A Detailed Look at the Impact of Cochin Pipeline Reversal on Propane Markets in the Midwest

Prepared for the Midwest Governors Association
Propane Supply Chain Working Group Meeting

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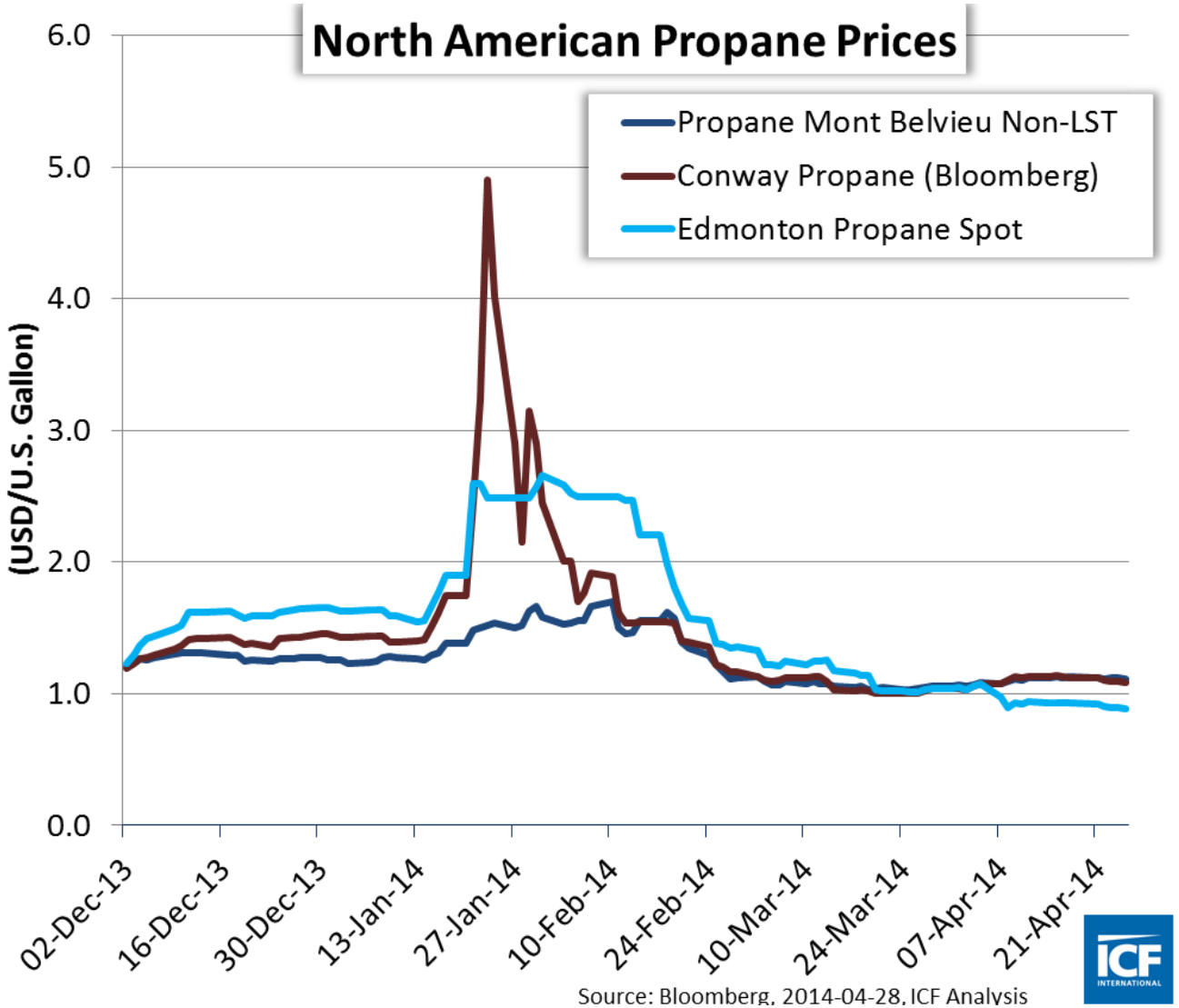
Presented by:
Michael Sloan
ICF International
9300 Lee Highway
Fairfax Virginia
22031

This Winter, Propane Shortages (and Prices) Made the Evening News



Source: Bloomberg, 2014-04-28, ICF Analysis

This Presentation is About the Numbers

1) A focused look at what happened this winter.
2) A look ahead at the impact of key market trends
3) A detailed look at the Cochin Pipeline
4) An assessment on the likelihood of a future supply crisis like the one this winter

What Happened this Winter?

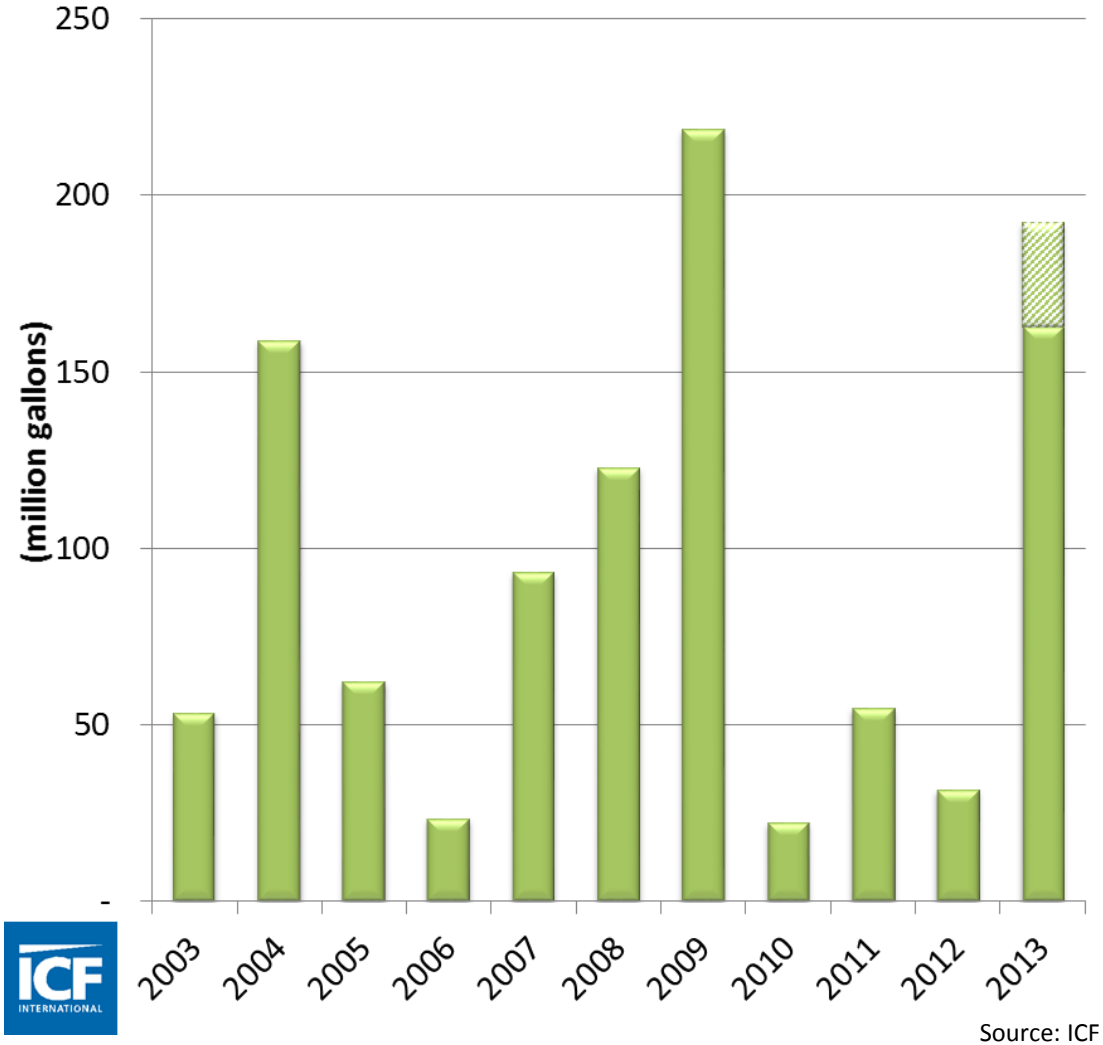
IN 2013, U.S. PROPANE PRODUCTION INCREASED BY 1.4 BILLION GALLONS

SO WHY WERE WE SHORT OF SUPPLY THIS WINTER?

1) Crop Drying
2) Cold Weather
3) Marine Cargo Exports
4) Capacity Outages and Constraints
5) Canadian Demand and Inventory
6) Cochin Pipeline Outage

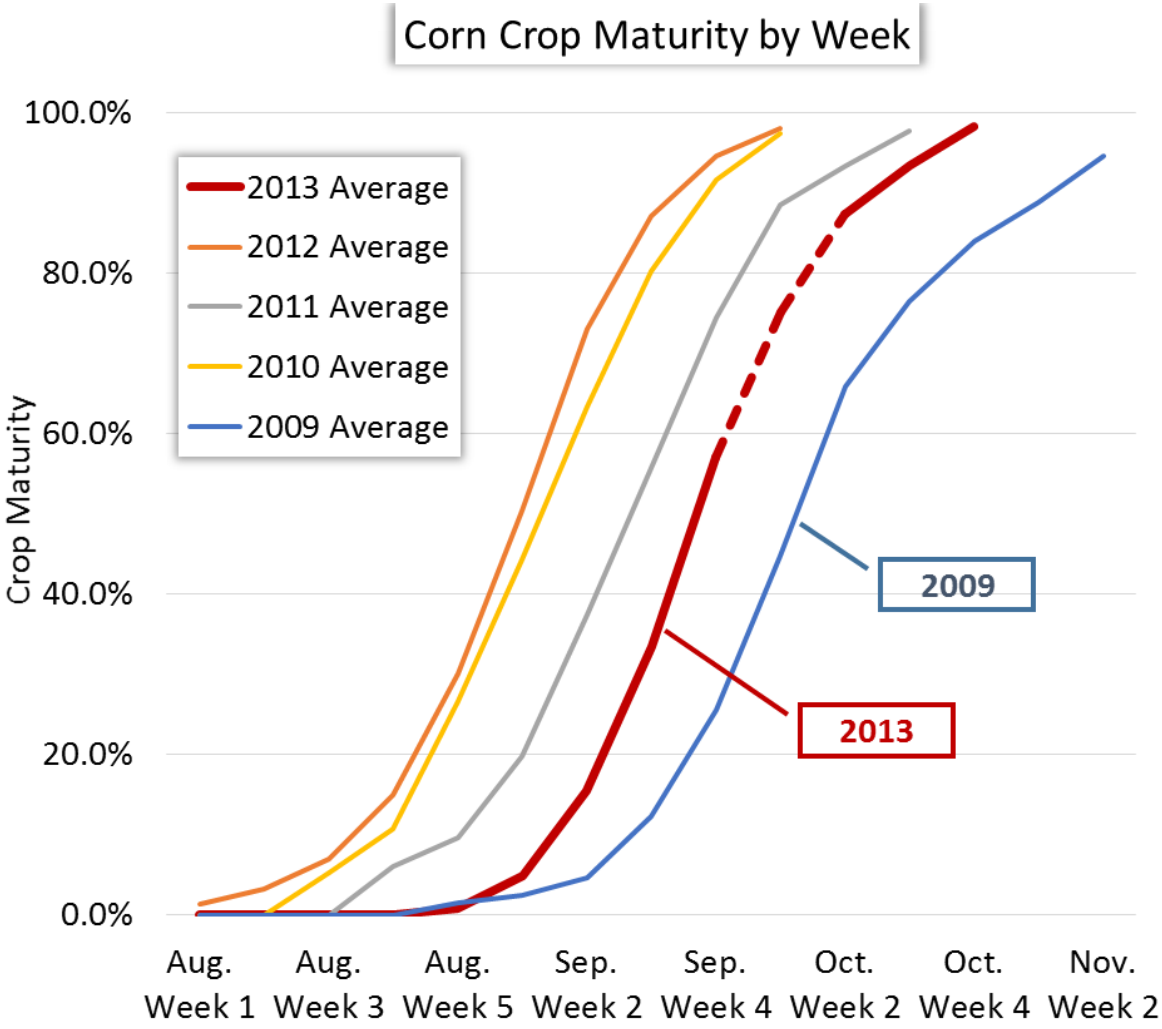
Grain Drying Demand in the Region Served by the Cochin Pipeline

