



**Vector Pipeline™**

# **Vector Pipeline**

**Customer Meeting  
Nashville, Tennessee  
September 21, 2017**



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# **Amy Bruhn**

## **Sr Manager, Transportation Services**



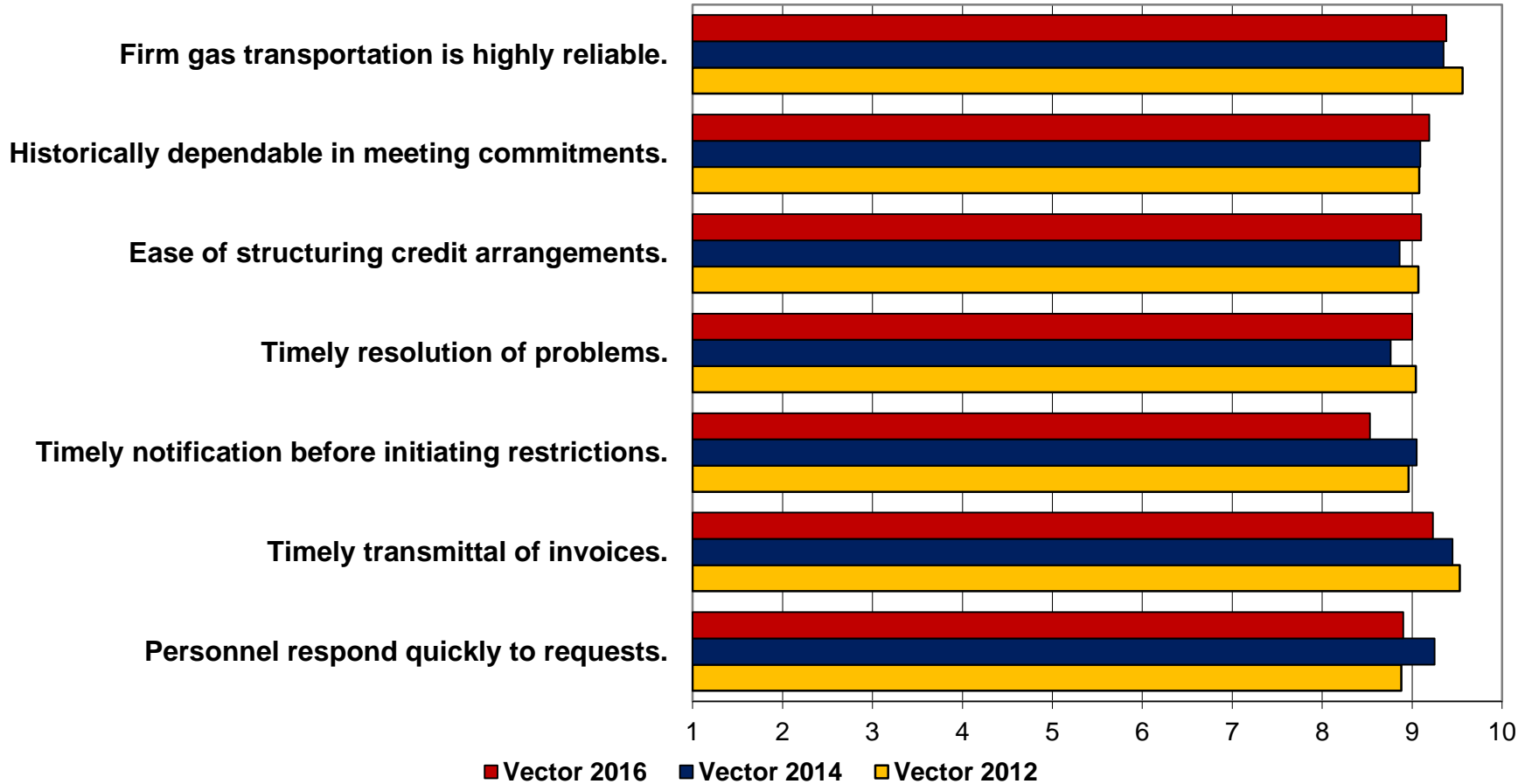
# Mastio Customer Survey

- **Baseline Requirements**
  - Items a company is expected to be competent in
- **Conscious Differentiators**
  - Actively drive supplier selection decisions
- **Latent Differentiators**
  - Correlate highly to customer satisfaction
- **Low Impact**
  - Parity with competitors is sufficient



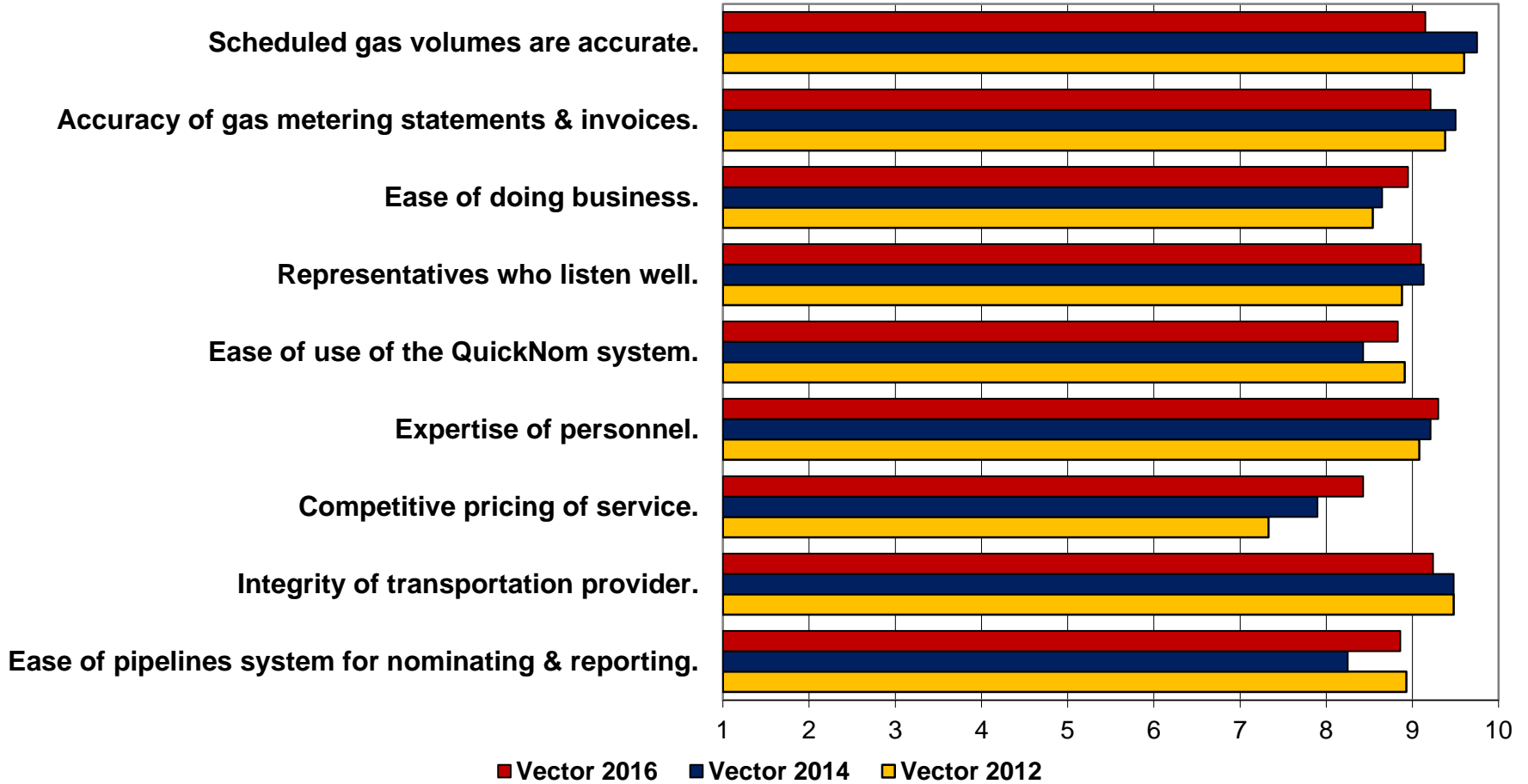
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# Baseline Needs

