MOUs/Contracts In Place
- Regional Necessity
- Existing Infrastructure
- DOE/FERC Status
- Timing/Global Demand
1. Estimate initial condition for each fundamental component by region.
2. Input initial conditions into general equilibrium market balancing model.
3. Iterate adjustments of supply and demand to balance market to zero given storage requirements and pipeline transportation dynamics.
Price Assumptions: $4 Gas, $90 Oil, NGL's - 40% of Oil
The Northeast production forecast is below the projections due to a lack of takeaway capacity from the region to other markets in the near-term. Once enough capacity is in place to move NE gas to other regions, Bentek expects production to continue to grow and help feed LNG export terminals.
The Texas forecast is below the projections due to processing constraints in the near-term. In the long-term, Bentek expects a small shift back to some dry-gas plays to meet incremental demand such as LNG.
Southeast dry plays are expected to play a large role in helping to meet the increased demand from LNG, thus an increase in drilling activity is expected.
CellCast is below the projections due to processing constraints in the Anadarko combined with the flaring in the Bakken that is not reflected in the Cellcast forecast.
Rockies production is held largely flat due to offsetting moves from dry-gas plays and an increase in drilling activity expected within the DJ basin.
LNG Exports drive the difference between Bentek Production CellCast & Production Projection
Wave of Expansions: Which ones will allow production to grow?

3.0 Bcf/d of expansion projects in 2014: Production will grow 2.8 Bcf/d
Only 30% of projects have in-service dates during the summer
2015 will look very similar to 2014, especially during the summer when demand is significantly lower.

3.8 Bcf/d of expansion projects in 2015: Production will grow 2.86 Bcf/d

REX East to West project only expansion with summer in-service date
Expansions in 2016 and 2017 will continue to add relief to supply-constrained regions.

5.4 Bcf/d of expansion projects by end of 2018: Production will grow 3.4 Bcf/d during the same period; projects start to bring equilibrium to Northeast price markets.

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Antrim Michigan

Michigan Antrim Characteristics

- ~40% of BBEP's reserves, ~30% of BBEP's current production
- BBEP has interest in ~3,200 Antrim wells, operates ~53% of them
- Shallow (depth ranges from ~600' to ~2,400' MD)
- Net thickness 70-100 ft.
- Total Organic Content is 0.3% - 24%
- Gas in Place 6-15 bcf per well
- Recovery Factor 20% - 50%
- Fracture stimulation of 2-4 stages in vertical wells
  - ~19,000 gallons of fluid per stage
- History of Antrim Completions
  - 1980's wells - mainly completed in the Lachine
  - Early 1990's - completed in the Lachine and Norwood
  - Early to Mid 1990's - multi stage fracs were utilized
  - Late 1990's - early 2000's Upper Antrim tested
  - Mid 2000's to present - horizontal drilling started

Reserves data based on BBEP YE 2012 Reserve Report at SEC pricing plus estimated proved reserves of recently completed Wyoming acquisitions.
Expansion projects are critical for production growth, especially during the summer when demand drops well below production levels.
2014 Expansions will add 2.7 Bcf/d of Capacity

### Mexican Border Crossing Expansions

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Capacity</th>
<th>City</th>
<th>State</th>
<th>In-Service Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kinder Morgan Mier Monterrey Expansion</td>
<td>275</td>
<td>Salineno</td>
<td>Texas</td>
<td>4/1/2014</td>
</tr>
<tr>
<td>Houston Pipe Line Edinburg Extension</td>
<td>140</td>
<td>Reynosa</td>
<td>Texas</td>
<td>6/1/2014</td>
</tr>
<tr>
<td>TETCO South Texas Expansion (300 MMcf/d)</td>
<td>on hold</td>
<td>Reynosa</td>
<td>Texas</td>
<td>6/1/2014</td>
</tr>
<tr>
<td>El Paso Sierrita Pipeline**</td>
<td>200</td>
<td>Sasabe</td>
<td>Arizona</td>
<td>10/1/2014</td>
</tr>
<tr>
<td>Net Midstream/PEMEX -- Agua Dulce - Frontera</td>
<td>2,100</td>
<td>Reynosa</td>
<td>Texas</td>
<td>11/1/2014</td>
</tr>
<tr>
<td>Total Export Capacity Additions</td>
<td>2,715</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total U.S. Export Capacity with Expansions</td>
<td>8,460</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: BENTEK Cell Model and Mexico Market Alert
Exports to Eastern Canada started as early as 2013.

Canadian Imports/Exports By Region (Bcf/d)
Sufficient Capacity for Rockies Gas East, Constraints West

Rockies Outflows to Midcon Market

Rockies Outflows to Midcon Producing

Rockies Outflows to PNW

- History
- Forecast
- Capacity