- Record Corn Crop
- Wet spring delayed planting
- Cooler than normal weather in July and August delayed the harvest.
- Above-average rainfall in October
- Until the rains came in October, the market expected below-normal propane demand



Source: ICF

Grain Drying Demand in the Region Served by the Cochin Pipeline Could Have Been Higher

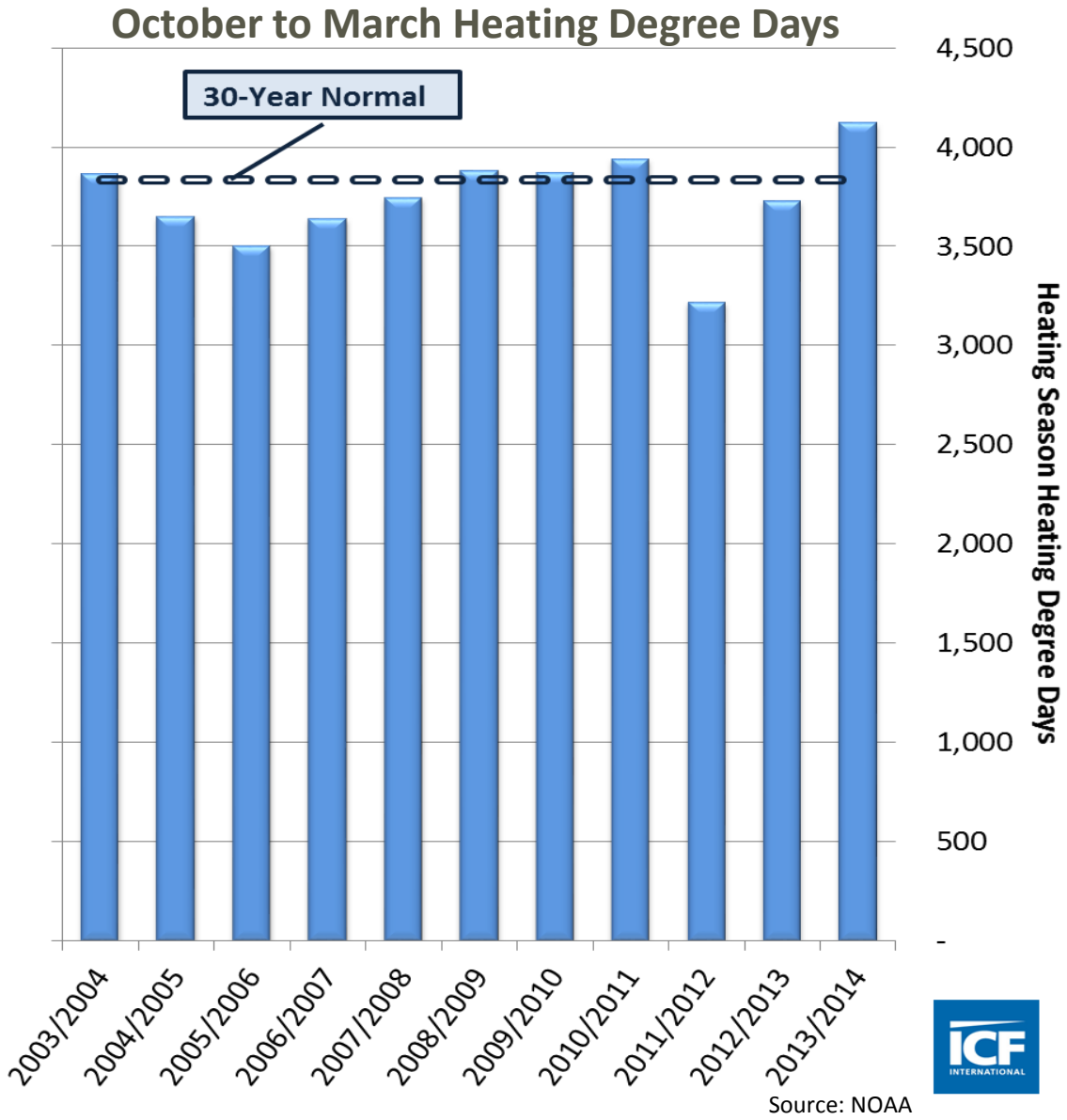


* Corn Crop Maturity data was not reported for the 1st and 2nd weeks of October

Source: USDA

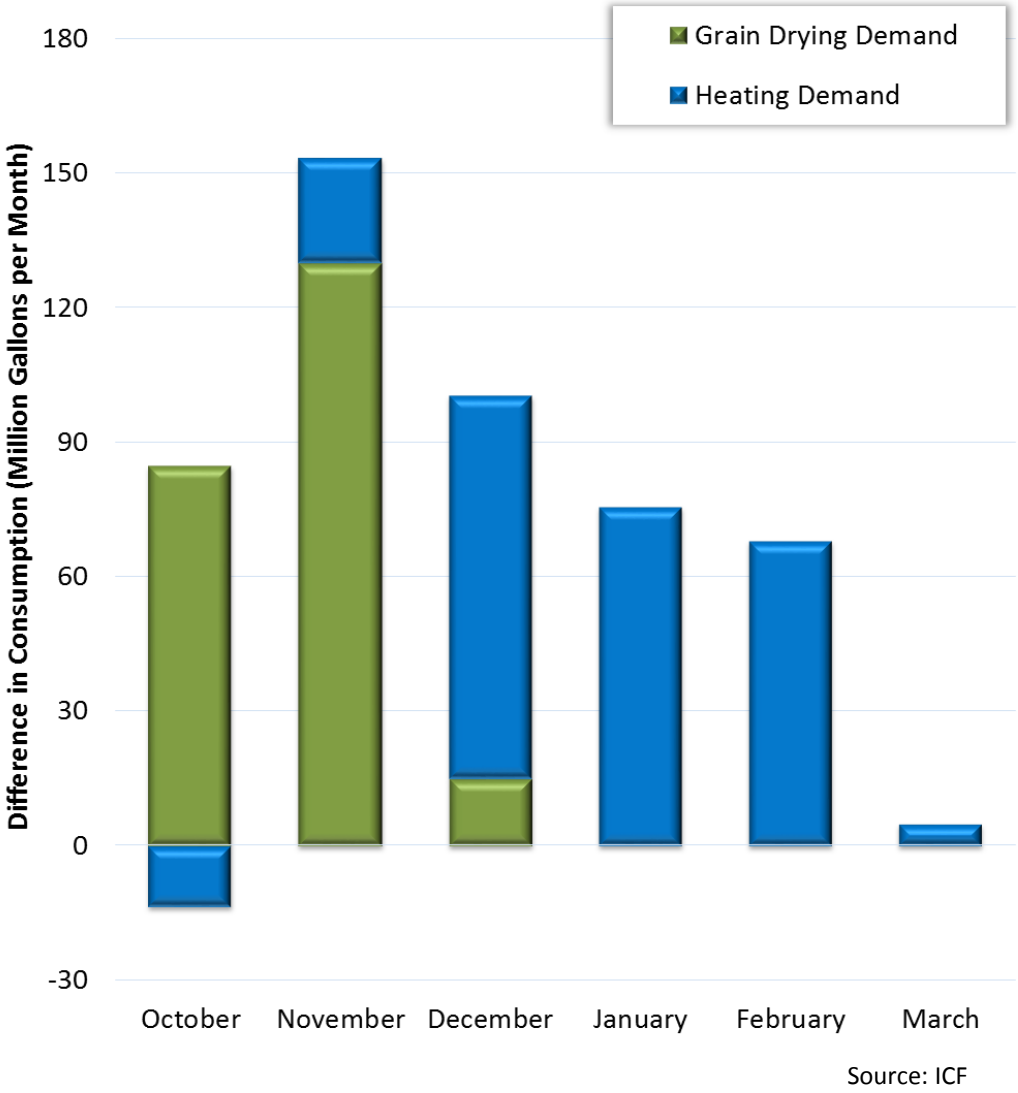
Cold Weather

- **The 2013/2014 winter was:**
  - 7.5 percent colder than 30-year normal weather
  - 10.5 percent colder than last winter
  - 27.9 percent colder than the winter of 2011/2012



Source: NOAA

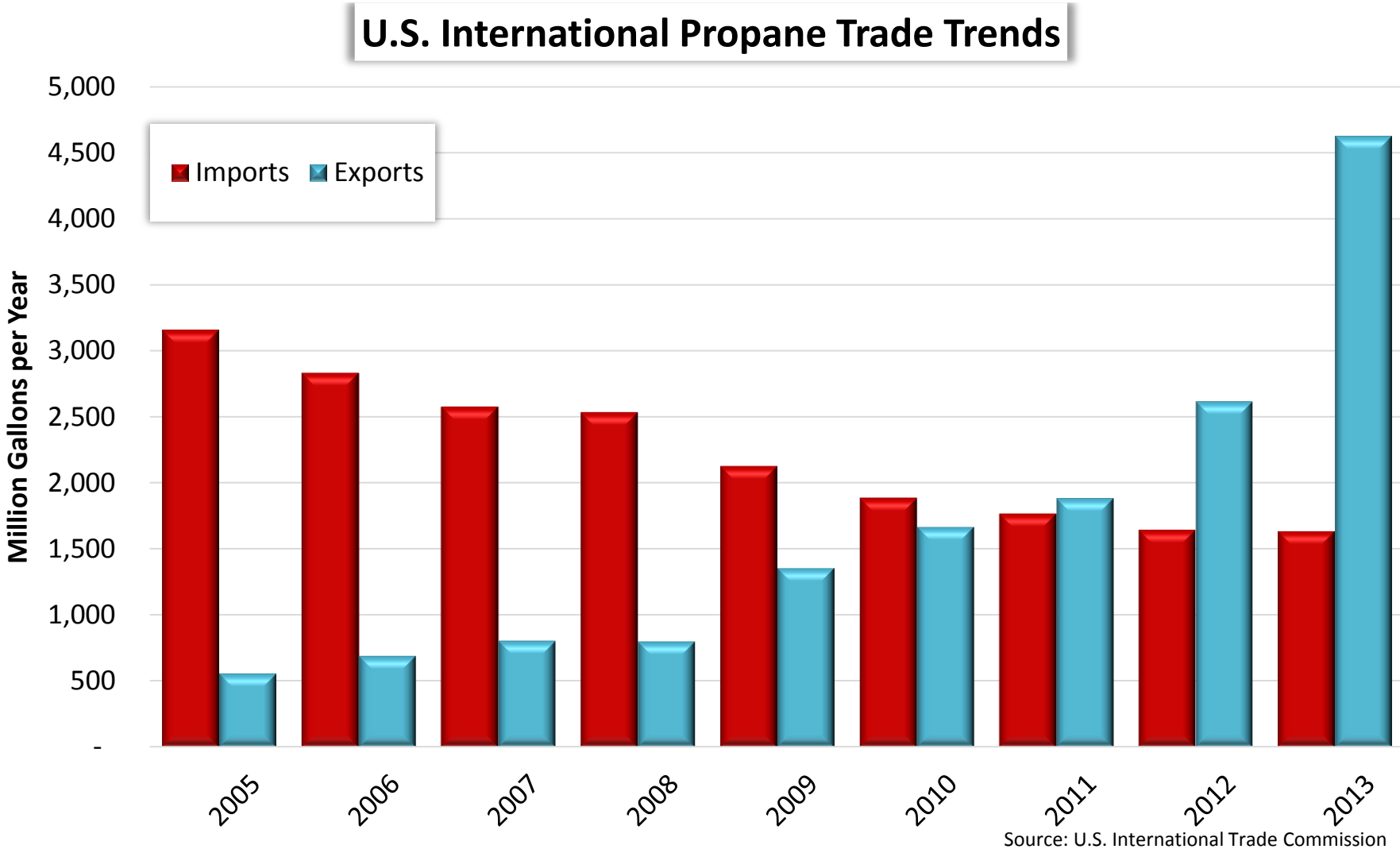
Change in October 2013 – March 2014 Midwest Propane Consumption Relative to Last Year