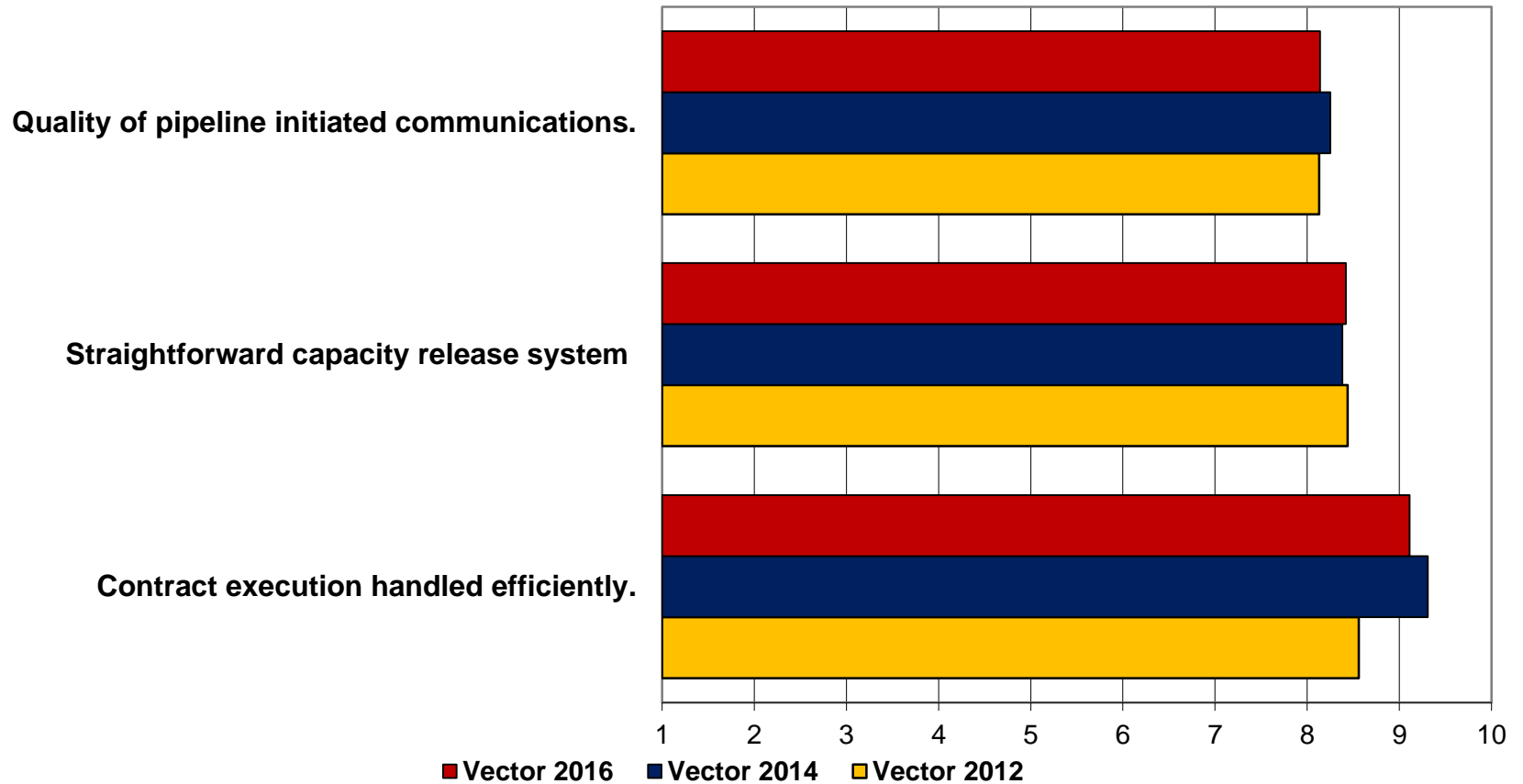




# Conscious Differentiators



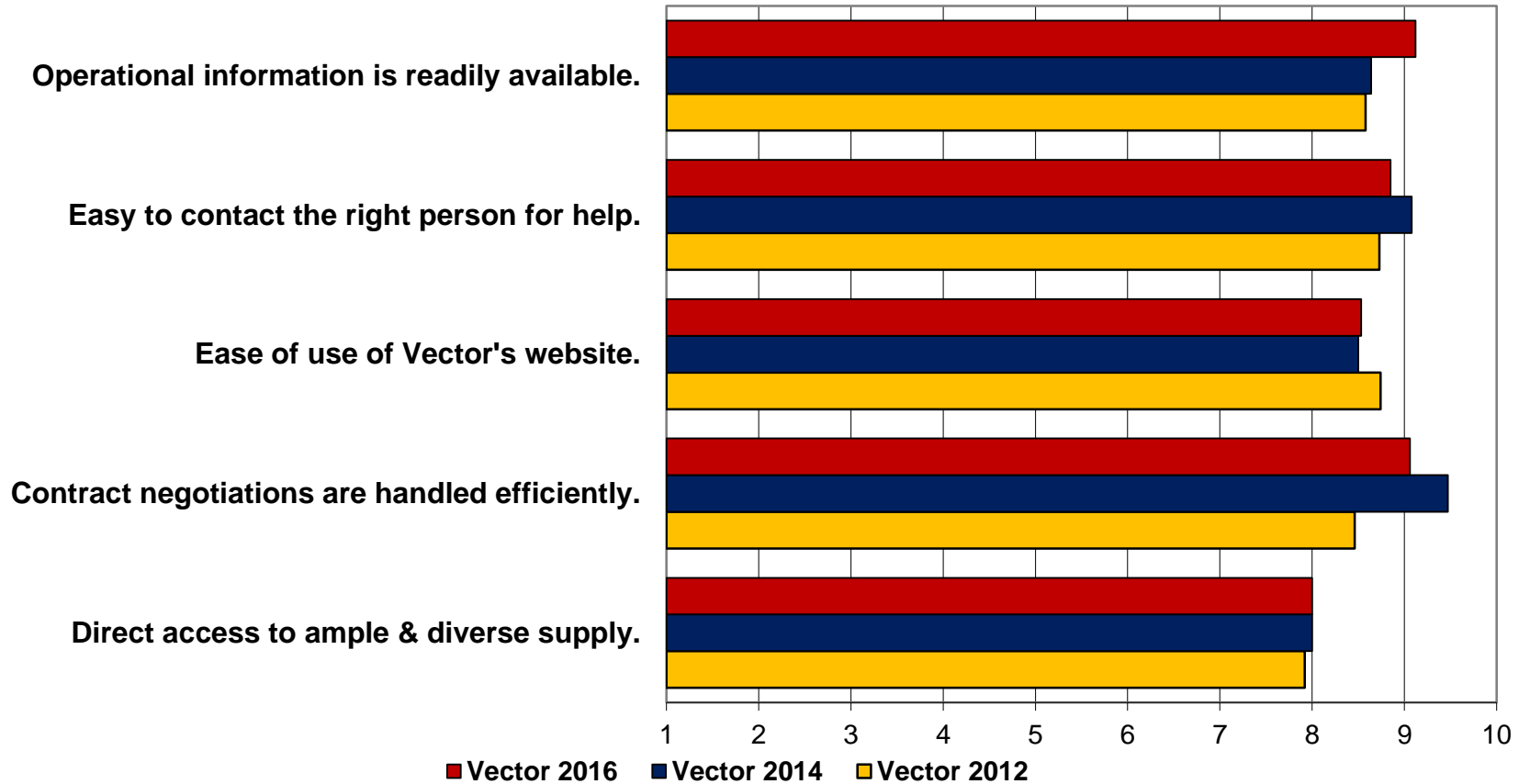
# Latent Differentiators





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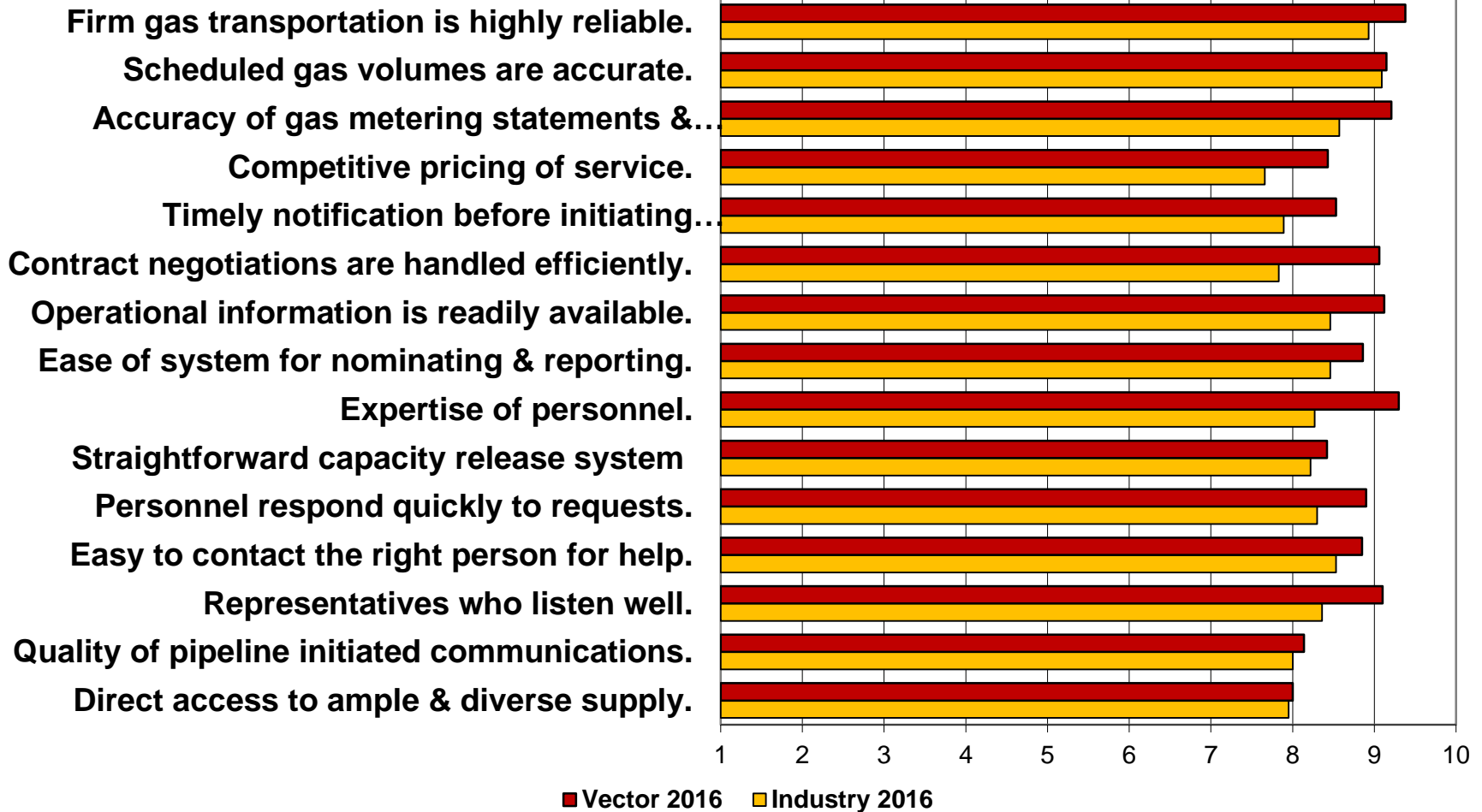
# Low Impact





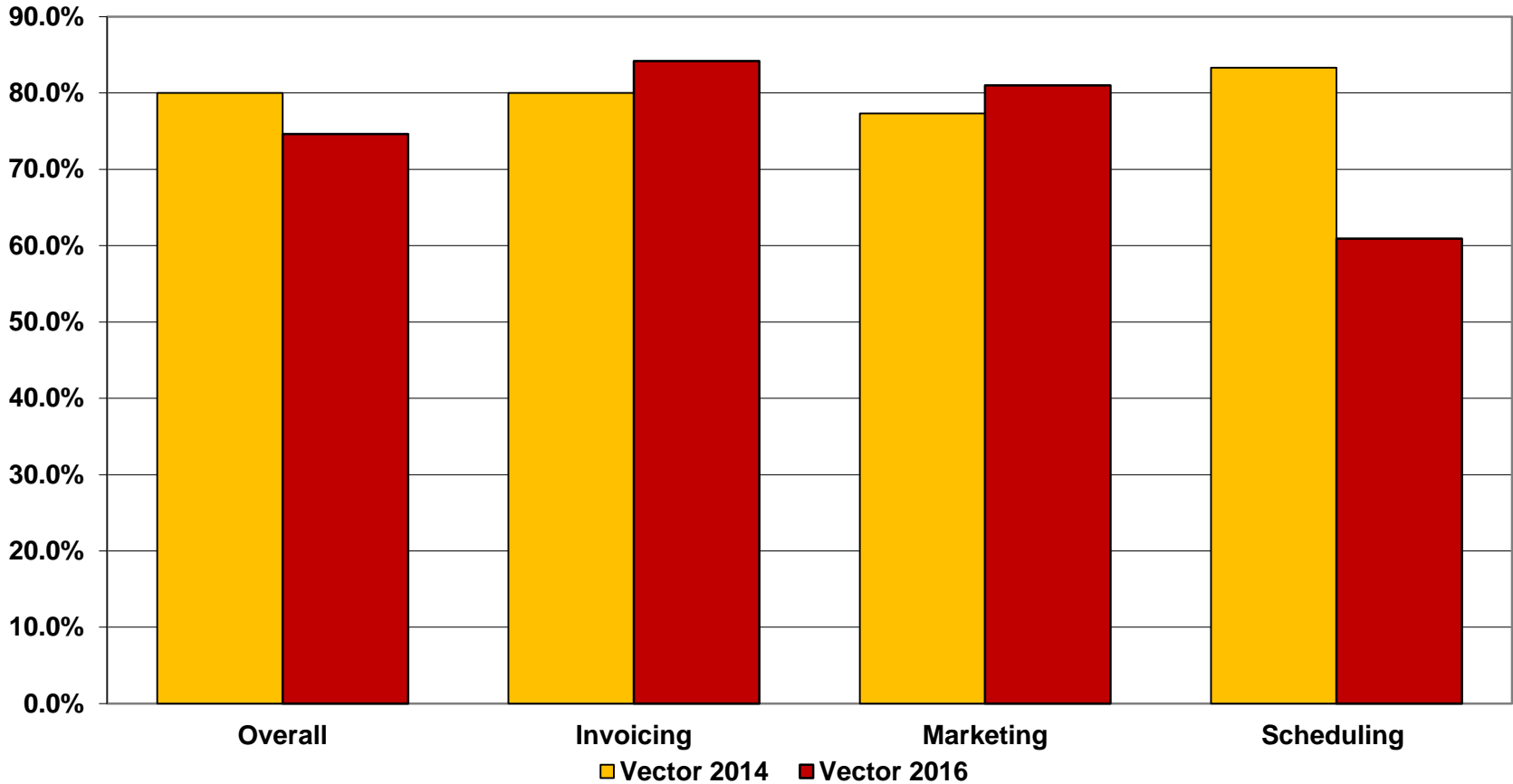
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# Vector vs. The Industry





# Net Promotor Score



# Survey Action Plan

We continue to seek areas where we can improve:

- Notifications
  - Began posting monthly planned maintenance.
  - Email all notices posted on the website?
  - Need to ensure we have the correct contacts.
- Scheduling
  - Continued training for the scheduling staff.



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# **Matt Malinowski**

## **Director, Market Development**



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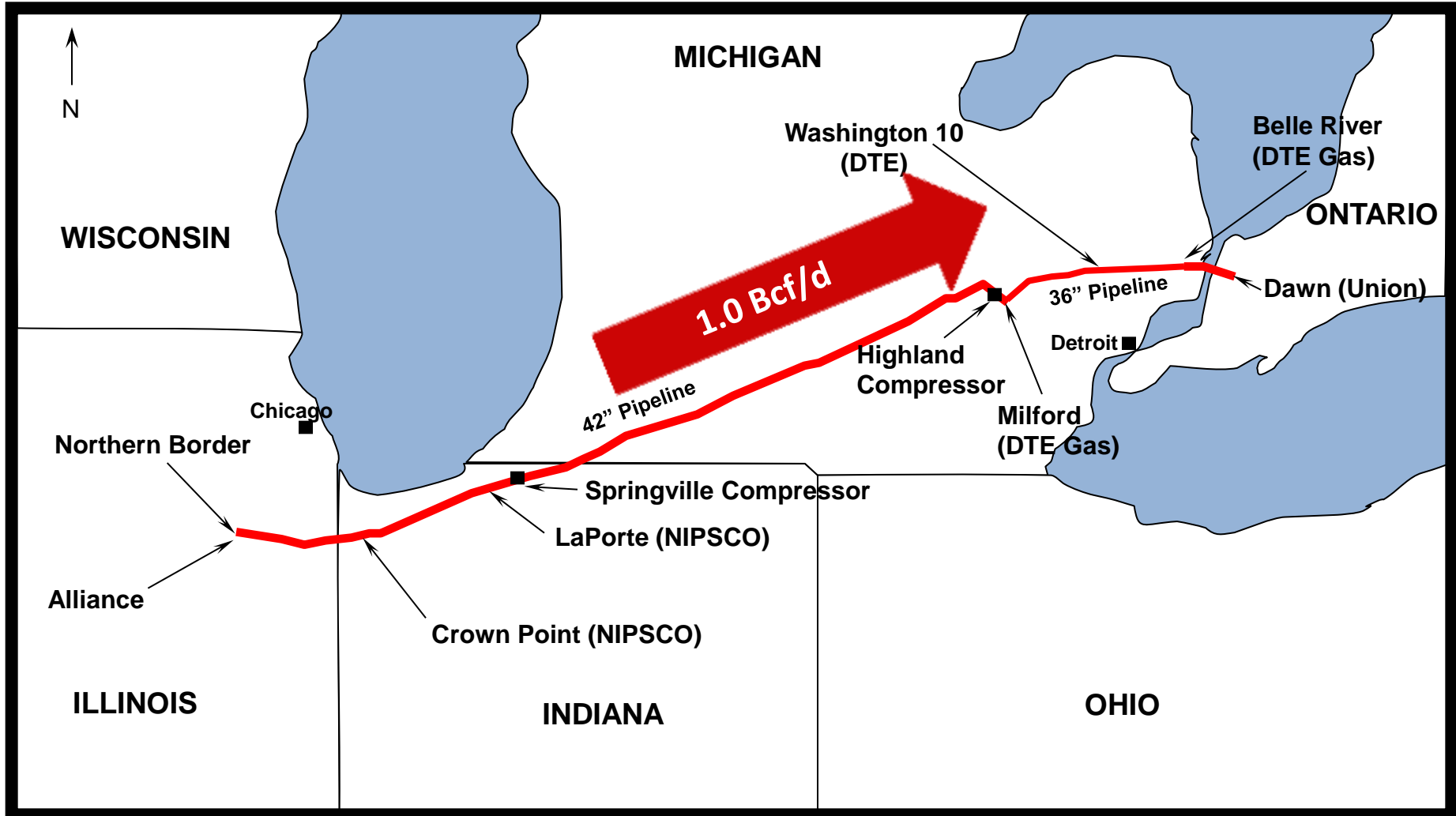
# Overview

- **Headquartered in Livonia, MI**
  - Partnership Owned Pipeline:
    - Enbridge (60%) & DTE Energy (40%)
- **348 Miles of 1000 psig MAOP Pipeline extending from Joliet, Illinois to Dawn, Ontario**
  - 333 Miles in the U.S.
    - 273 Miles of 42"
    - 60 Miles of 36"
  - 15 Miles of 42" in Canada
- **In-service December 1, 2000**
- **Initially designed to provide an alternate route to bring Western Canadian gas to Dawn, Ontario.**



# The Original System (2000/01)

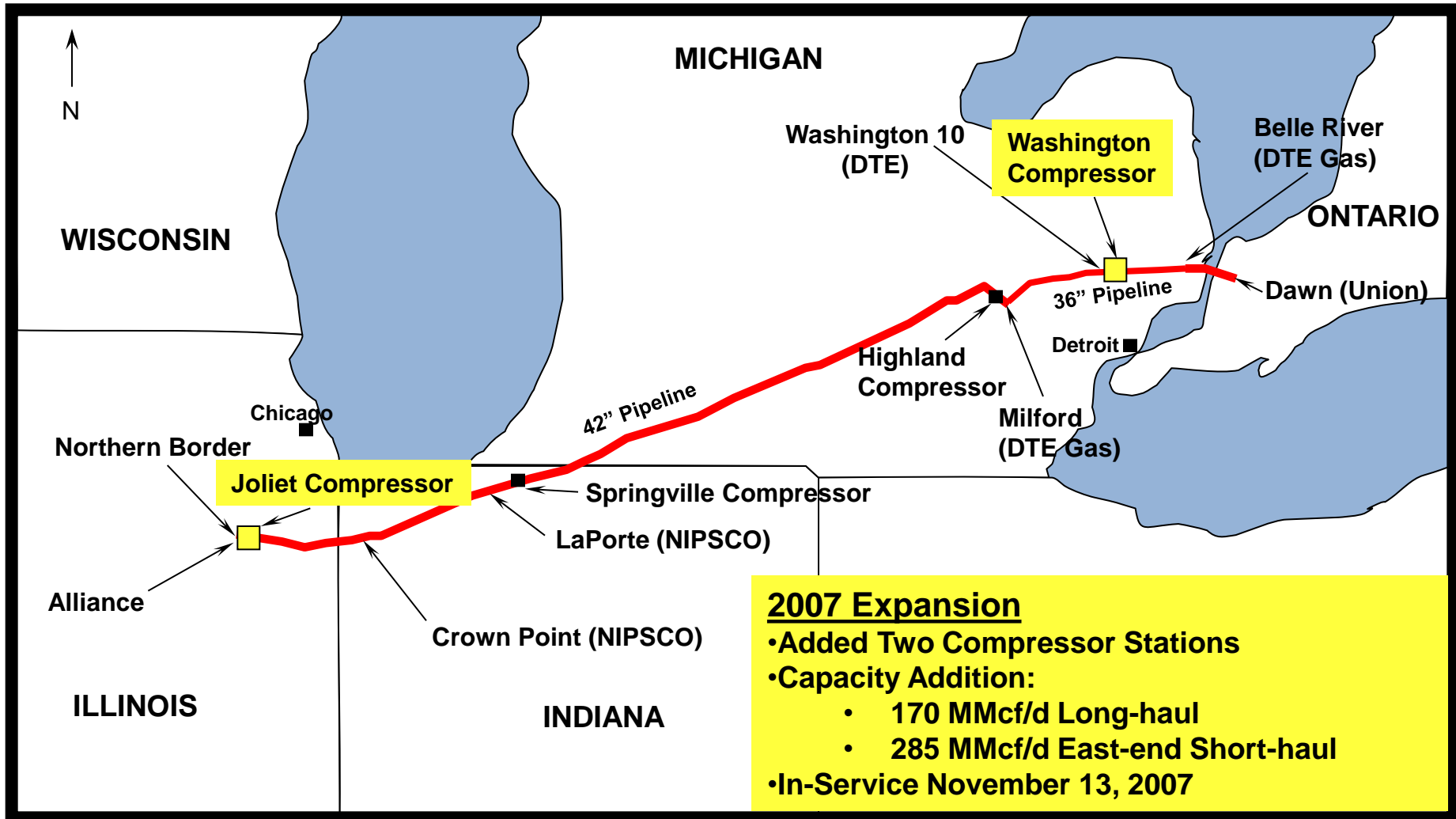
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# 2007 Expansion