Source: ICF

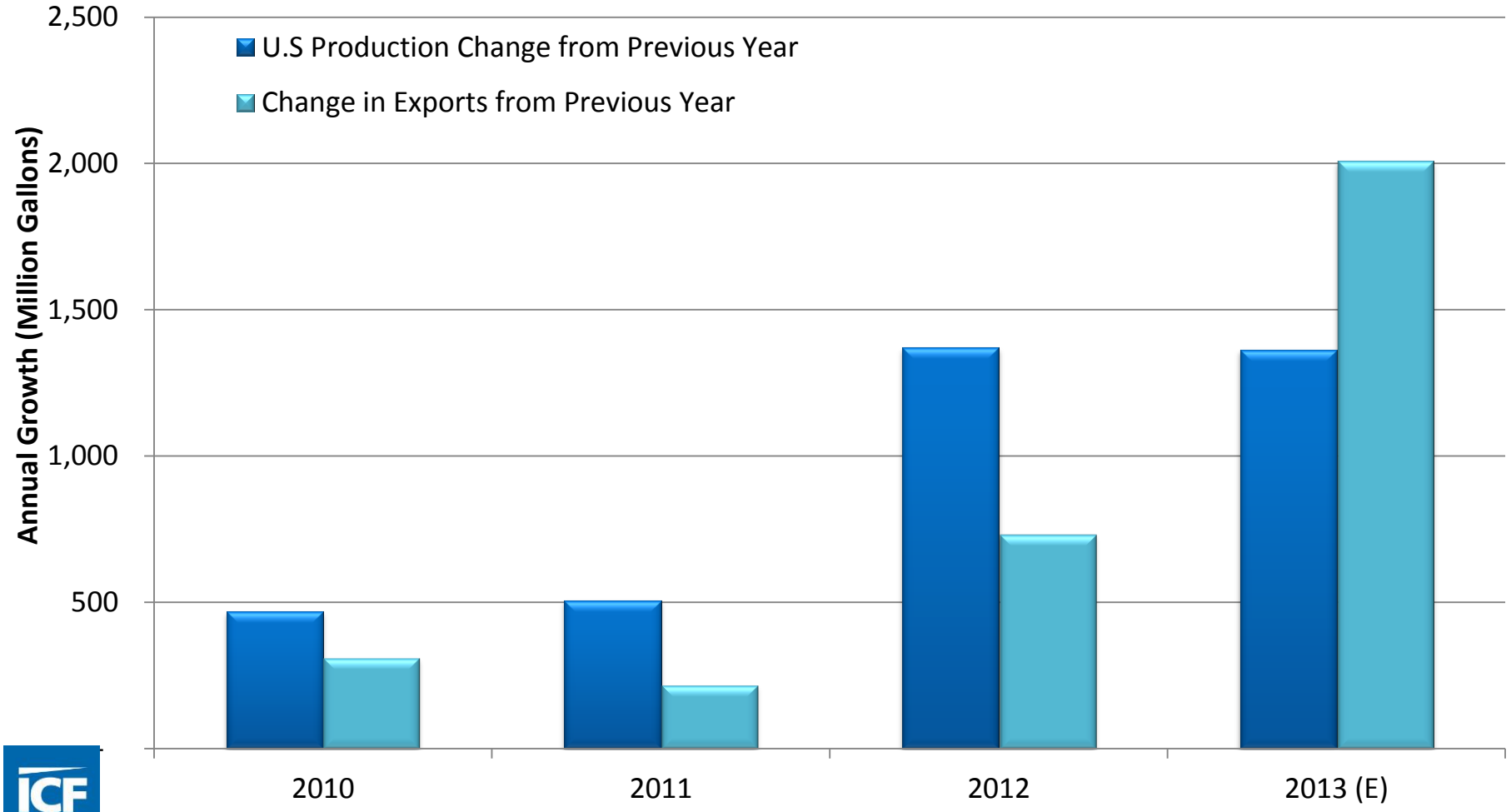
- The 2013/2014 winter propane consumption in the Midwest was 490 million gallons higher than the previous year
  - Grain Drying: 245 million gallons
  - Cold Weather: 245 million gallons
- And about 420 million gallons higher than it would have been with "normal" weather:
  - Grain Drying: 145 million gallons
  - Cold Weather: 275 million gallons

The Growth in Domestic Production has Driven a Long Term Change in Imports and Exports

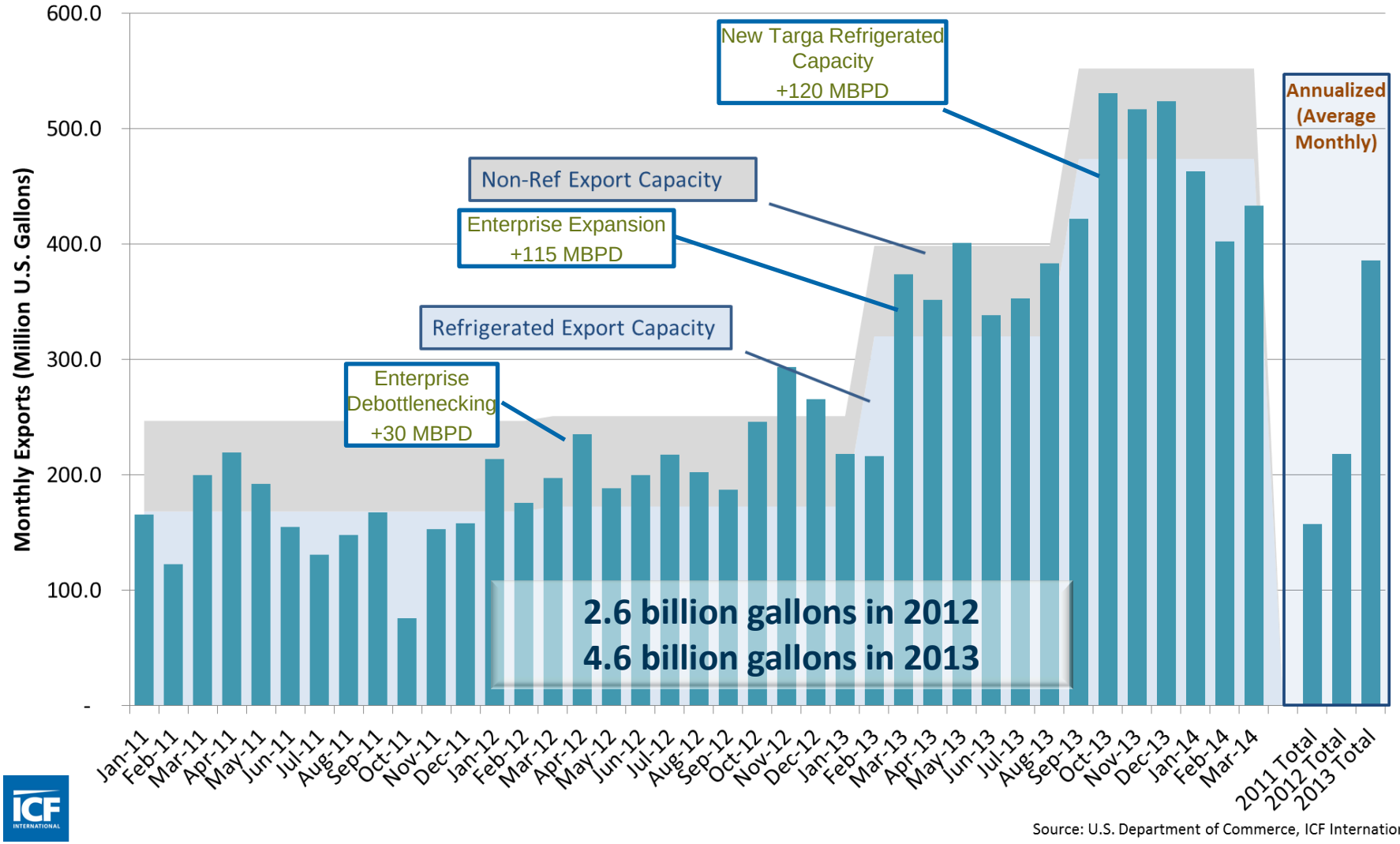


Source: U.S. International Trade Commission

Annual Change in Propane Exports Relative to Annual Change in U.S. Propane Production



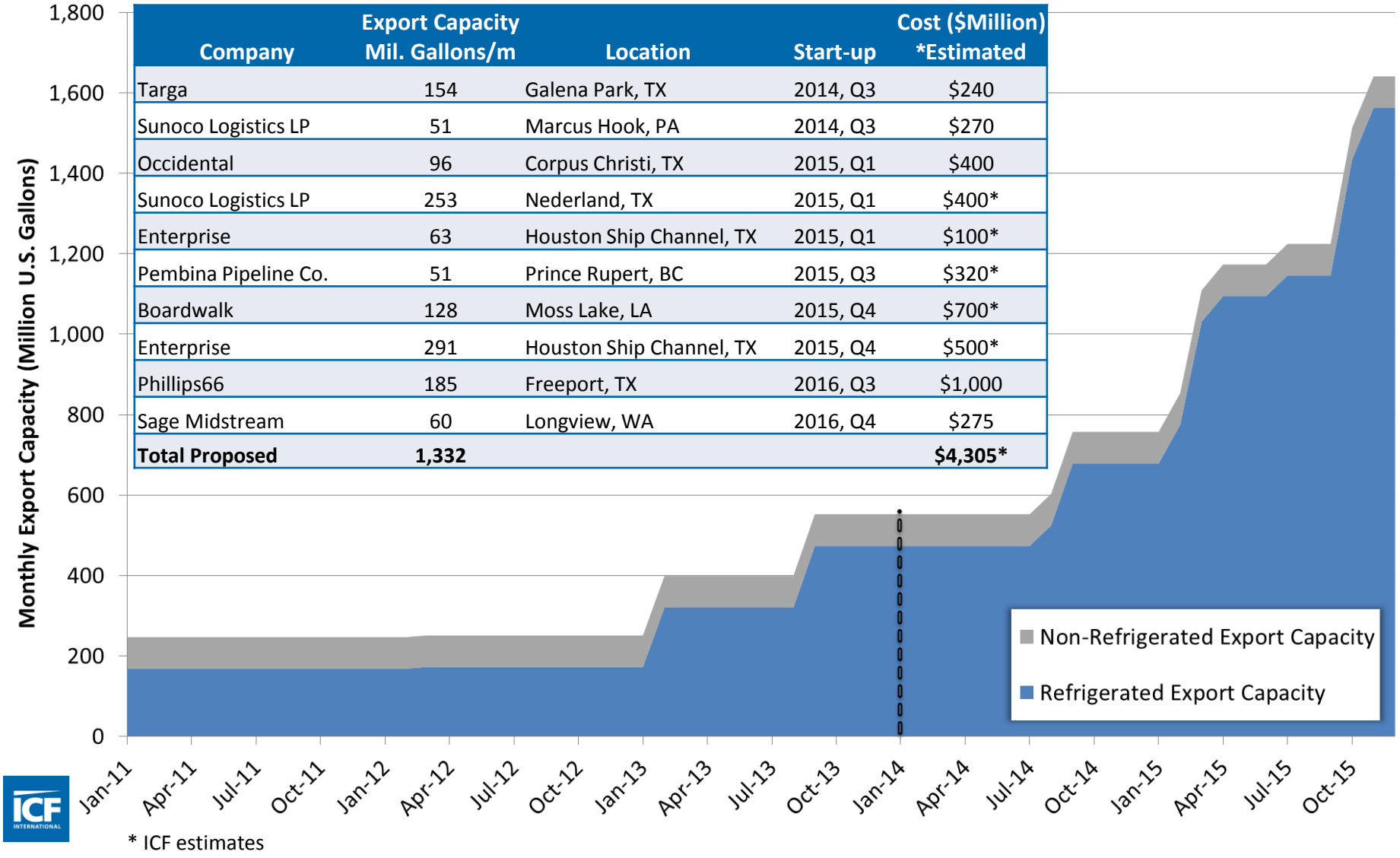
Propane Exports Doubled After the 2013 Terminal Expansions Came On-line



Source: U.S. Department of Commerce, ICF International

Planned Export Terminals Significantly Add to Current Export Capacity

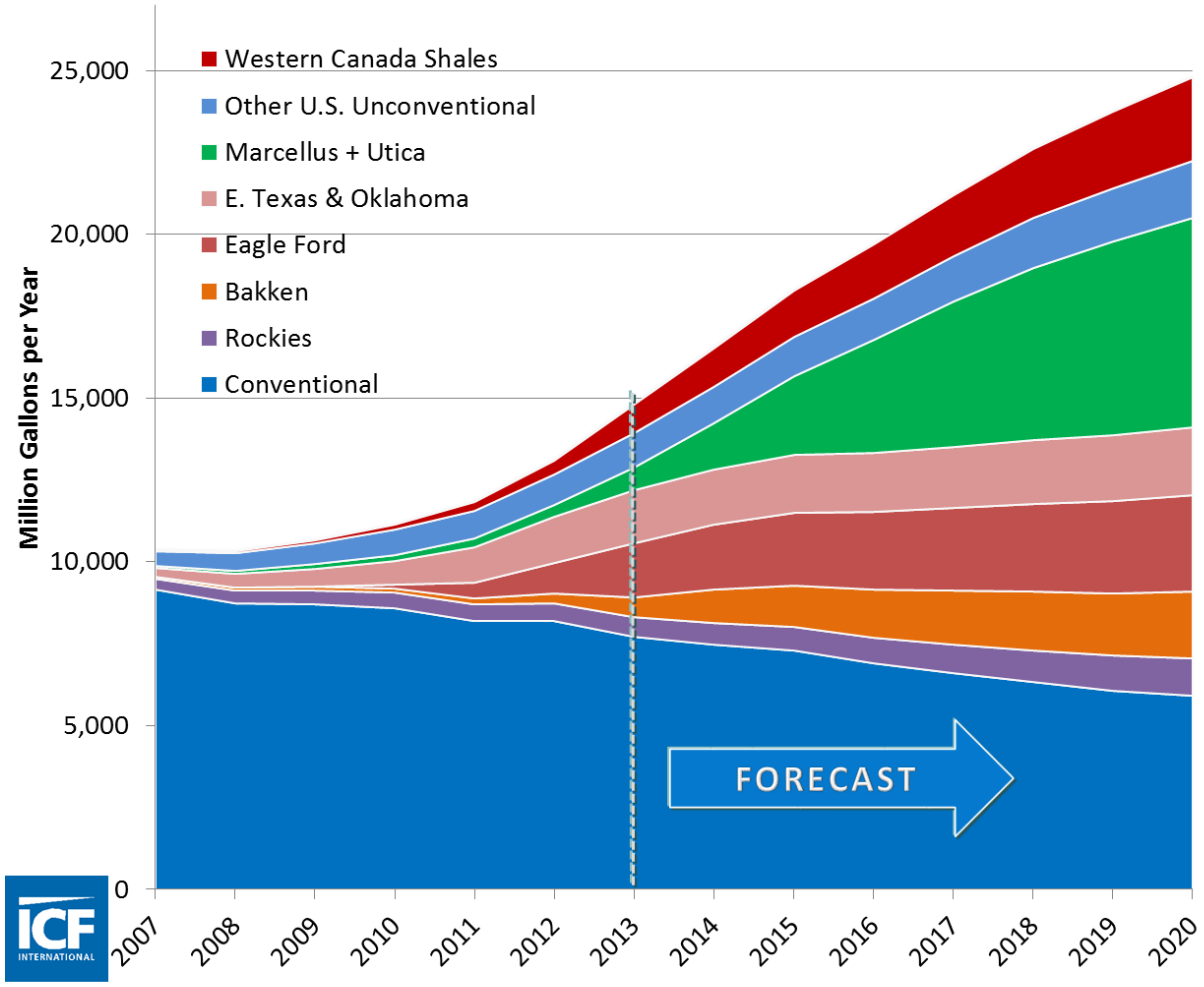
Company	Export Capacity Mil. Gallons/m	Location	Start-up	Cost ($Million) *Estimated
Targa	154	Galena Park, TX	2014, Q3	$240
Sunoco Logistics LP	51	Marcus Hook, PA	2014, Q3	$270
Occidental	96	Corpus Christi, TX	2015, Q1	$400
Sunoco Logistics LP	253	Nederland, TX	2015, Q1	$400*
Enterprise	63	Houston Ship Channel, TX	2015, Q1	$100*
Pembina Pipeline Co.	51	Prince Rupert, BC	2015, Q3	$320*
Boardwalk	128	Moss Lake, LA	2015, Q4	$700*
Enterprise	291	Houston Ship Channel, TX	2015, Q4	$500*
Phillips66	185	Freeport, TX	2016, Q3	$1,000
Sage Midstream	60	Longview, WA	2016, Q4	$275
Total Proposed	**1,332**			**$4,305***



* ICF estimates

Propane Production Growth

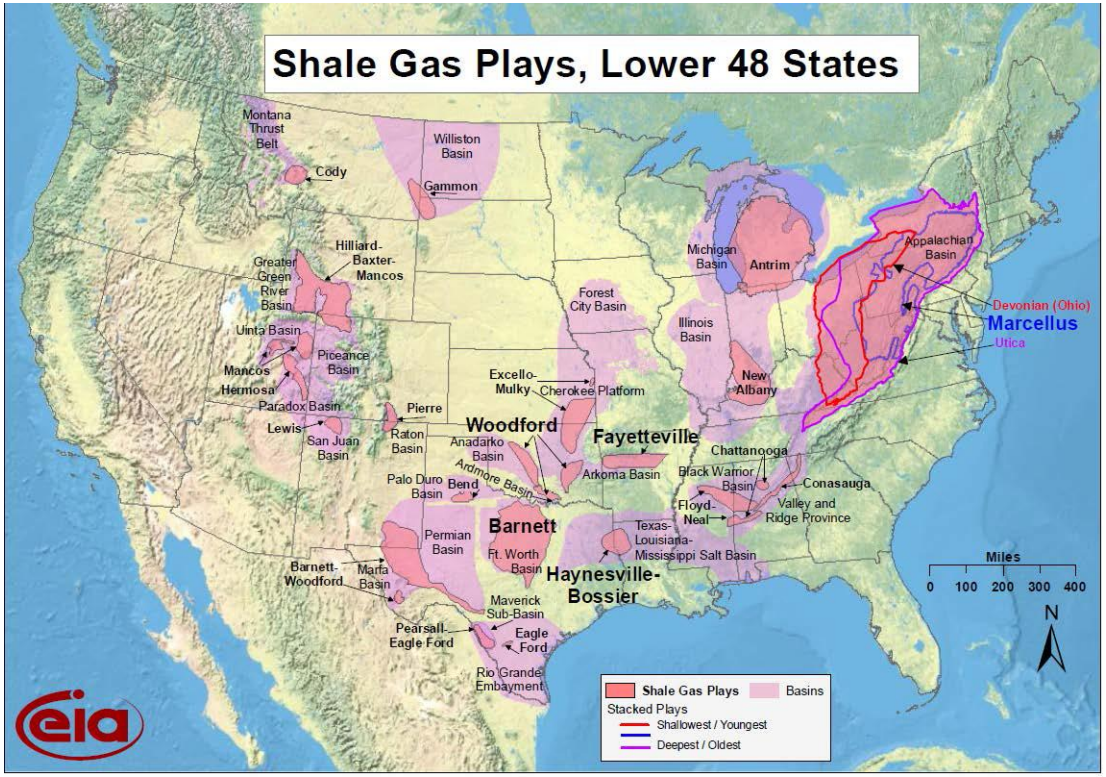
- ICF forecasts total North American production of propane from gas processing plants to grow from 14.8 billion gallons in 2013 to 24.8 billion gallons in 2020
- Production growth is broad-based:
  - Bakken (ND, MT) to produce 2 billion gallons of propane per year by 2020.
  - Marcellus/Utica production expected to increase from 650 million gallons in 2013 to 6.4 billion gallons in 2020



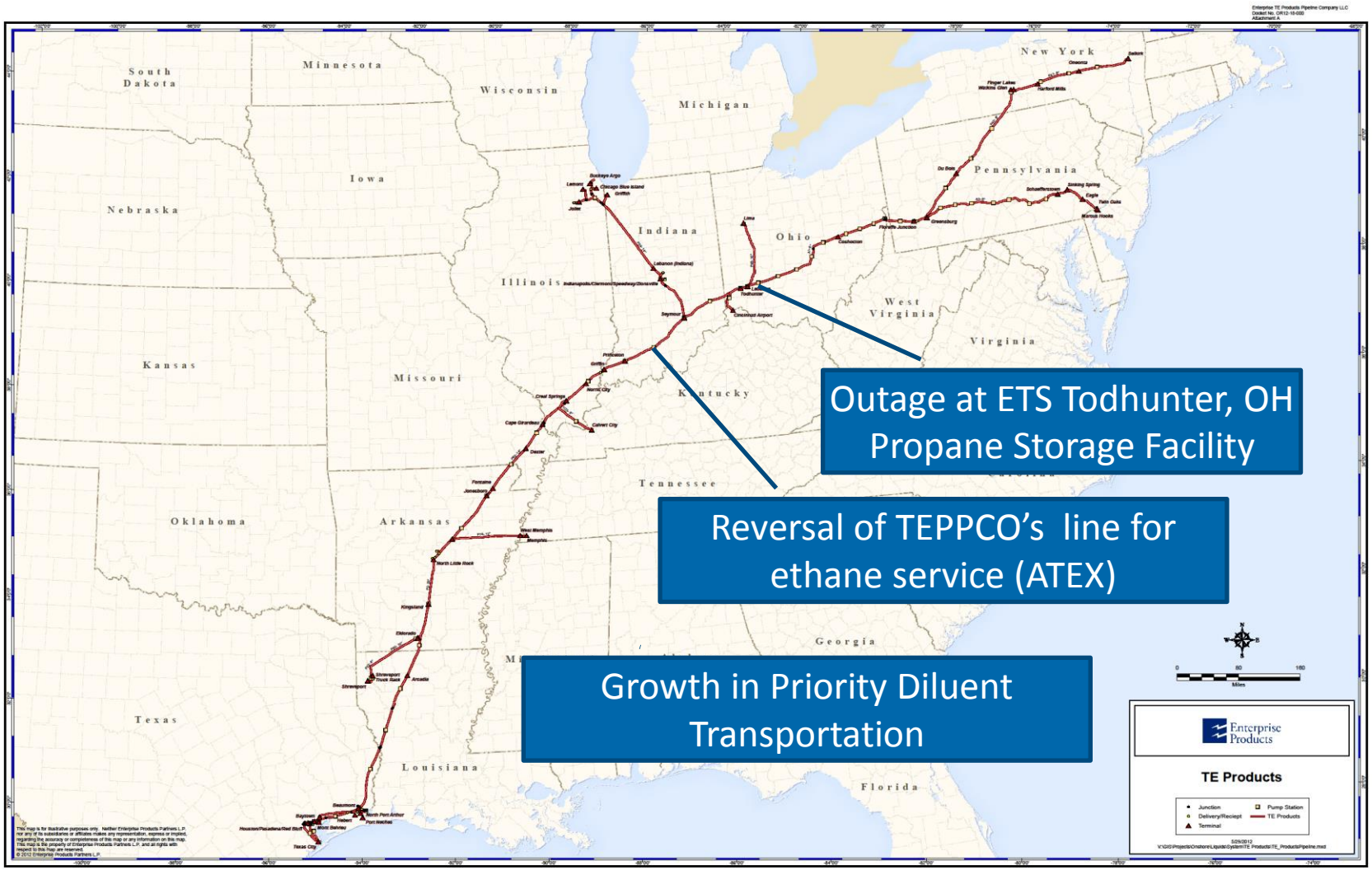
Source: ICF

Broad energy market trends reducing seasonal propane transportation capacity into the Midwest