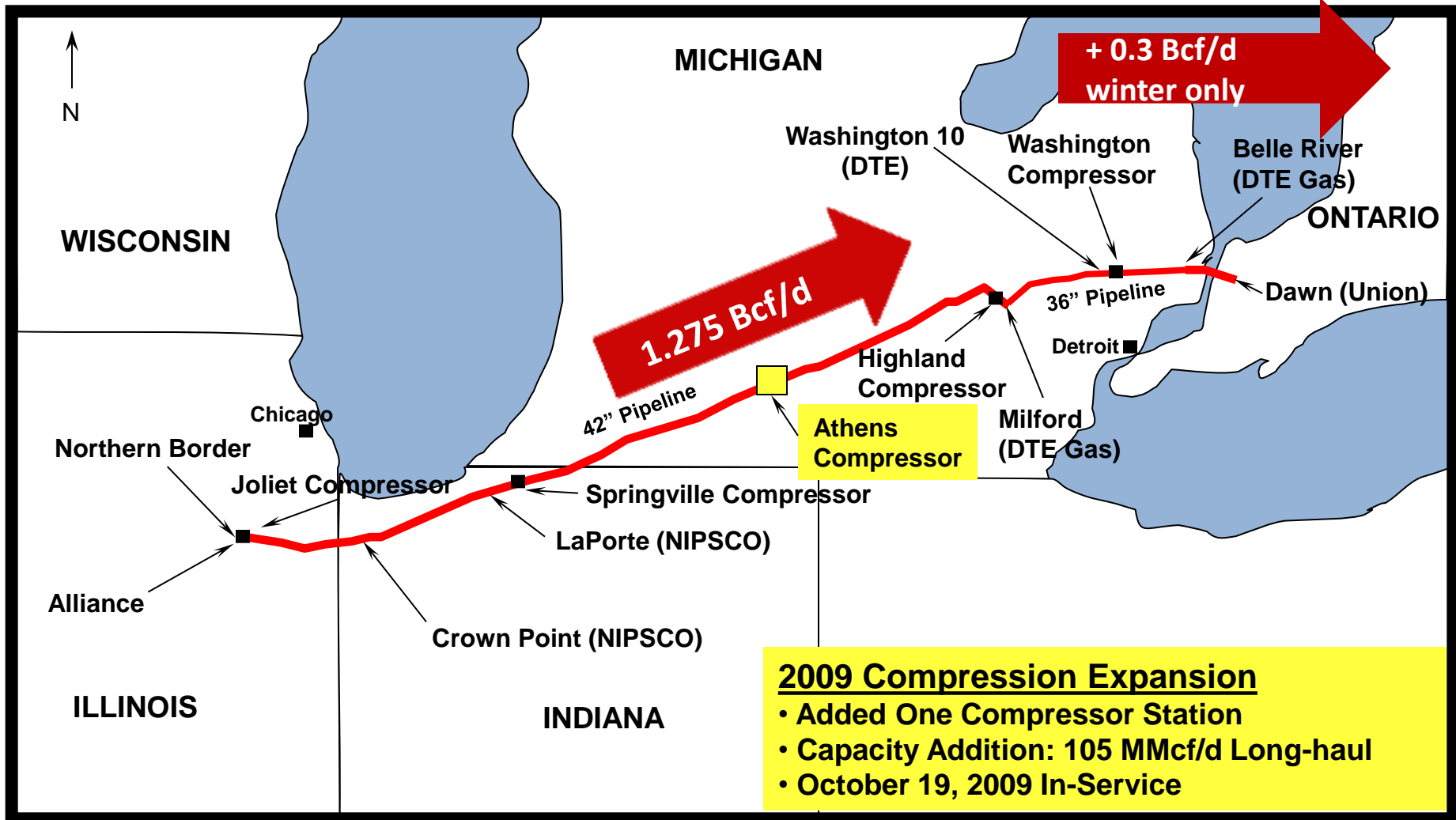
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# 2009 Expansion

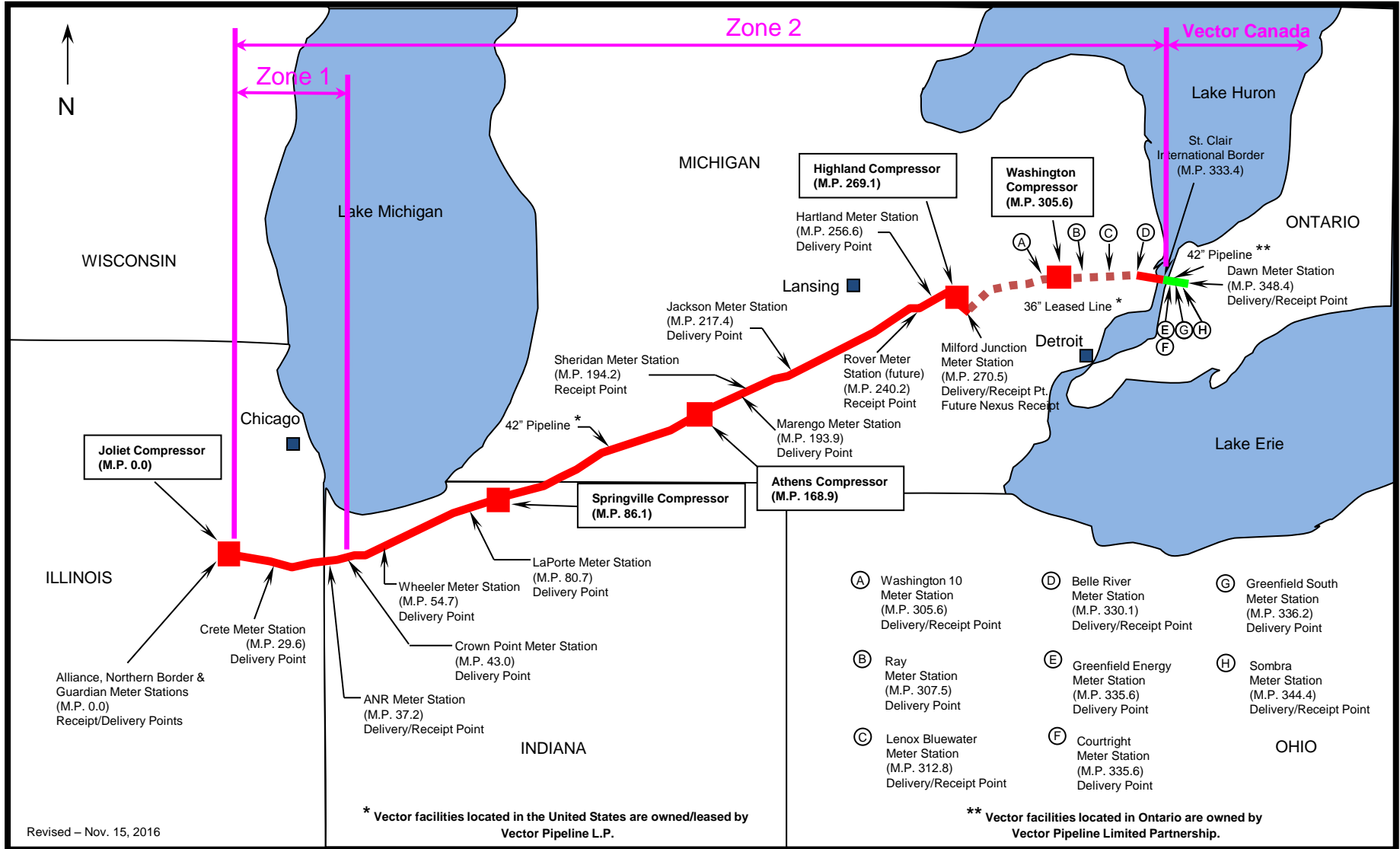
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# Vector Pipeline - Rate Zone Map







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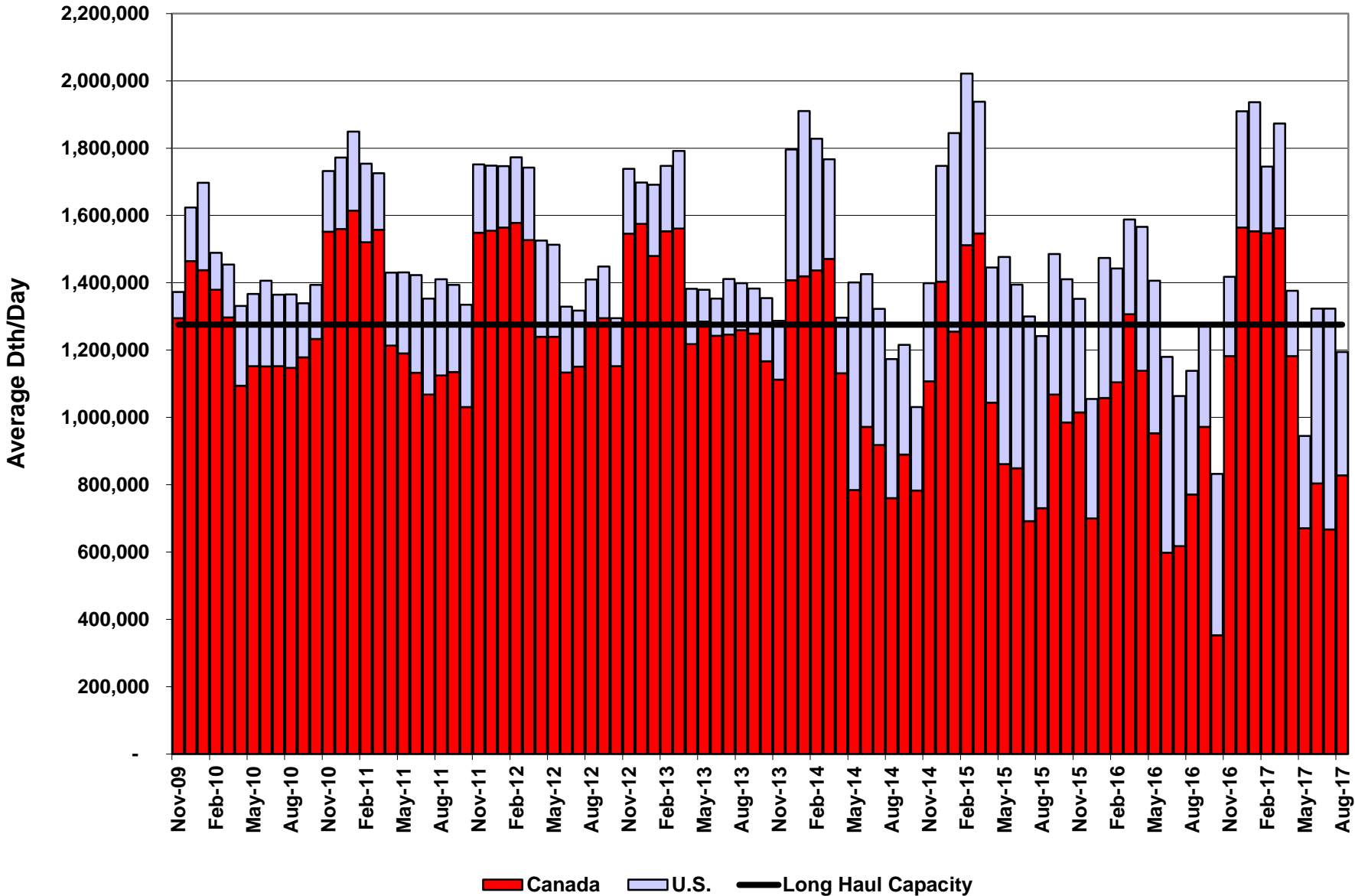
# Recent Flows



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# Scheduled Deliveries

(Includes Longhaul, Shorthaul, Backhaul and Segmentation)