- Propane Production and Exports
  - Moving propane to Mont Belvieu
- Ethane Production and Demand
  - Moving ethane to the Gulf Coast demand centers
- Canadian Diluent Demand
  - Rapid growth in demand to serve Alberta oil sands industry
  - High load factor load is displacing seasonally available capacity on liquids pipelines



Changes on the TEPPCO Pipeline Affecting Propane Services into the Midwest

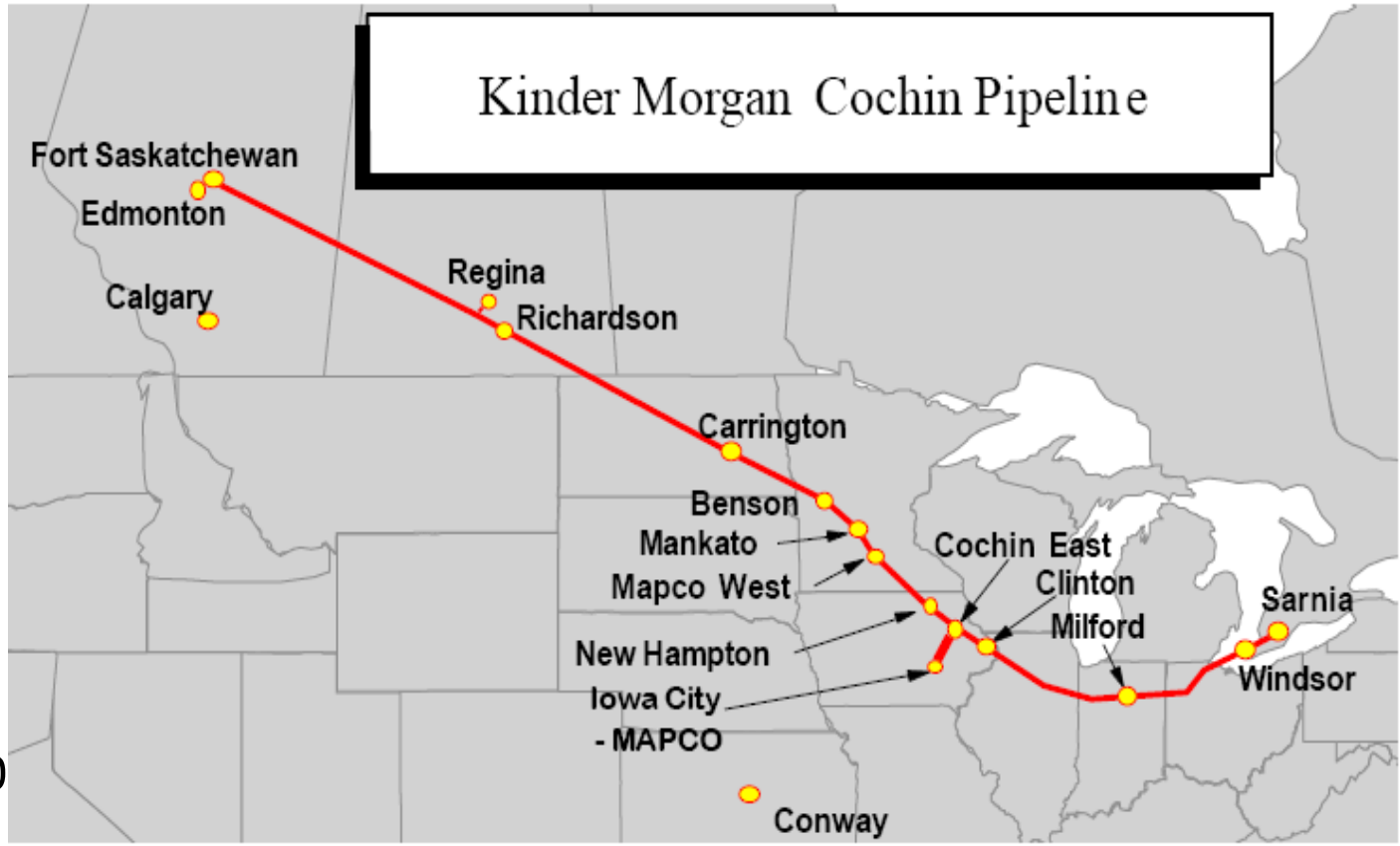


Source: "Answer of Enterprise TE Products Pipeline Company LLC to Complaint of Thrifty Propane, Inc.", *United States of America Before the Federal Energy Regulatory Commission, Thrifty Propane vs. Enterprise TE Products Pipeline Company LLC*. May 21, 2012. Appendix A

The Cochin Pipeline

- The Cochin Pipeline provides a direct link between
  - Alberta propane production.
  - Propane storage in Alberta.

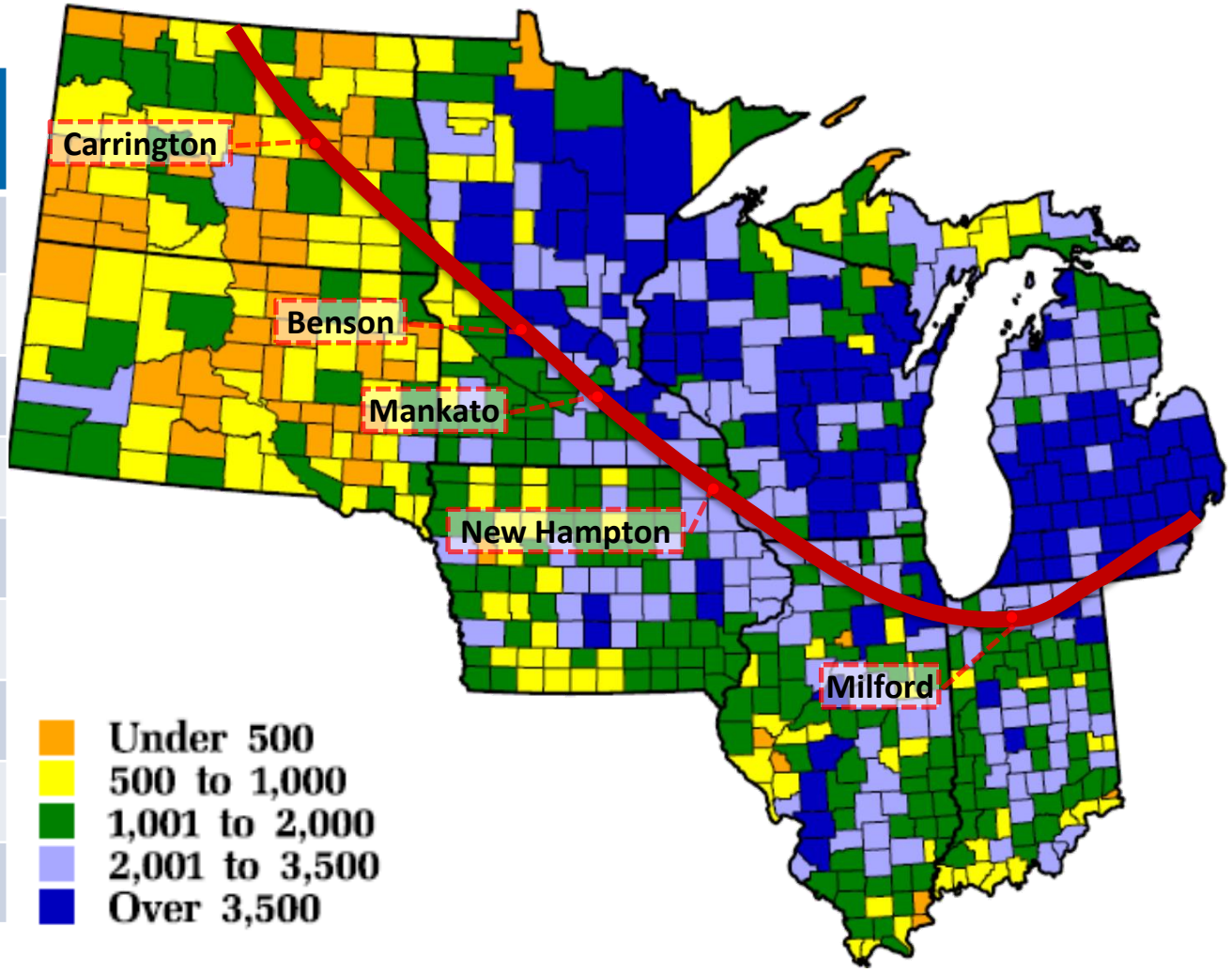
  And the U.S. Midwest propane market
- The Cochin delivered about 320 million gallons of propane to the Midwest in 2013



Source: Kinder Morgan

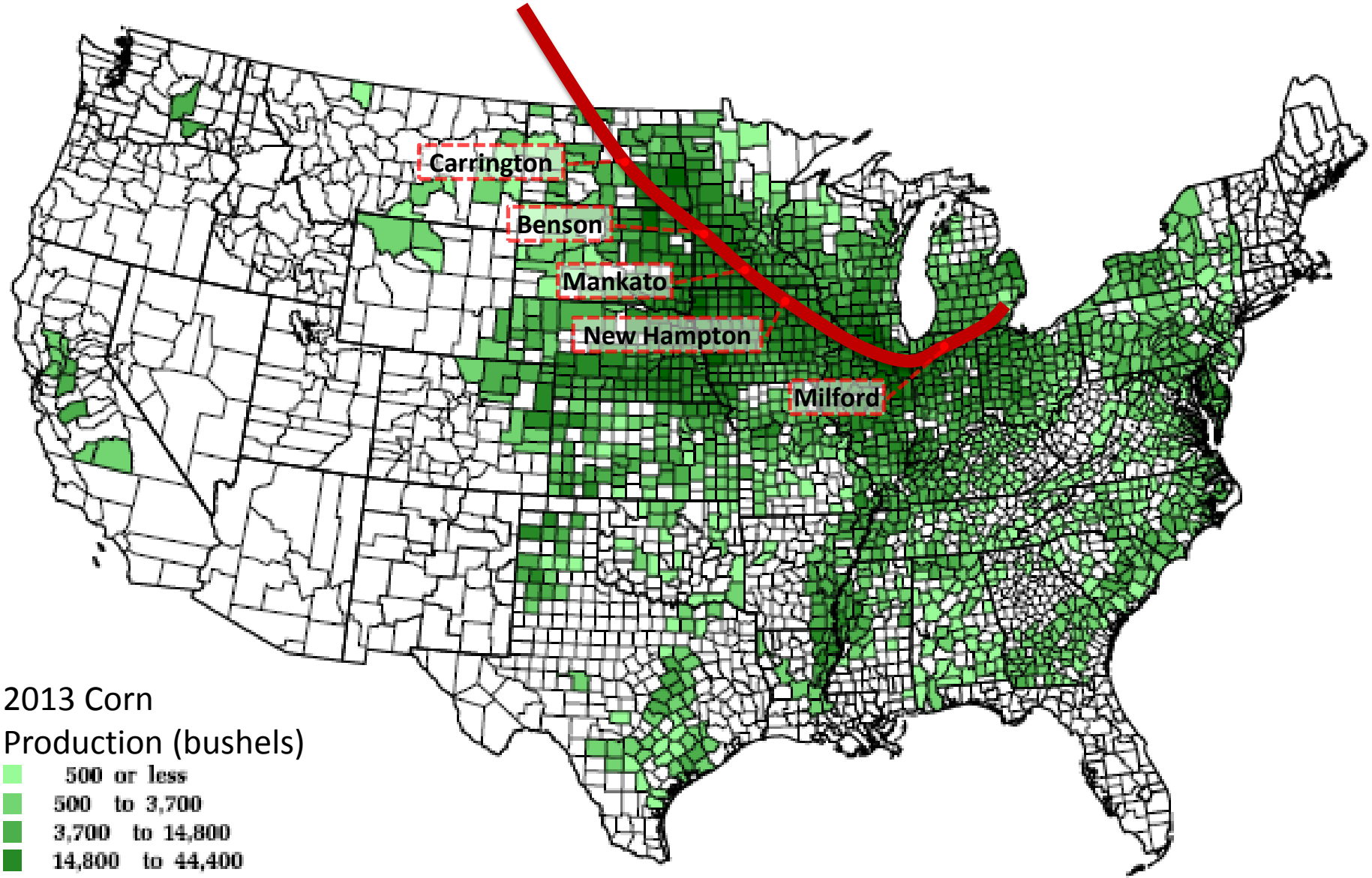
Cochin Supplies the Midwest Propane Country

State	House-holds	Market Share
IL	189,000	4.0%
IN	176,500	7.1%
IA	162,000	13.2%
MI	320,500	8.4%
MN	213,500	10.1%
ND	38,500	13.3%
SD	54,000	16.7%
WI	245,000	10.7%
Total	1,399,000	8.1%



Source: U.S. Census Bureau, Kinder Morgan, ICF

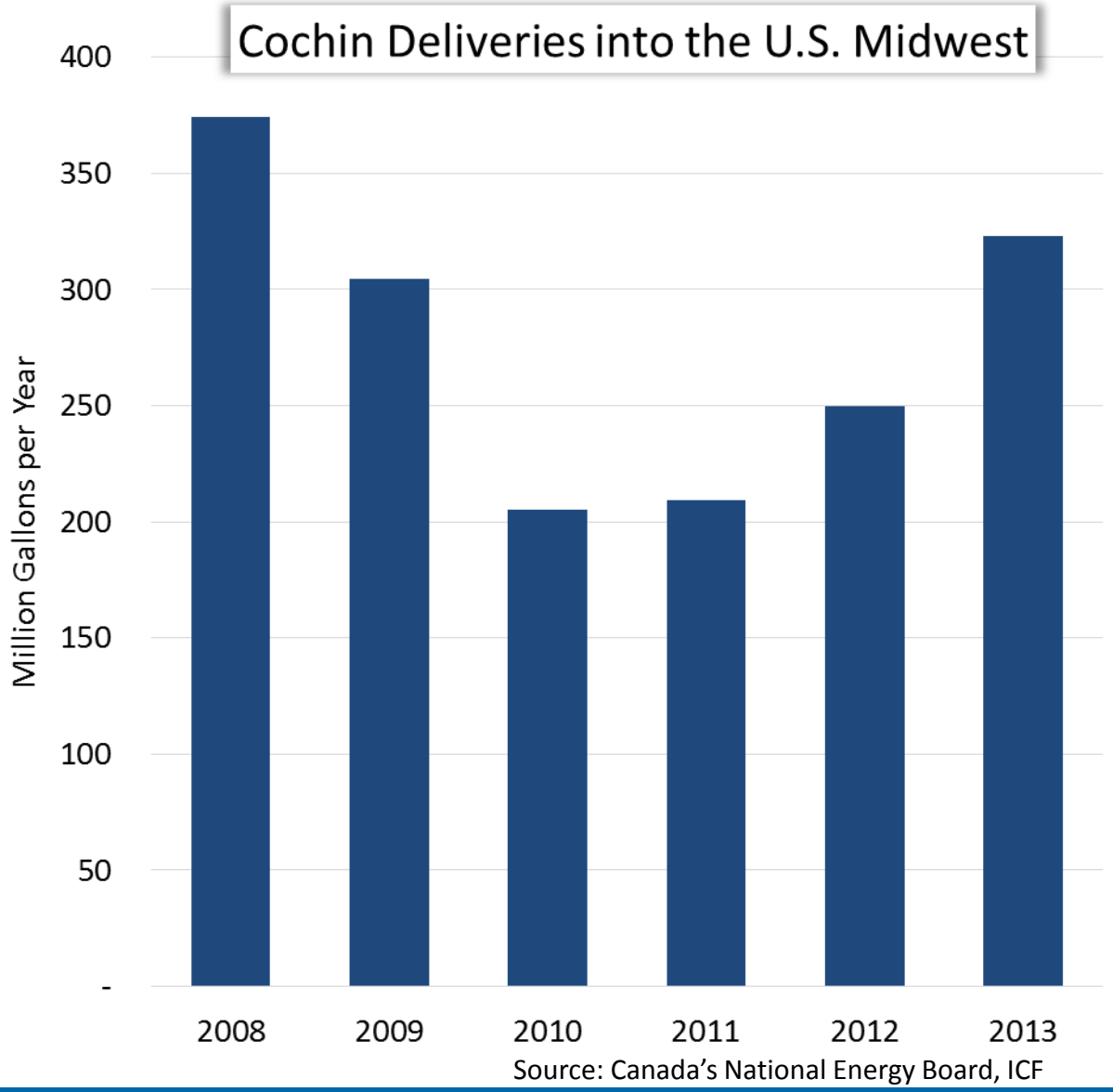
And the Heart of the Corn Producing Region



Source: U.S. Dept. of Agriculture, Kinder Morgan, ICF

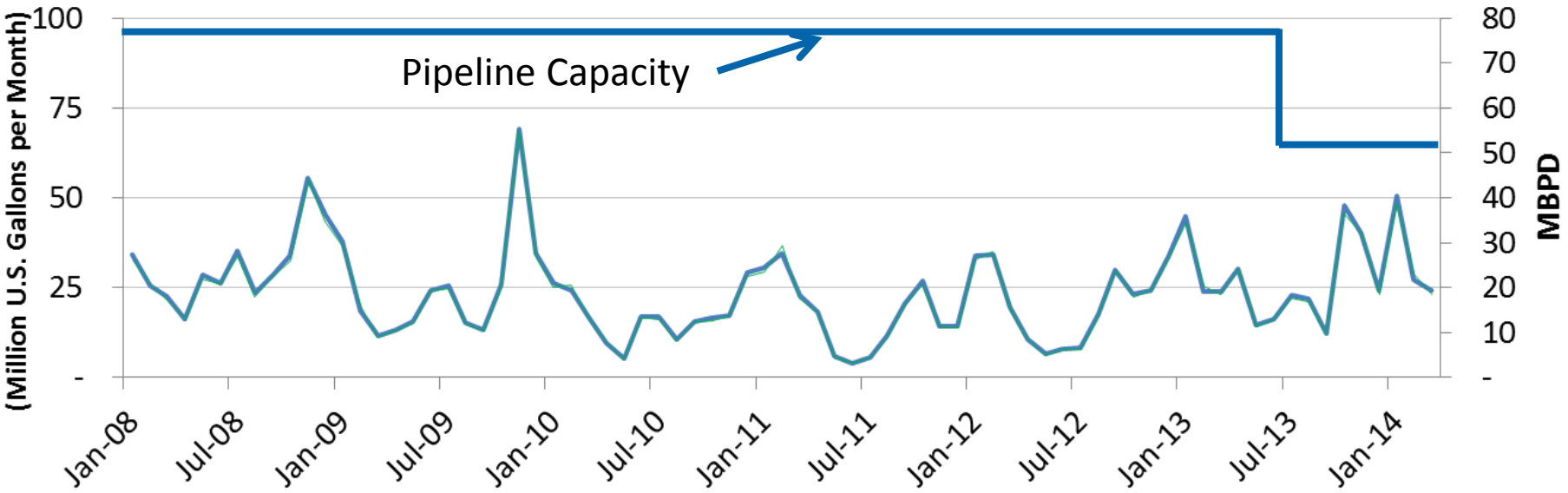
Deliveries on the Cochin System

- In 2008, annual capacity utilization was about 30%
  - Capacity of 78,000 barrels per day
- Shipments on the Cochin system dropped dramatically after 2009
- 2013 deliveries returned closer to historic norms
  - Normal 2012/2013 winter
  - Strong grain-drying demand in 2013



Source: Canada's National Energy Board, ICF

Deliveries on the Cochin System



Source: Canada's National Energy Board, ICF

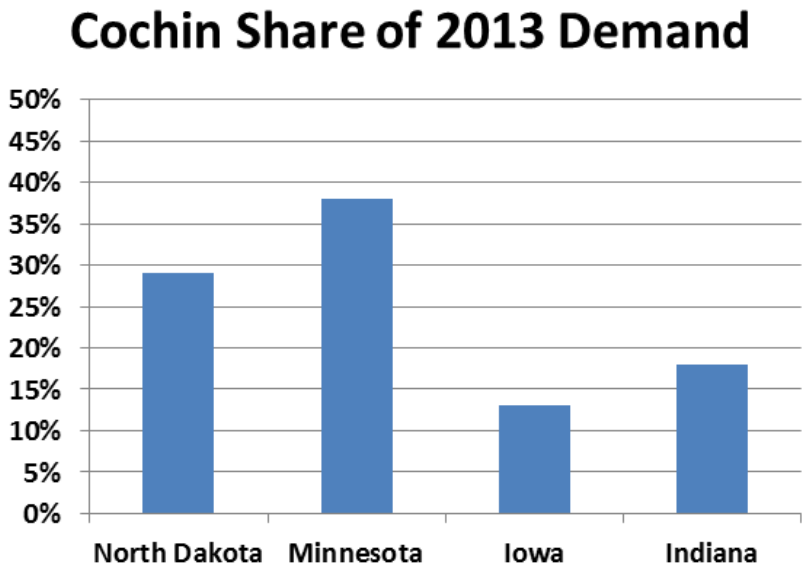
- The Cochin Pipeline provides direct access to the major NGL storage facilities in Alberta
  - 5.2 million barrels (220 million gallons) of usable propane storage capacity
- The combination of excess pipeline capacity, and direct access to major storage facilities, allowed the Cochin Pipeline to provide annual and seasonal swing delivery capacity directly into the Midwest

2013 Deliveries on the Cochin System

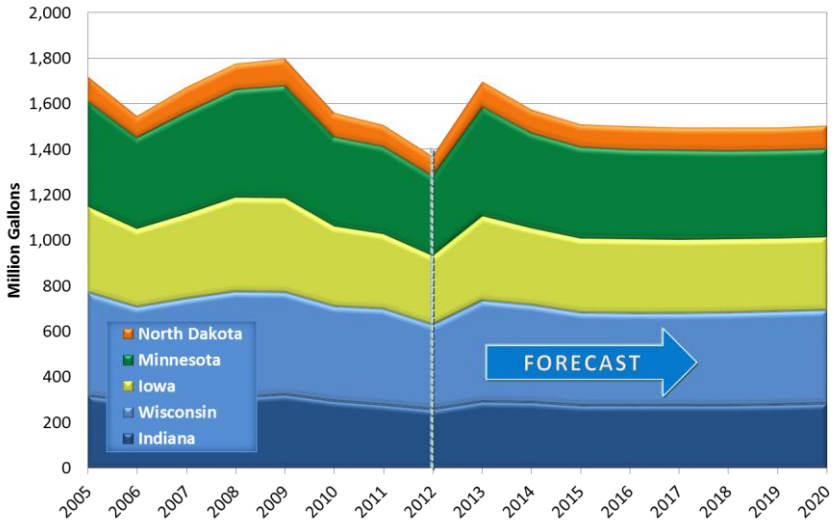
	Estimated 2013 Deliveries (million gallons)	Storage Capacity (million Gallons)	Loading Racks	Repurposed for Propane Service?
Carrington, ND	30	0.9	2	Possible - Truck
Benson MN	125	1.5	2	Yes-Rail
Mankato MN	50	0.7	2	Possible-Pipeline
New Hampton, IA	45	1.0	2	Possible - Truck
Milford, IN	50	1.5	2	Planned - Truck
Total	300	5.6		

- The Benson terminal is the only Cochin terminal currently slated for conversion to rail
- The storage facilities and loading racks at the other terminals are likely to remain available for propane service.