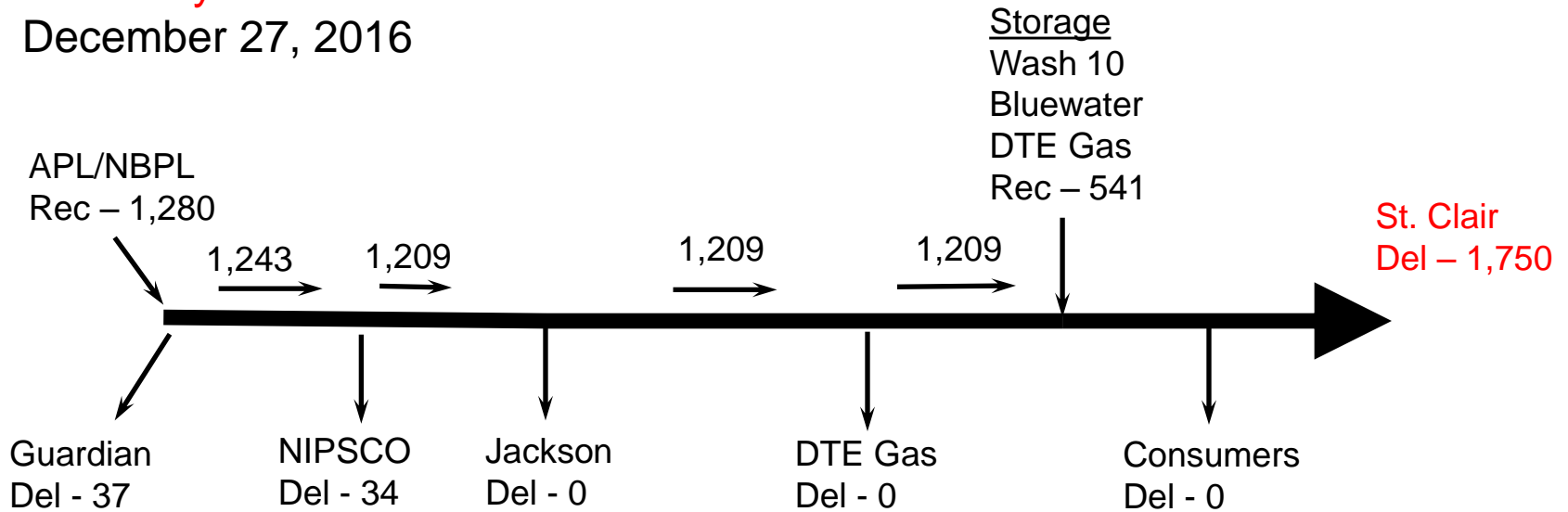


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# Winter 2016/17

## Peak Day at St. Clair

December 27, 2016



Temperature Range – S.E. Mich. (White Lake): 27°F to 34°F

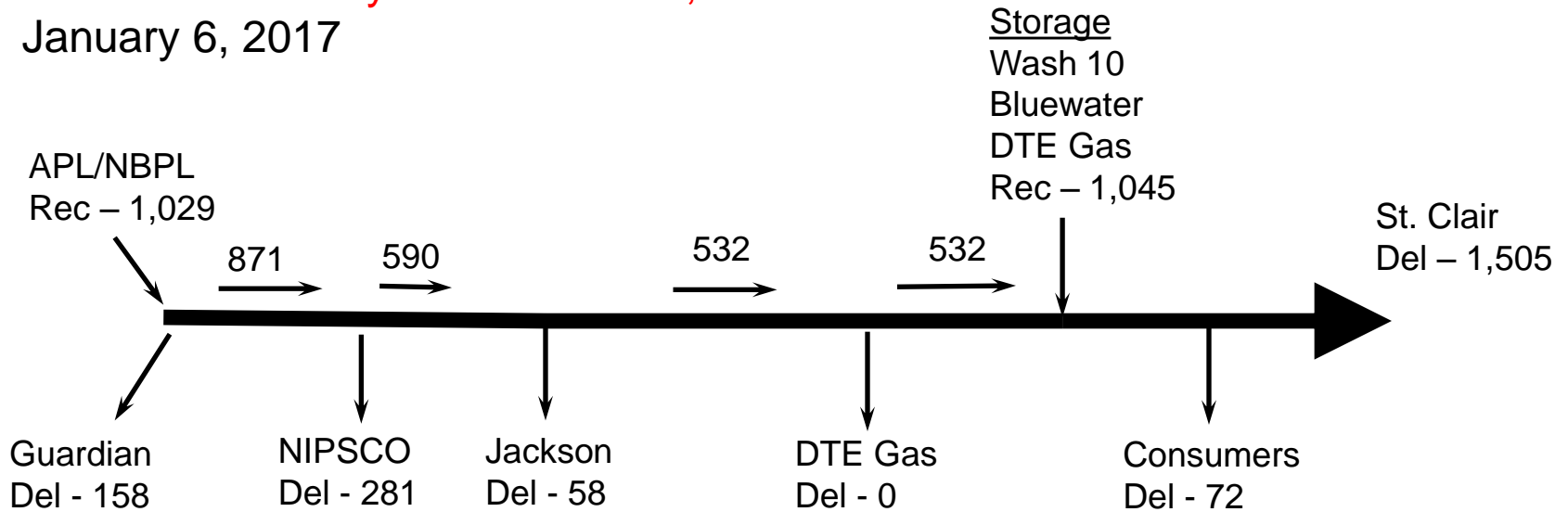


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# Winter 2016/17

Winter 2016/17 System Peak – 2,077 Dth

January 6, 2017



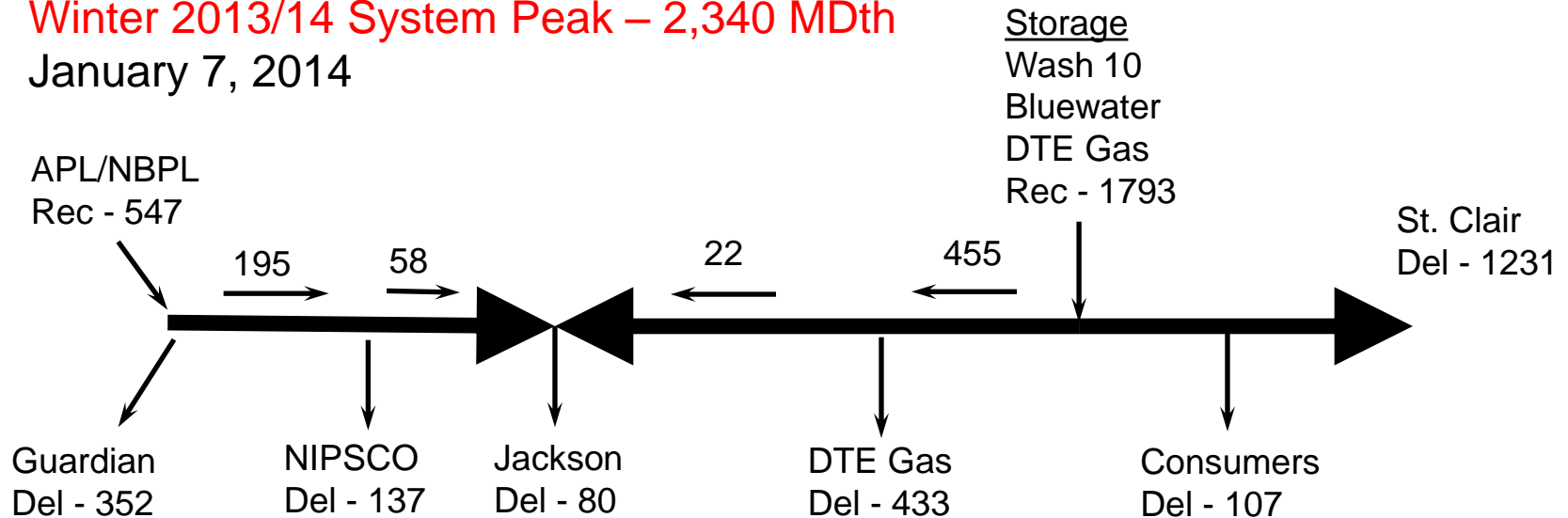
Temperature Range – S.E. Mich. (White Lake): 5°F to 10°F



# Winter 2013/14

## (Polar Vortex)

Winter 2013/14 System Peak – 2,340 MDth  
January 7, 2014



Temperature Range – S.E. Mich. (White Lake): minus 17°F to plus 1°F



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# **BTU Content**

**(Btu/cf @ St. Clair)**

| <b><u>Year</u></b> | <b><u>Btu/cf</u></b> |
|--------------------|----------------------|
| <b>2010</b>        | <b>1015</b>          |
| <b>2011</b>        | <b>1015</b>          |
| <b>2012</b>        | <b>1026</b>          |
| <b>2013</b>        | <b>1035</b>          |
| <b>2014</b>        | <b>1045</b>          |
| <b>2015</b>        | <b>1054</b>          |
| <b>2016</b>        | <b>1054</b>          |



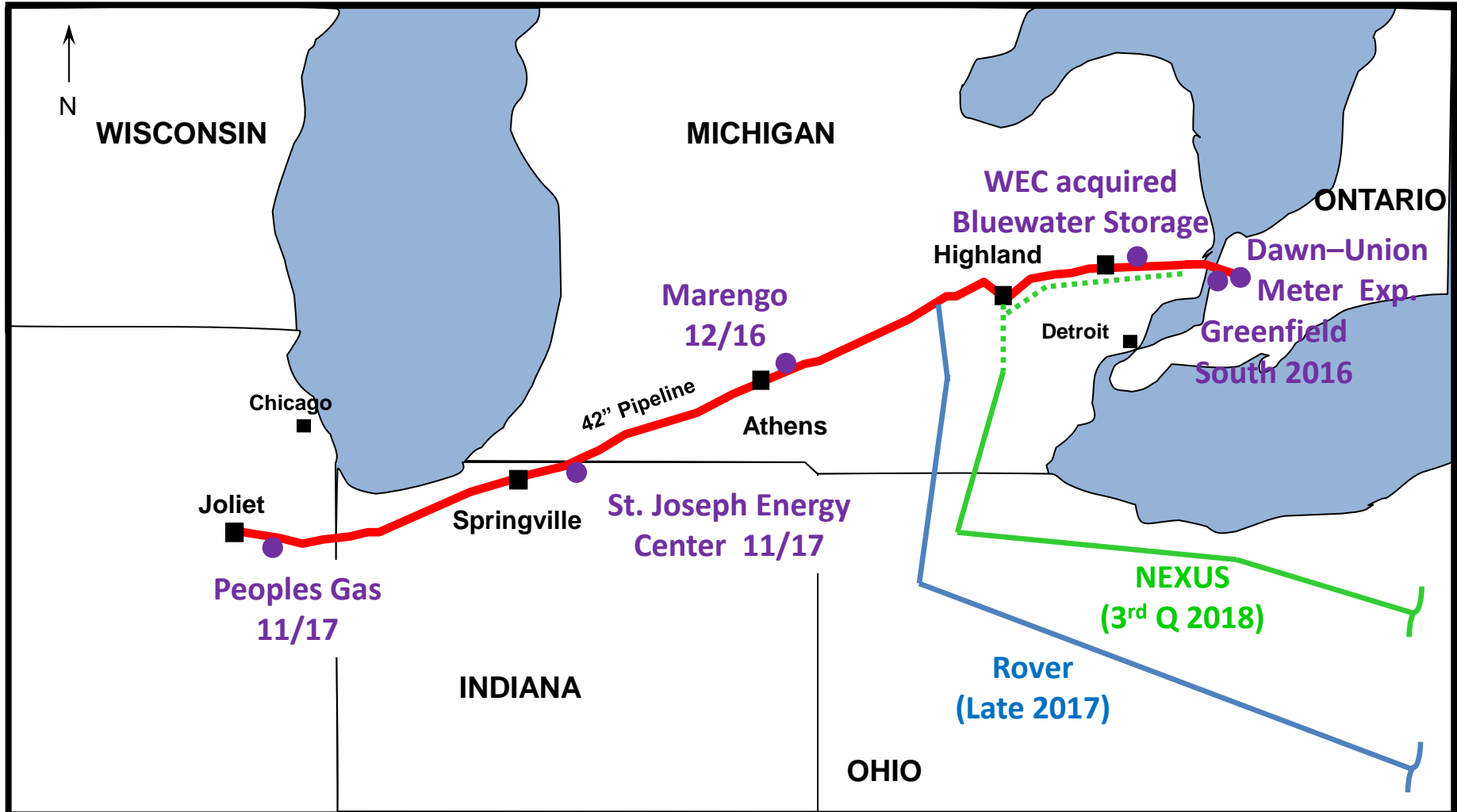
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# Recent Projects



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# New Interconnections





# Marengo Interconnect

- New delivery near Albion, Michigan with SEMCO Pipeline
- Deliveries for Andersons Albion Ethanol Plant
- In-service December 2016



# Greenfield South

- Greenfield South – Eastern Power
  - 300 MW powerplant in Ontario
  - Commercial in-service 2017





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# SJEC

- St. Joseph Energy Center
  - New delivery in Indiana for a 700 MW Power Plant on PJM
  - Vector 1.5 mile, 20-inch lateral and meter station completed Summer 2017
  - Test gas planned Q4 2017
  - Commercial in-service for plant early 2018
  - Lateral sized to handle future “twin” plant



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# SJEC





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# SJEC





# Peoples Interconnect

- Peoples Gas – Smith Road Interconnect
  - New delivery near Manhattan, Illinois with Peoples Gas Light and Coke
  - 280 MDth/d metering capacity
  - Predominantly winter-use for supply and storage gas
  - In-service winter 2017/18



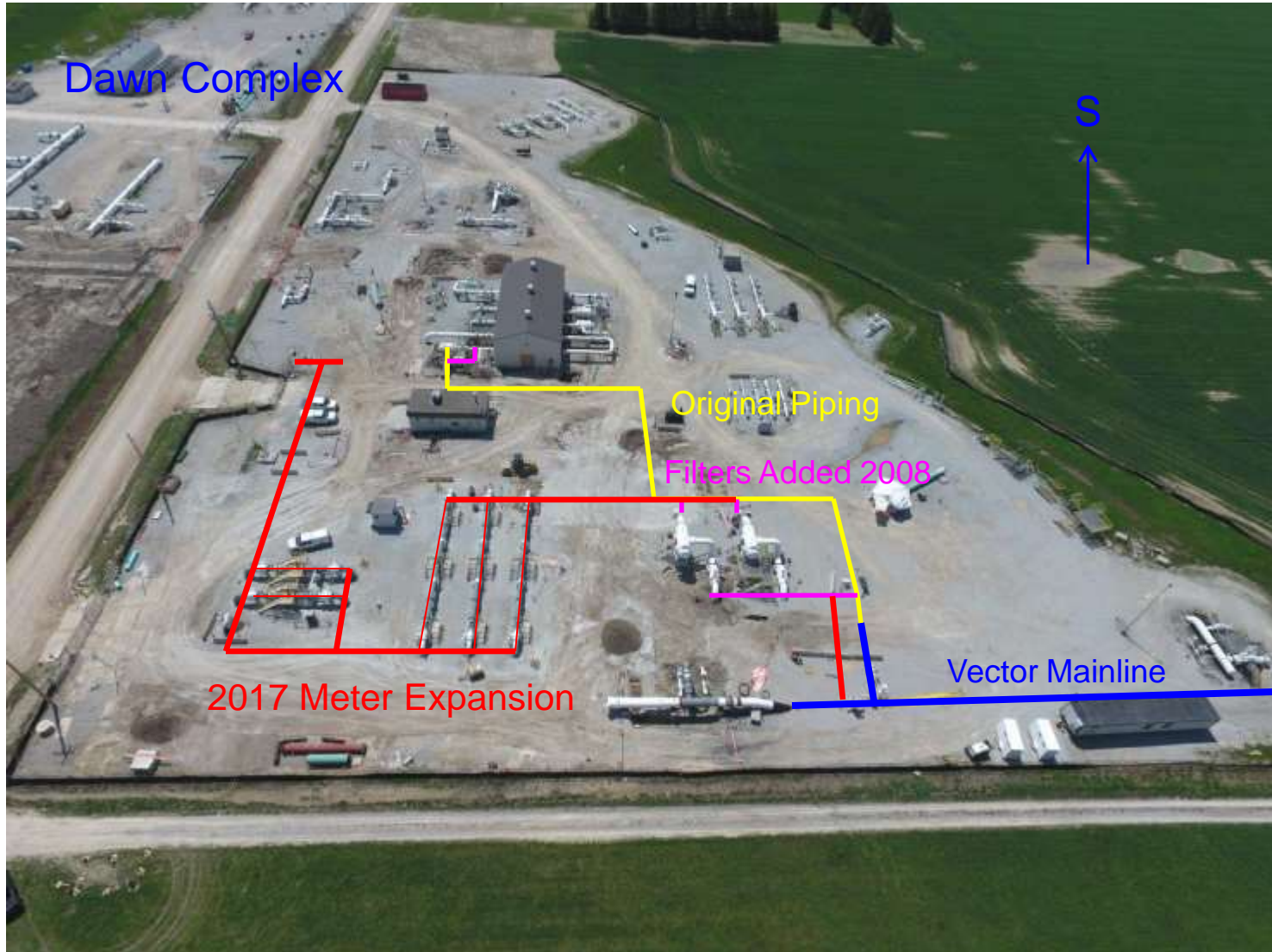
# Dawn Expansion

- Union Gas expanded the Vector-Dawn meter station from 1.5 Bcf/d to 2.3 Bcf/d
- Sized for future expansion on Vector (matches Vector's Presidential Permit capacity)
- Reduces maintenance downtime
- Better measurement over a wider range of flows



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# Dawn Expansion





# Rover Interconnect

- New receipt near Howell, Michigan
- Meter Station Capacity-1.45 Bcf/d
- Awaiting Final Commissioning and In-Service



# Rover Interconnect





# Milford Mod's (NEXUS)

- Modifications to allow the Vector-DTE Gas interconnection at Milford, Michigan to be bi-directional
- Install 0.6 miles, 30-inch “jumper line” to allow lower pressure receipts to flow into the inlet of Vector’s Highland Compressor



# Milford Mod's (NEXUS)





# May 2017 Outages

- The Dawn Meter project, and the Rover and NEXUS projects created a major outage in May 2017
- Firm Gas was interrupted – the pipeline was fully cut open in three locations for construction
- Many interconnecting parties assisted in mitigating impacts to flows
- Vector appreciates the patience from Shippers during this major downtime



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How this Impacts Vector.....