2013 Deliveries on the Cochin System



Source: NEB, ICF



Source: ICF

- Cochin is the largest single source of propane supply into North Dakota (29%) and Minnesota (38%)
  - And a major source of supply into Iowa (13%) and Indiana (17%)
- While the Cochin has no terminals in Wisconsin, many of the marketers in the southern half of the state rely on Cochin deliveries into Minnesota

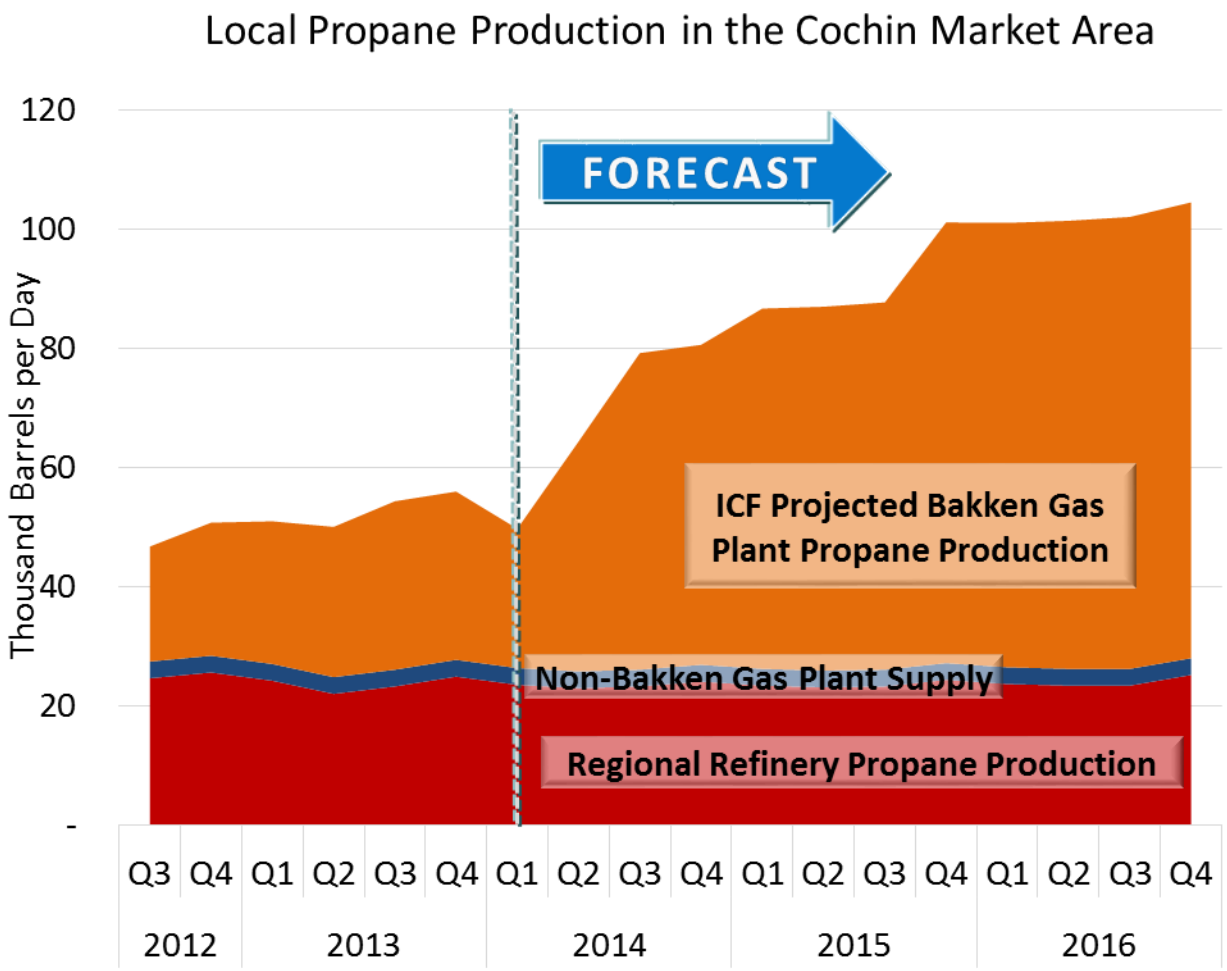
Impacts of Cochin Pipeline Reversal

- Loss of supply to Midwest marketers and consumers.
- Loss of swing capacity to meet grain drying and cold weather demand
- Loss of access to Canadian storage
- Loss of supply diversity
- Increased demand on other supply options

The Alternatives to the Cochin Propane Pipeline: Production, Pipelines, Trains, and Trucks

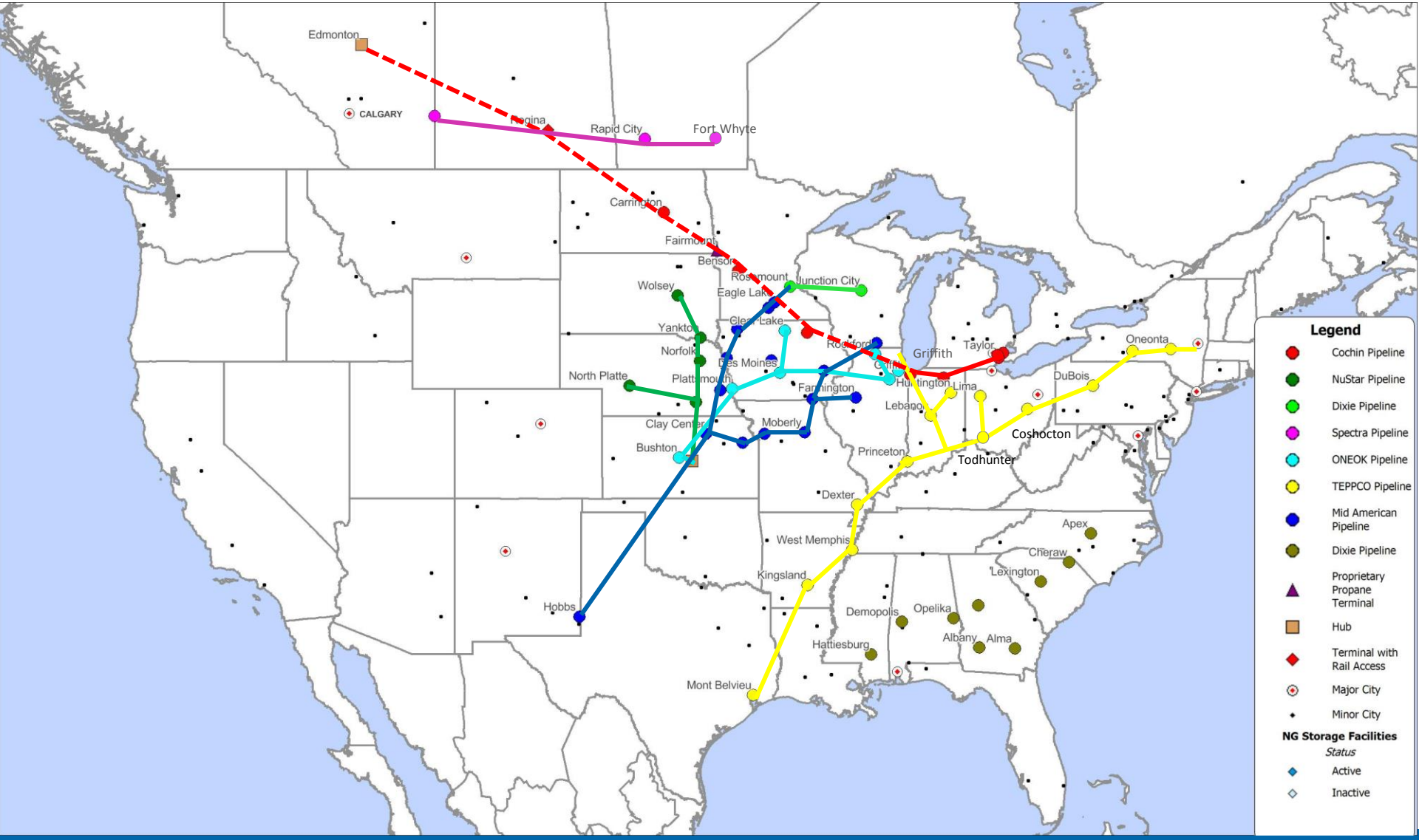
Cochin Market Area Production

- Rapid growth in Bakken production will displace some Cochin volumes
- A long haul to Cochin market centers means reliance on rail
  - 242 miles to Carrington
  - 614 miles to Mankato
  - 830 miles to New Hampton
- Bakken production lacks the flexibility of the Cochin to meet swings in demand
  - Lack of storage capacity