The “Real” News about Vector

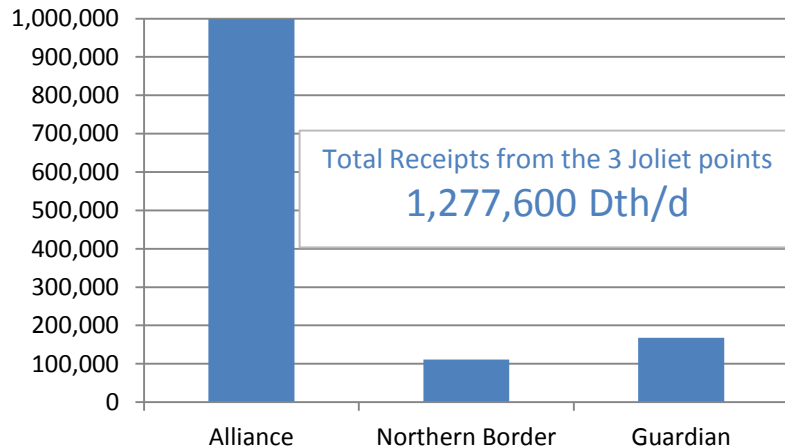


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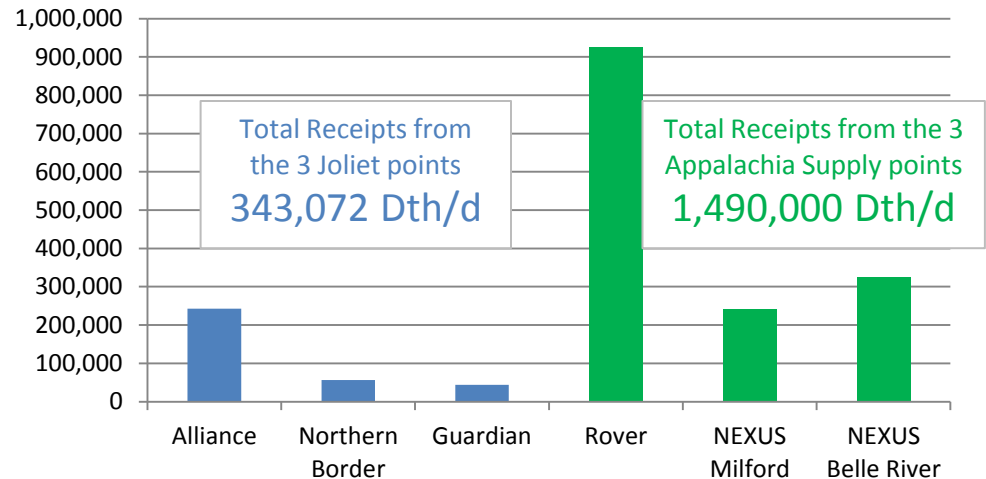
# Impact #1

## Customers' Primary Receipt Points

- NEXUS & Rover will dramatically alter the receipt point composition of our customers.



Data from early summer 2017



Expected by late Q3 2018

**Result: A net reduction at the Joliet receipt points of over 930,000 Dth/d**



# Impact #2

## Firm Deliveries to Dawn

- NEXUS & Rover will increase our firm deliveries to Dawn, but not as much as you may think!

### Summer Period: Firm Deliveries to Dawn, Ontario

|                          | 2017 – Pre Rover / NEXUS | 2018 – Post Rover / NEXUS |
|--------------------------|--------------------------|---------------------------|
| Joliet Points            | 1,182,991                | 255,000                   |
| Marcellus / Utica Points | 0                        | 1,490,000                 |
| <b>TOTAL</b>             | <b>1,182,991</b>         | <b>1,745,000</b>          |

**Net Increase of 562,009 Dth/d**

### Winter Period: Firm Deliveries to Dawn,

| <u>Ontario</u>           | 2016/17 – Pre Rover / NEXUS | 2018/19 – Post Rover / NEXUS |
|--------------------------|-----------------------------|------------------------------|
| Joliet Points            | 1,182,991                   | 255,000                      |
| MI Storage Points        | 285,000                     | 0                            |
| Marcellus / Utica Points | 0                           | 1,490,000                    |
| <b>TOTAL</b>             | <b>1,467,991</b>            | <b>1,745,000</b>             |

**Net Increase of 277,009 Dth/d**





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## Impact #3

# Back-hauls to West end Markets

- With Vector's access to storage and the addition of new interconnects on the west end of Vector, the amount of firm winter back-hauls will increase.

| Delivery Point       | 2016/17 – Pre Rover / NEXUS | 2018/19 – Post Rover / NEXUS |
|----------------------|-----------------------------|------------------------------|
| Guardian             | 321,185                     | 500,718                      |
| NIPSCO               | 61,500                      | 65,000                       |
| Peoples              | NA                          | 160,000                      |
| Other                | 25,000                      | 96,000                       |
| <b>TOTAL (Dth/d)</b> | <b>407,685</b>              | <b>821,713</b>               |

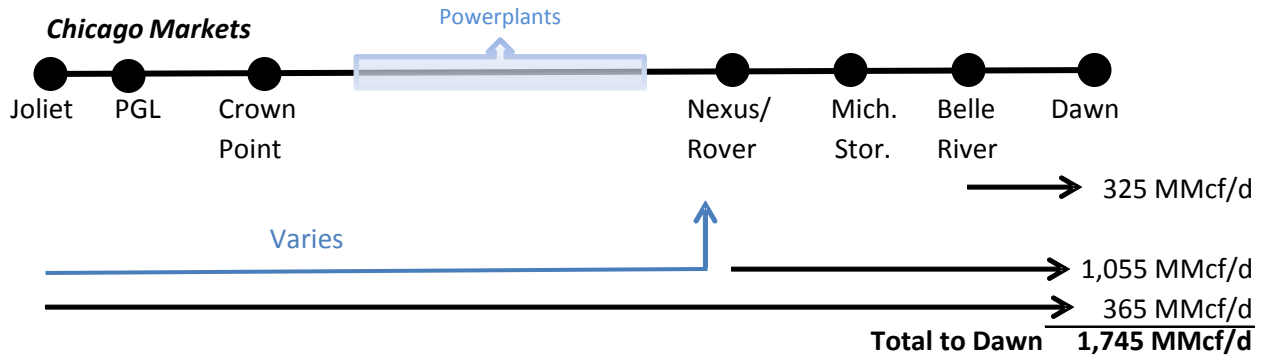
**Over a 100% increase in a two year period!**



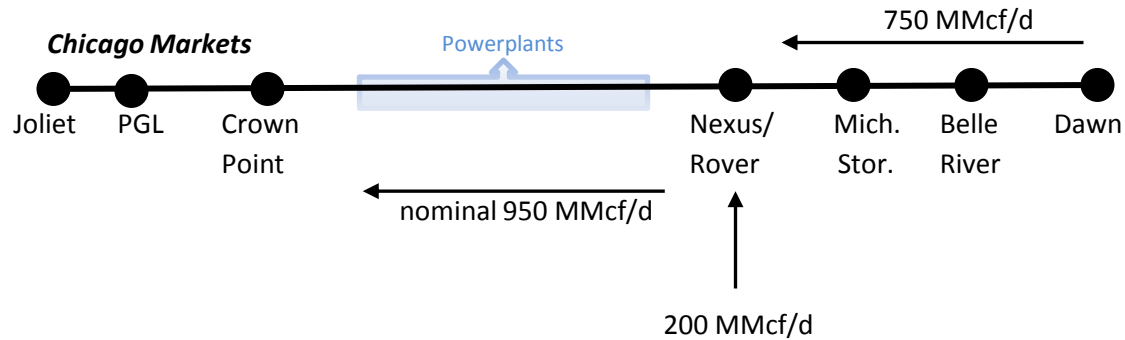
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# Future Flows

Forward Haul



Back Haul





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# What's Next for Vector



# Springville Compressor

## 2018-19 timeframe

- Station currently has two 15,000 hp Solar Mars power turbines and is designed to flow west to east
- Add Bi-directional Capability
- New impellers on one or both gas compressors to handle wide range of flows
- Potentially replace one 15,000 Solar Mars Power Turbine with a smaller engine



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# Revisions to Capacity Postings

- Currently post long-haul capacity (Joliet to Dawn)
- May enhance capacity postings by segments, for example:
  - Zone 1 - up to Crown Point
  - Joliet to Milford
  - Rover/Milford to Dawn
  - Backhauls from Milford



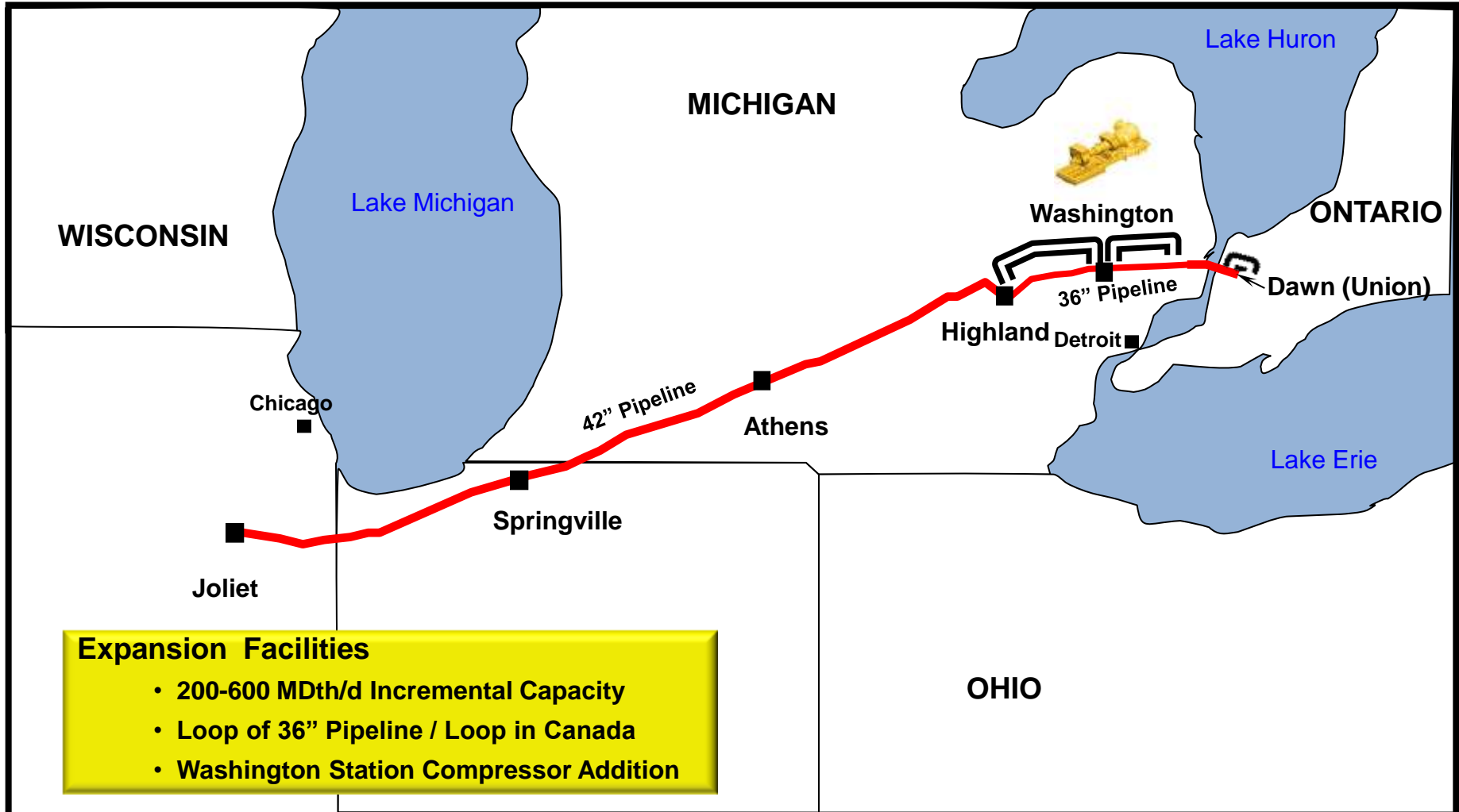
# Potential Projects

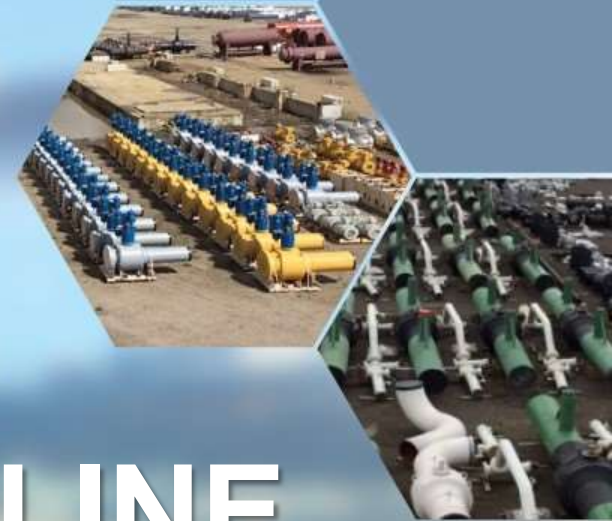
- Chicago/Northern Indiana Markets
  - Exploring growth within this region
- Continue pursuing LDC Interconnects
  - MGU and SEMCO
- New powerplants
  - Phase 2 SJEC (MISO)
  - Coal retirements in Michigan



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# Future Expansion





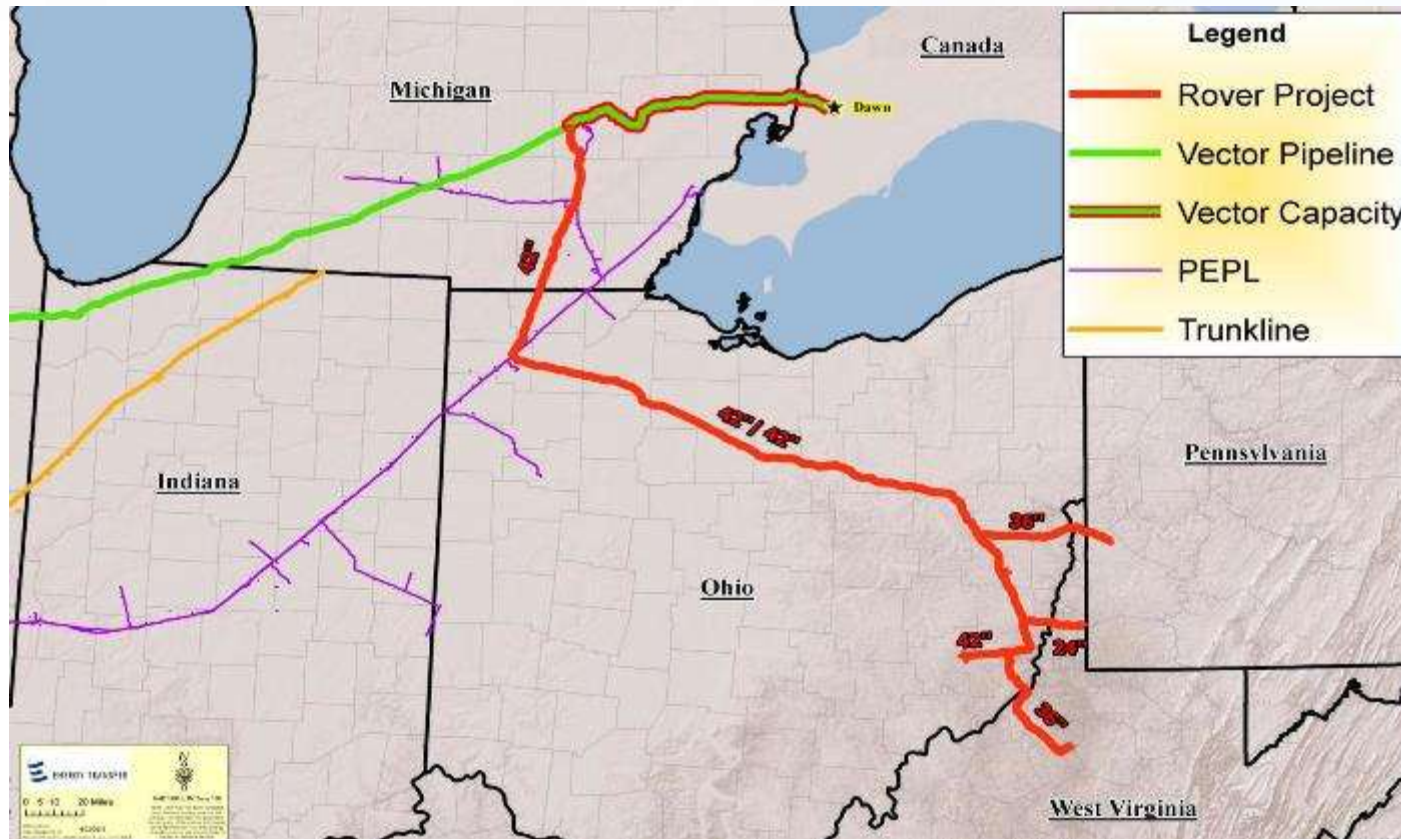
# ROVER PIPELINE

***VECTOR SHIPPER MEETING  
SEPTEMBER 2017***

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# ROVER PROJECT OVERVIEW



## Project Total:

- 713 miles of pipeline

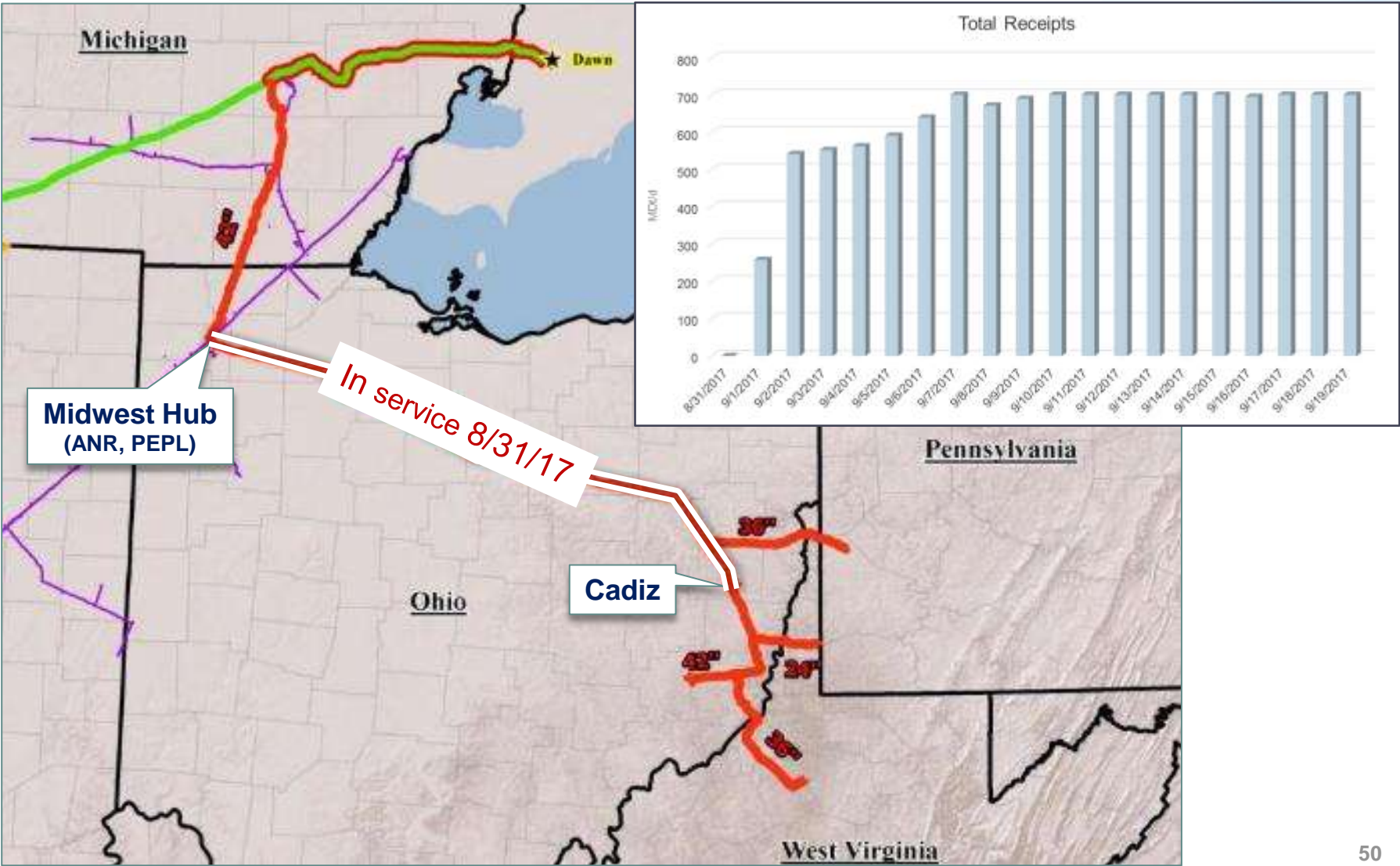
## 10 Compressor stations:

- 6 Supply Zone
- 3 Mainline Zone
- 1 Market Zone North

Initial forwardhaul capacity of 3.25 Bcf/day

3.1 Bcf/day (95% of design capacity) subscribed under long-term firm agreements

# ROVER INITIAL IN-SERVICE



# ROVER CUSTOMER PORTAL



ROVER PIPELINE LLC

Thursday, Sep 14, 2017



QUICK LAUNCH

Lake Charles LNG | Panhandle | Sea Robin | Southwest Gas | Trunkline

- Informational Postings
- Capacity
- Gas Quality
- Index Of Customers
- Locations
- Notices
- Posted Imbalances
- Regulatory
- Standards Of Conduct
- Tariff
- Transactional Reporting
- Password Management
- Rates
- Point Catalog
- Maps
- Forms
- User Manuals
- Downloads
- Search
- Customer

**Rate Calculator** i

Effective Date: 09/14/2017 Rate Schedule: FIRM TRANSPORTATION SERVICE

Receipt:     Distance: 0.0

**Calculate** v

**Map Labels:** Market Zone North, Market Zone South, Dawn Hub, Vector, Mainline Zone, Supply Zone, Crawford, Wayne, Leesville, Seneca, Cadiz, Clarington, Bulger, Majorsville, Sherwood.

**Legend:** Rover Pipeline (blue line), Compressor Station (blue circle)

Critical Notices - None

Non Critical Notices - 1

1. Rover Pipeline LLC - Notice of Co...

Planned Service Outages - None

**Weather**

| City         | Hi/Low    | Precipitation |
|--------------|-----------|---------------|
| Indianapolis | 76/ 58 °F | 10%           |
| Defiance     | 73/ 56 °F | 20%           |
| Columbus     | 71/ 57 °F | 20%           |
| Detroit      | 75/ 58 °F | 20%           |

**Contact Numbers**

**Emergency Contacts**  
**24-Hr Emergency:**  
 (800) 225-3913  
**Call Before You Dig:**  
 811 (For National)  
**Media Contact:**  
 (214) 840-5820

**Customer Service**  
**Phone:**  
 (713) 989-4272  
**Toll Free:**  
 (800) 275-7375  
**Direct Email:**  
[Email](#)

**Messenger Services**

# ROVER FERC UPDATE

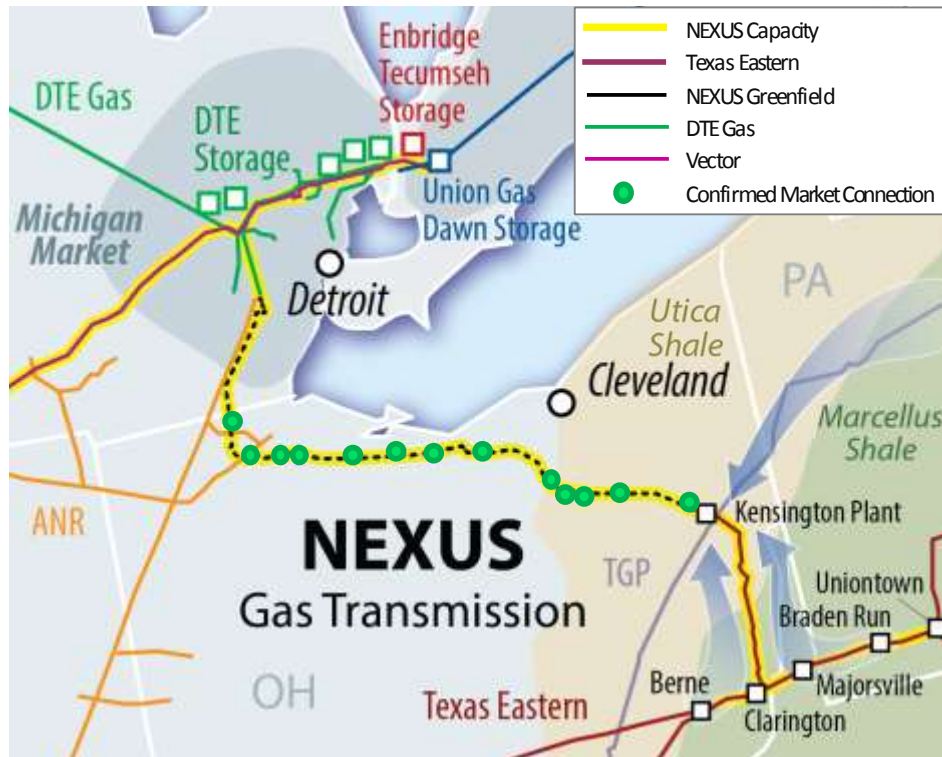
- **On September 18<sup>th</sup>, FERC authorized Rover to resume Horizontal Directional Drill (HDD) activities at nine locations**
  - Drilling operations at these locations are expected to begin within the week with an emphasis on the Captina Creek HDD in Belmont County, Ohio.
    - Completion of the Captina Creek HDD will allow the full Phase 1 portion of Rover to be placed into service by the end of the year.



# NEXUS: Linking a Prolific Supply Basin to a Strong and Growing Market

September 2017

# The NEXUS Project links prolific supply to a strong and growing market



## Project Summary:

**Design Capacity:** 1.5 Bcf/d  
**New:** 255 miles of 36" pipe and 4 compressor stations in Ohio (total of 578 miles including existing pipe)

**In-Service:** Late Q3 2018

**Shippers:** Chesapeake, Columbia Gas OH, CNX Gas, DTE Electric, DTE Gas, Enbridge, Noble, Union Gas

## Key Advantages:

- Access to the most prolific, low-cost supply basin in North America
- Supports Midwest's transition to natural gas
- Provides connections to Northern Ohio, Michigan and Western Ontario load centers
- Connects with Michigan and Ontario storage



# The project route provides shippers with access to multiple markets and allows for significant flexibility

## Market Zone 1

### Receipt Meters:

- Kensington Area Receipt Meters:
  - Kensington Processing Plant
  - Texas Eastern
  - Tennessee Gas Pipeline
- NEXUS Ypsilanti
- PEPL-MCON

### Delivery Meters:

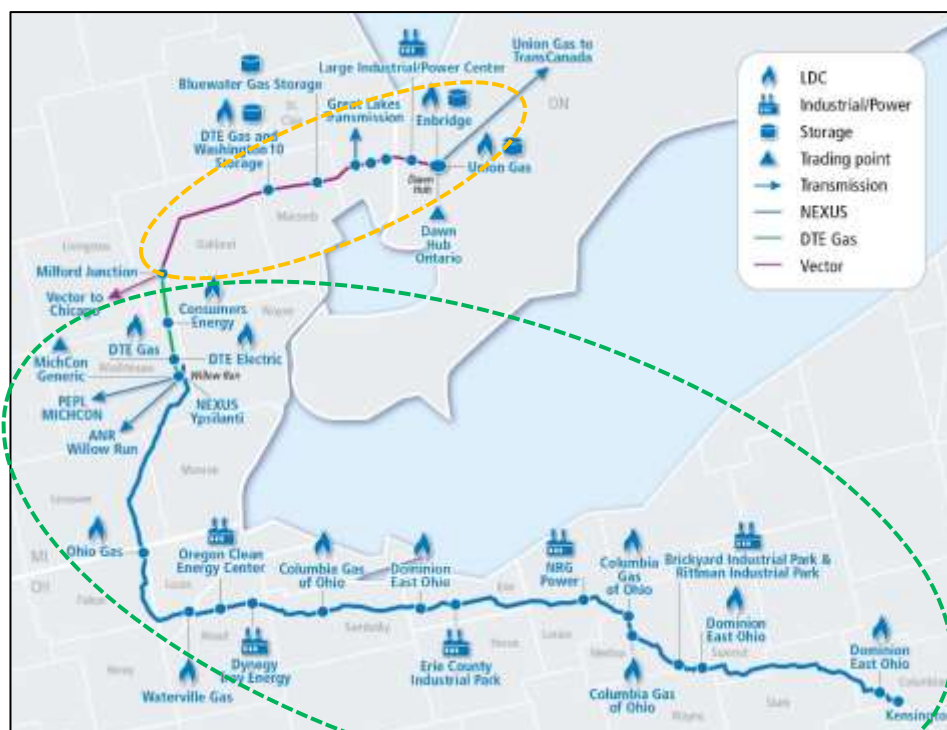
- Dominion East Ohio
- Columbia Pipeline Group
- NEXUS Greenfield Ypsilanti at Willow Run, MI
- PEPL-Scofield

### Bi-directional Meters:

- Accounting Point at Kensington
- ANR-Willow Run
- Consumers Northville
- (DTE) Vector Milford Junction

### Taps

- Ohio LDCs
- Power generators
- Industrials



## Market Zone 2

### Receipt Meters:

- (Vector) Milford Junction
- Willow-MCGC Trading Point

### Delivery Meters:

- Consumers – Ray
- Greenfield Energy
- Courtright

### Bi-directional Meters:

- DTE Gas Storage – W10
- Bluewater Storage
- Vector Belle River
- Great Lakes-Belle River
- St. Clair
- Sombra
- Dawn Hub



# Significant coal-fired generation capacity will be retired over time and will be replaced by new gas-fired generation

**Over 13,800 MW of new gas-fired generation will be added from 2017-21 with a potential gas load of ~2.3 Bcf/d**

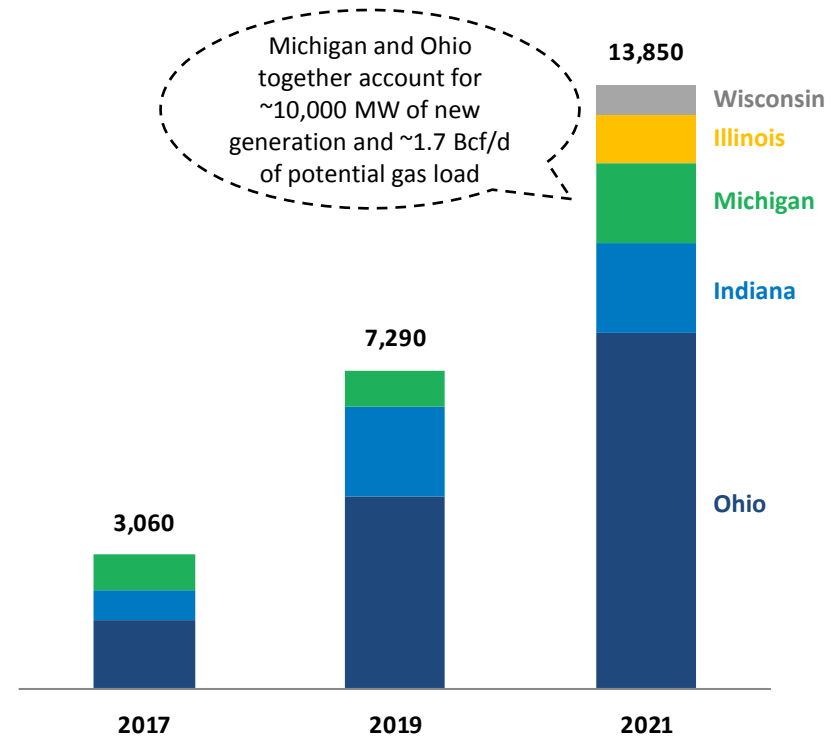
**“Ontario is expected to add ~1,300 MW of new natural gas power generation over the next 18 months, according to forecasts”**  
*December 16, 2016*

**“DTE Energy has filed a Certificate of Necessity with the Michigan Public Service Commission (MPSC) seeking to build a state-of-the-art natural gas-fired power plant of about 1,100 MW”**  
*August 1, 2017*

**“The gas-fired power business in Ohio is in line for a massive expansion in the next few years, with four projects representing about 4,600 MW of new capacity going right now through the site approval process at the Ohio Power Siting Board. ”**  
*June 6, 2017*

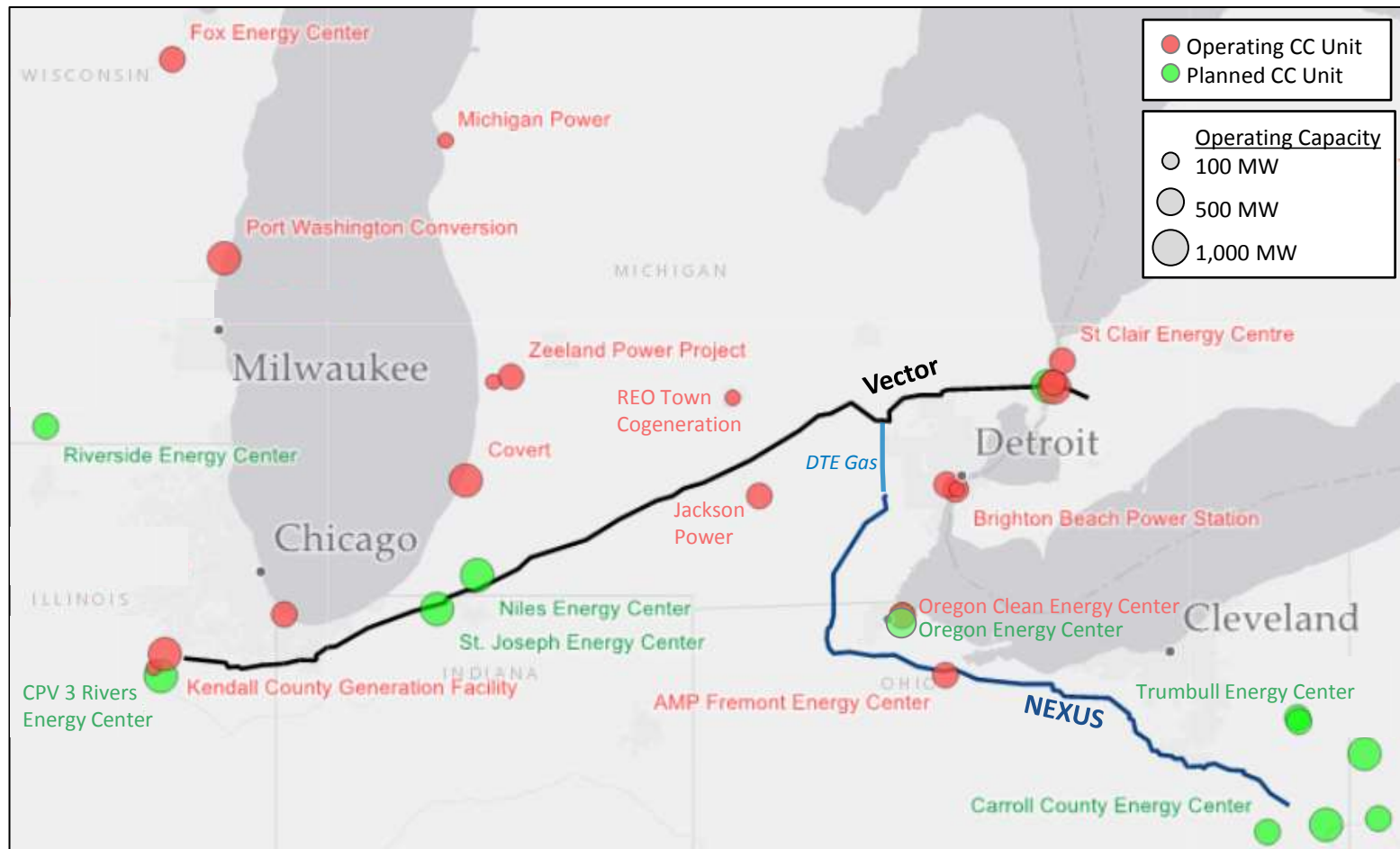
**“Clean Energy Future-Oregon, LLC filed a full application with the board proposing to develop, finance, build, own and operate the Oregon Energy Center, a new natural gas-fired, 955-MW combined-cycle facility located in the City of Oregon, Lucas County, Ohio.”**  
*April 19, 2017*

**Cumulative New Gas-fired Generation Additions, MW**



Source: SNL, press releases, DTE Analysis

# Combined cycle generation plants along the NEXUS/Vector corridor

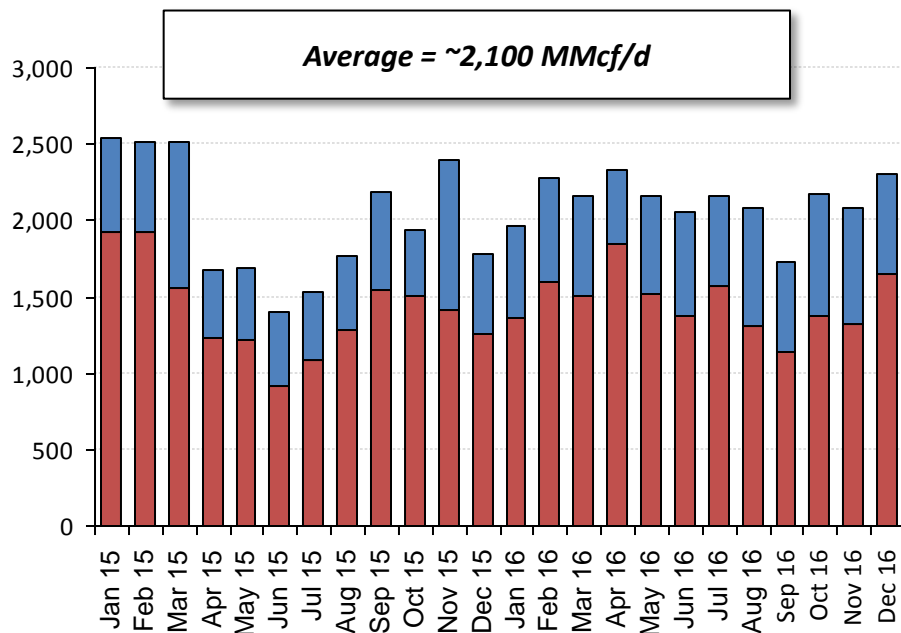


# Great Lakes markets are highly liquid and traded volumes materially exceed those in the Gulf Coast region

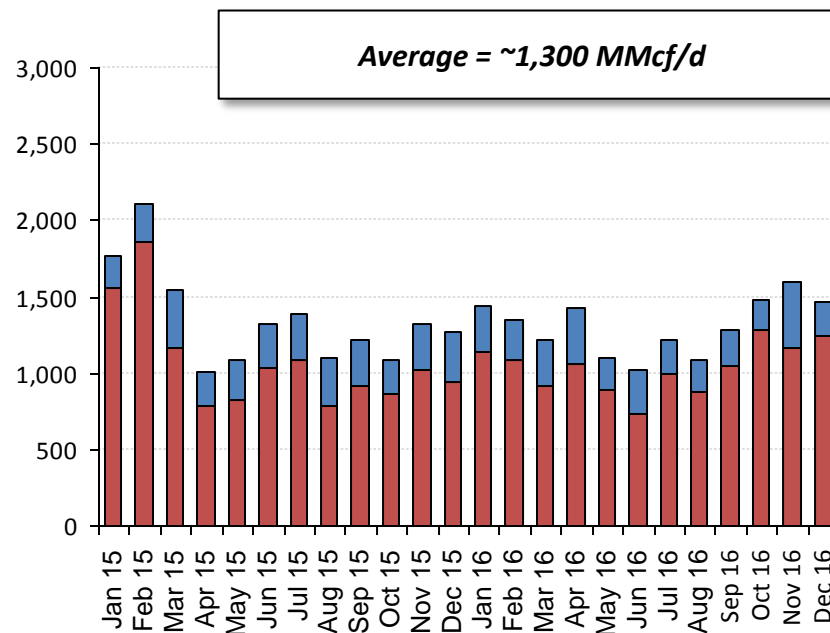
MMcf/d

Month Ahead Trade Volume  
Day Ahead Trade Volume

**Daily Traded Volumes at NEXUS Primary Markets:  
Chicago, Dawn, and MichCon**



**Daily Traded Volumes at Henry Hub Area<sup>1</sup>**

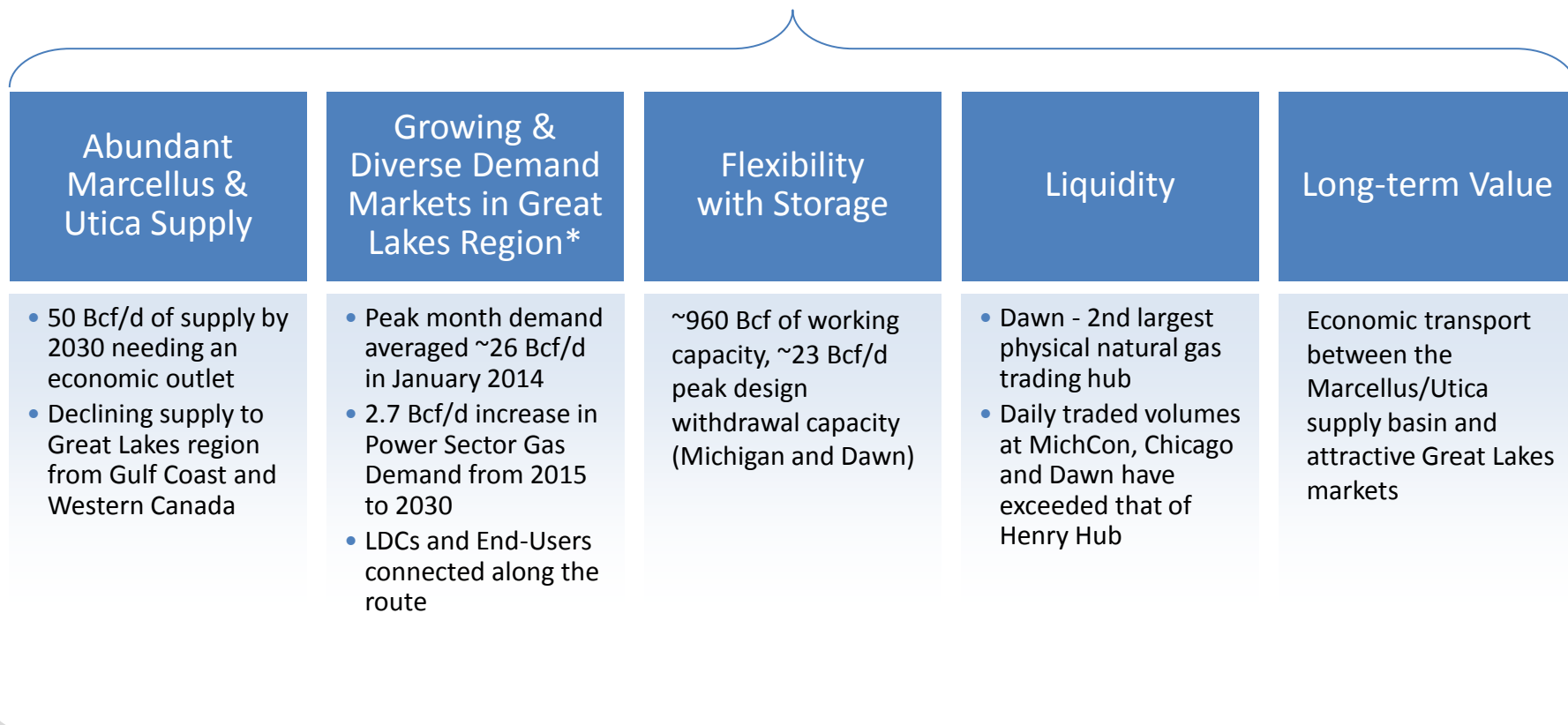


- The high degree of liquidity in the Great Lakes markets means that realized prices are more transparent and certain than less liquid markets
- This results in a very small bid-ask spread and buyers and sellers can transact large volumes with price certainty

1. Henry Hub area market points include Henry Hub, Columbia Gulf Onshore, Columbia Gulf Mainline, TGP Z1, Trunkline ELA, Trunkline WLA, ANR Patterson LA, Trunkline Z1A, Pine Prairie, TETCO WLA

Source: ICE/10X

# The NEXUS project allows shippers to connect abundant low cost Marcellus / Utica supply to attractive markets in the Great Lakes region



# Dawn Hub - Ontario's Energy Advantage



Jim Redford, Vice-President,  
Business Development Storage and Transmission

September 21, 2017



An Enbridge Company

# Supply to the Dawn Hub

## Diversity = Reliability



**Abundant and diverse natural gas serving the growing needs of the market**

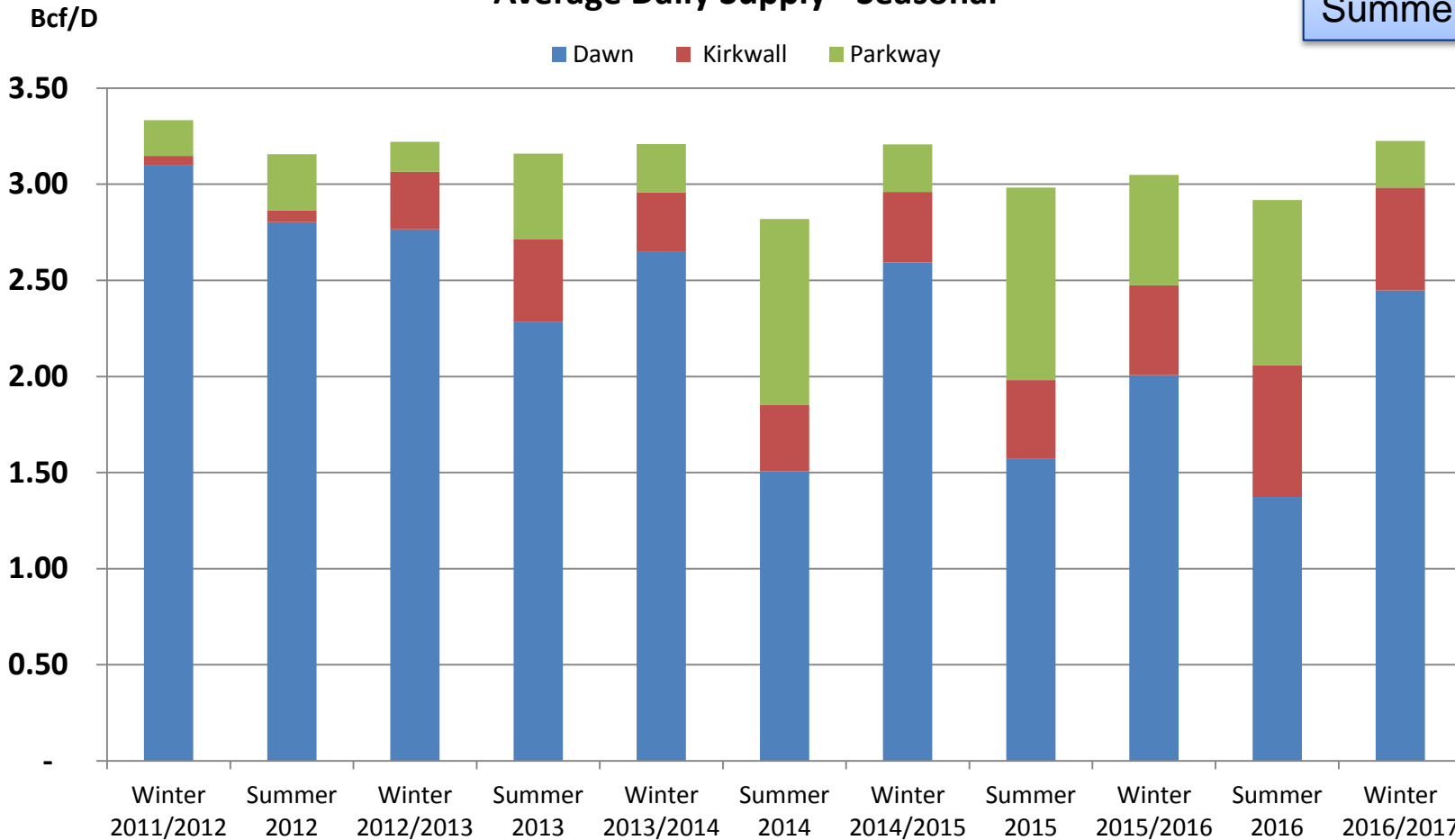


# Supply to the Dawn Hub

## Third Party Pipeline Supply

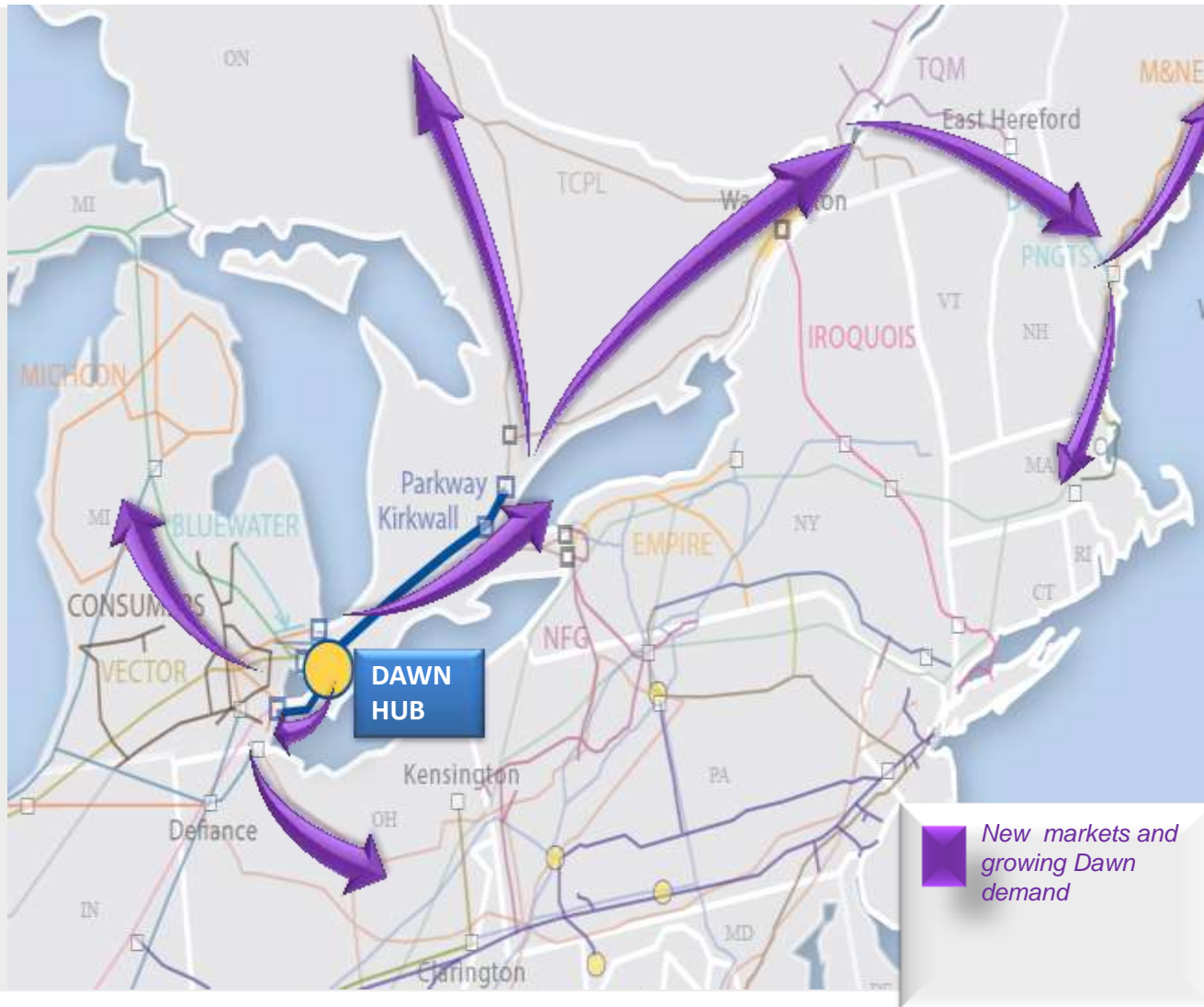
|        |           |
|--------|-----------|
| Winter | 3.2 Bcf/d |
| Summer | 3.0 Bcf/d |

**Average Daily Supply - Seasonal**



# Downstream Connectivity

## Growing Connectivity to Meet Market Demand



### 2015-2017 Expansion:

- 1.3 Bcf/d increases Dawn Parkway System capacity to 7.5 Bcf/d
- Union can continue to add capacity to meet market demand

 New markets and growing Dawn demand

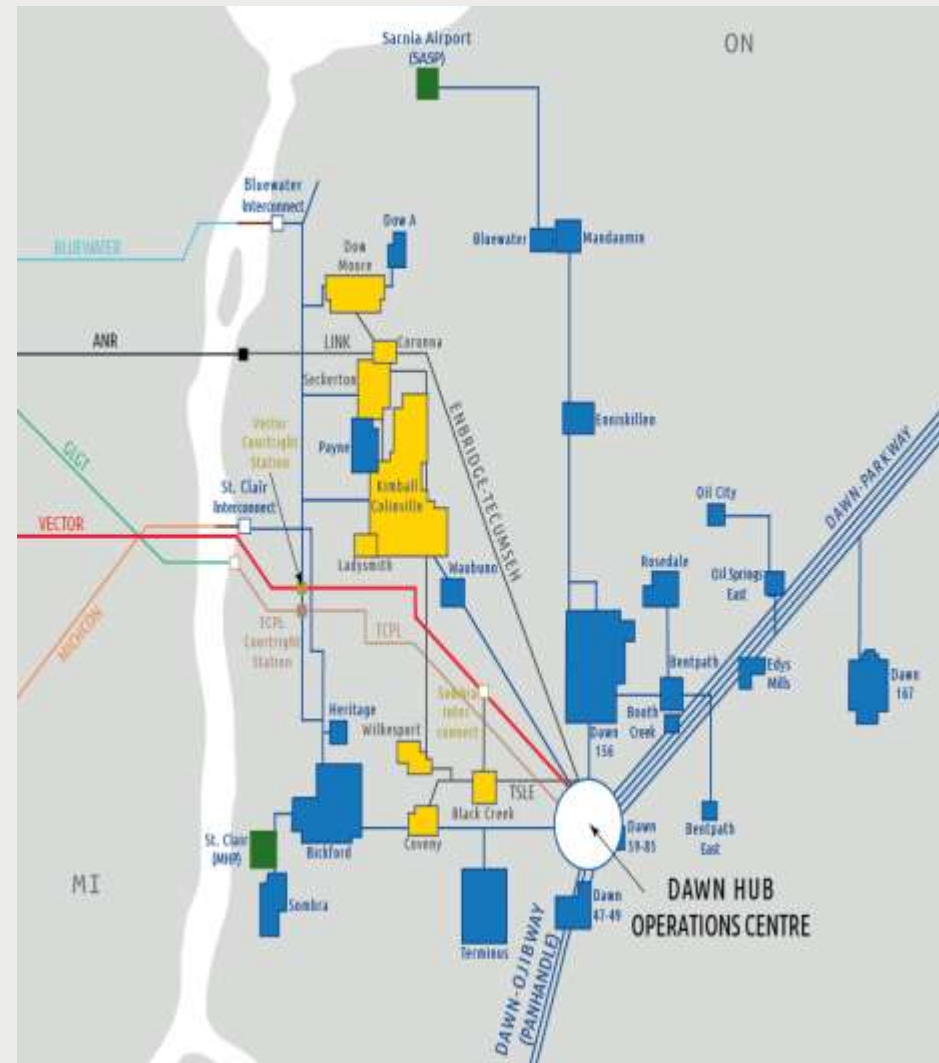




# Dawn Storage

## Growing to Meet Demand

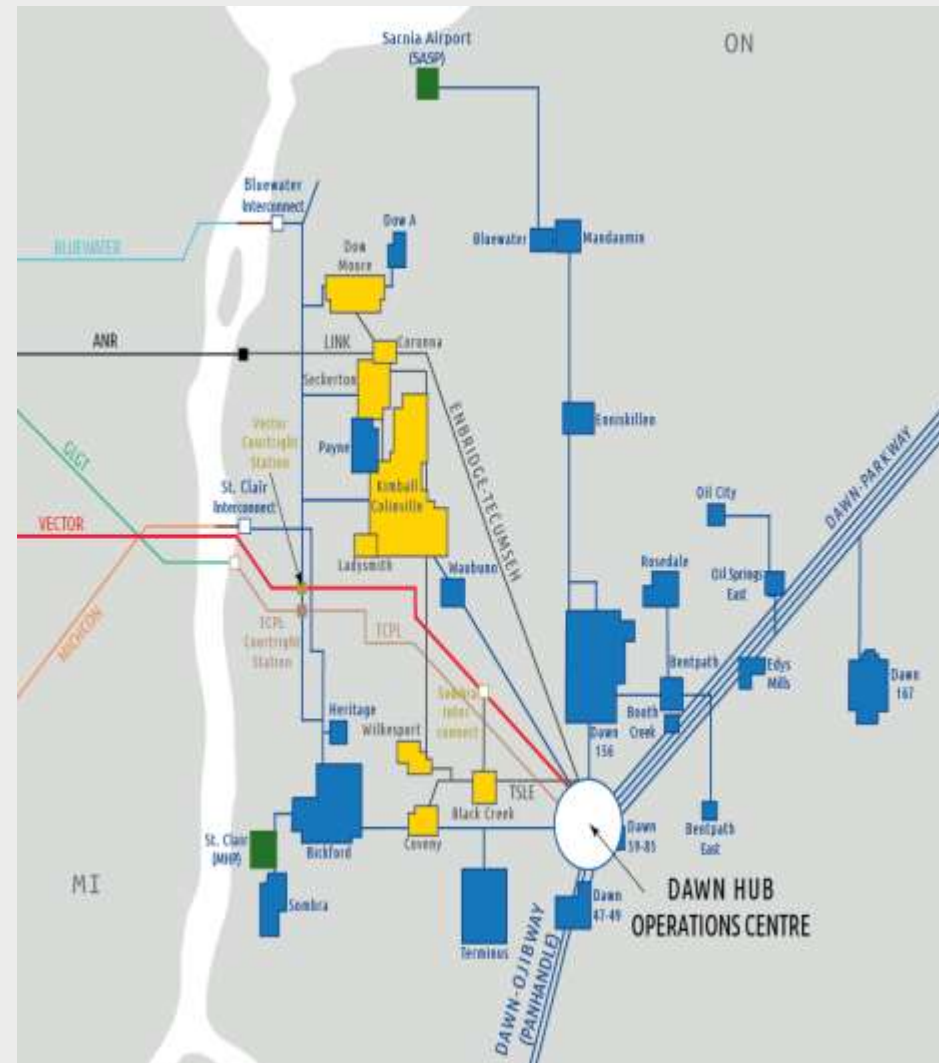
- **120 Bcf total merchant storage @ 2017**
- **Total storage deliverability of:**
  - **3.1 Bcf/d Union Gas**
  - **2.4 Bcf/d Enbridge Gas Distribution**



# Dawn Storage

## Growing to Meet Demand

- **Storage Enhancement Projects:**
  - 2010-2018 - 7 Bcf incremental storage space
  - 2010-2018 - ~0.2 Bcf/d of incremental deliverability
  - Post 2018 – develop incremental space





# In Closing...



[www.uniongas.com](http://www.uniongas.com)





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**QUESTIONS**

**?**



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**THANK YOU**