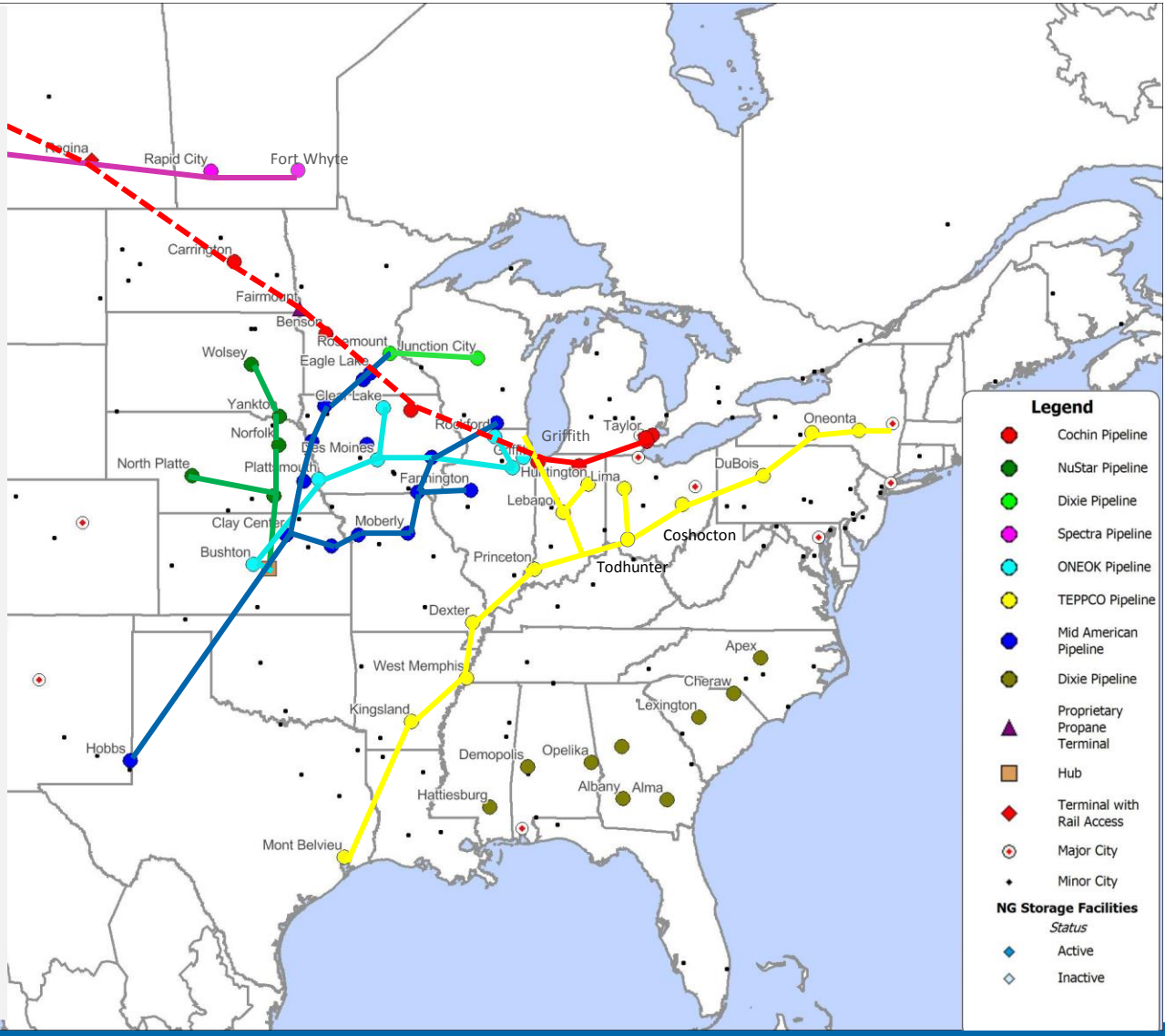
Source: EIA, ICF

Propane Pipelines and Terminals in the Cochin Market Area



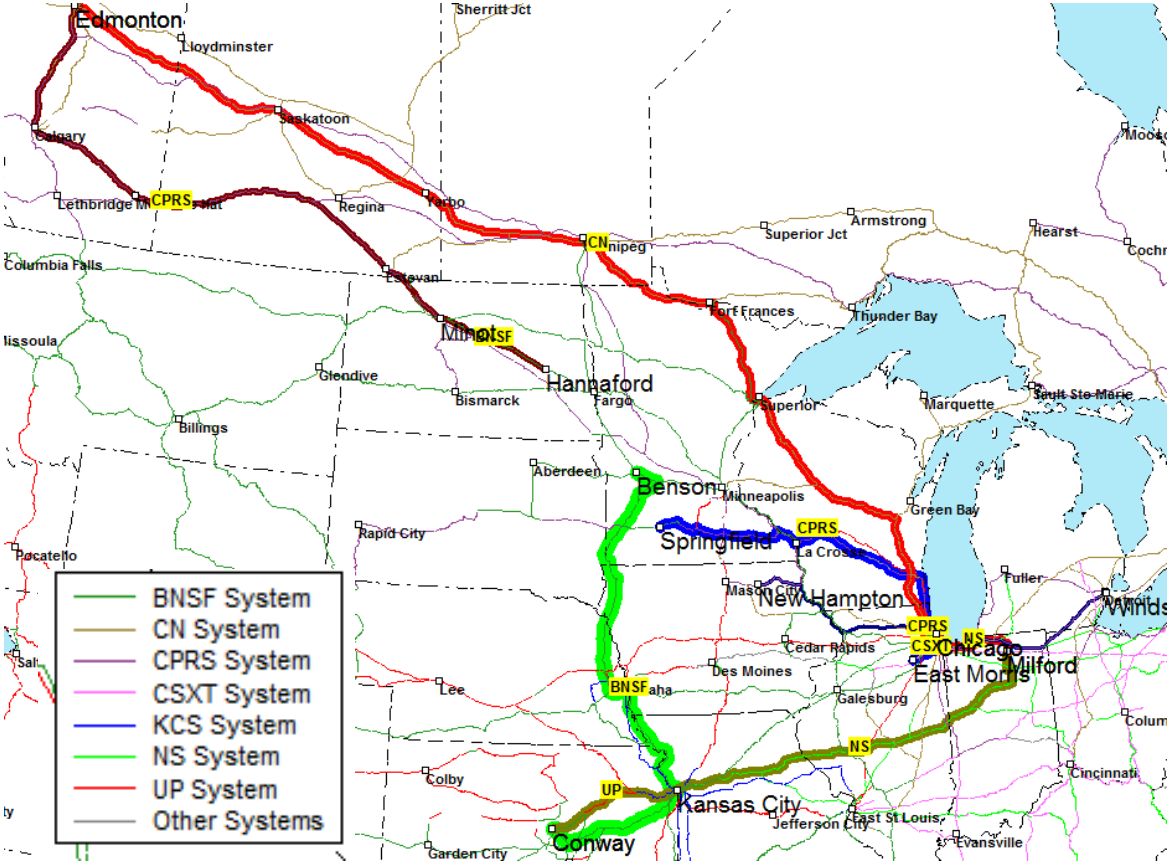
Propane Pipelines and Terminals in the Cochin Market Area

- Additional capacity available during the summer and shoulder months.
- But limited additional capacity for seasonal or peak period demands
- Pipeline (and major supplier) winter allocation ratios are declining.
  - 2 to 1 ratios now common



The Rail Option: Can Rail Replace the Cochin?

- 65 new rail car deliveries per day (peak periods)
- 900-1,200 dedicated rail cars
- Requirements for rail to deliver Cochin volumes
  - Propane capable rail cars
  - Rail system capacity
  - Rail loading capacity
  - Unloading capacity in the Cochin Market Region



Source: Hellerworx, ICF

Rail Loading Capacity from Alberta Propane Storage will be Constrained in the Near Term

- The Cochin Pipeline is interconnected with major propane storage facilities in Alberta
- Propane rail loading capacity at the primary propane storage facilities in Alberta has not been expanded to accommodate increased volumes
  - Keyera has announced construction of an $85 million rail terminal near Fort Saskatchewan to optimize propane movement out of western Canada
    - Targeted start up for the second half of 2015
  - Other major rail expansion projects expected on-line starting in 2016
- The lack of additional loading capacity limits the ability of the Alberta storage operators to boost shipments during peak periods
  - Some rolling stock will be used for propane storage to boost shipments during peak period
  - Propane may be shipped to the Gulf Coast during the summer instead of into storage.

Other Sources of Supply by Rail

- Most of the Bakken production growth will move by rail.
  - Tioga Gas Plant Expansion
    - *32 to 44 rail cars per day total*
    - *15 – 20 propane rail cars per day (est.)*
- The Alliance Pipeline will transport additional Alberta NGL's to Aux Sable, Illinois
- Facilities will have limited on-site storage capacity and will look first to high load factor customers
  - Large block rail shipments to Conway or the Gulf Coast

Market Area Propane Rail Delivery Capacity

- ICF estimates $50+ million in new investment in rail terminals and rail cars
  - 8-10 new or expanded rail terminals with 5+ million gallons of storage
- New terminals
  - Cochin Benson terminal restructured as a rail terminal
    - Capacity about 40 million gallons per year
  - CHS adding five new propane rail terminals in the Cochin Market Area
    - Major terminals at Hannaford, ND and Rockville Minnesota
  - Individual marketers adding or reactivating small private rail terminals
- The combination of new rail terminals, with increased utilization of existing rail terminals in the region should be sufficient to meet increased rail demand

Rail Reliability Concerns

- Rail delivery scheduling is much less reliable than pipeline delivery.
- Rail scheduling reliability goes down during bad weather and peak demand periods.
  - Cold weather reduces rail equipment efficiency
    - *Slower speeds*
    - *Shorter trains*
    - *Less efficient switching and handling*
- Congested rail capacity and peak rail demand periods decrease the efficiency of manifest rail service.

Conclusions of Rail Analysis

- Sufficient rail cars should be available to meet the demand, although during peak periods, suppliers may need to pay a premium to divert rail cars from other applications
- The rail network should be sufficient to handle the additional volumes being diverted to rail
  - Most propane rail shipments will move in the manifest rail network
  - The manifest rail network suffers from significant reliability and scheduling issues that will get worse during peak demand periods and cold weather periods
- Rail loading capacity at Alberta propane storage facilities is unlikely to be sufficient to meet peak demand during the 2014/15 winter, and may be insufficient to meet peak demand during the 2015/16 winter
  - Effectively limiting access to Alberta storage
- Destination rail terminals are in existence or being constructed in proximity to the former Cochin terminals that should be sufficient to handle the 2013/14 winter volume levels
  - However, not all of the terminals may be fully operational by the 2014/15 winter

Truck Transport

- When pipelines are constrained and rail is unavailable or unpredictable, long haul truck transport provides flexibility to meet requirements
- Transport companies and marketers in the Cochin region are expanding transport fleets.
  - Hiring drivers has been difficult
- Transport efficiency during a supply emergency is dependent on hours of service waivers
  - 30 percent increase in utilization with waivers
- Loading delays at terminals substantially increased costs and reduced transport efficiency this winter

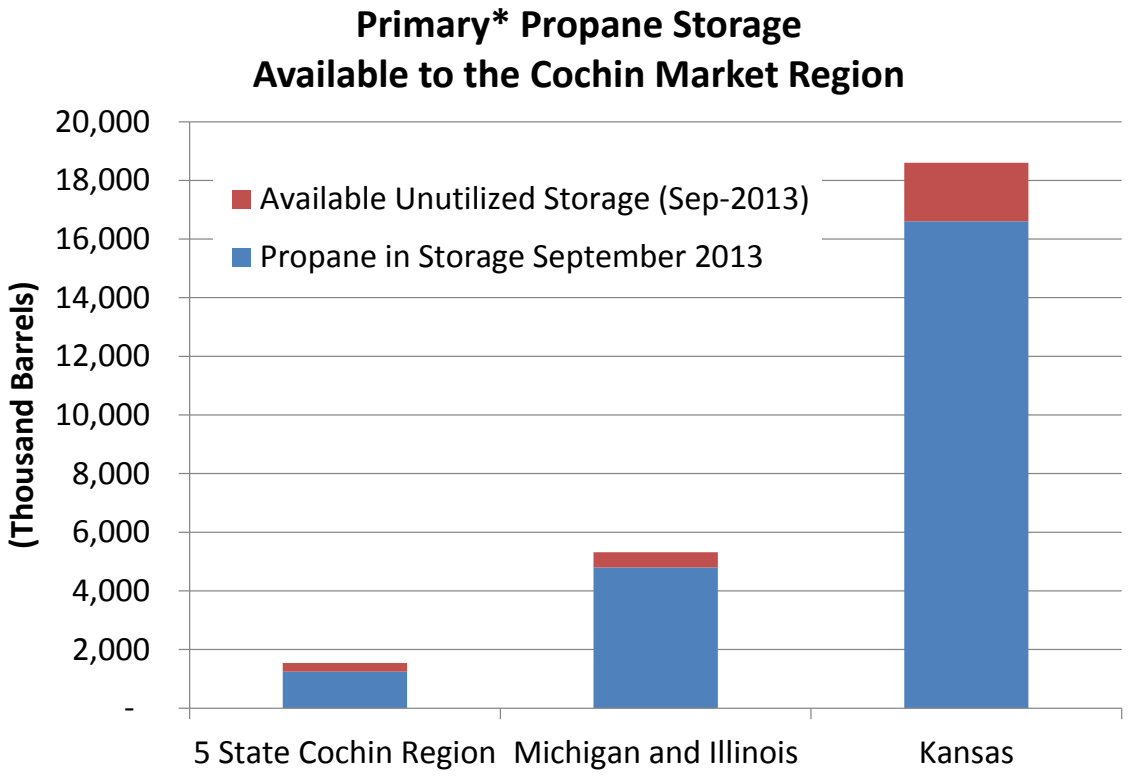
Truck Transport Cost Per Gallon*

	Source of Supply		
	Tioga, ND	Conway, KS	Windsor, ON
Carrington	$ 0.12		
Benson	$ 0.21	$ 0.37	
Mankato	$ 0.29	$ 0.35	
New Hampton	$ 0.39	$ 0.28	$ 0.28
Milford	$ 0.53	$ 0.37	$ 0.09

* Including depreciation and O&M, but excluding driver waiting time (if any)

Primary Propane Storage in the Cochin Market Region

- Primary storage in the five state Cochin market region could meet one week of peak demand
  - 2013 underutilized storage capacity would have met one day of demand
- In the broader market region, storage could meet three weeks of peak demand
  - Underutilized storage capacity in 2013 would have met four days of demand



* Includes Bulk Terminal, Gas Plant, and Refinery Storage, but not Pipeline or Rail Terminal Storage

Source: EIA

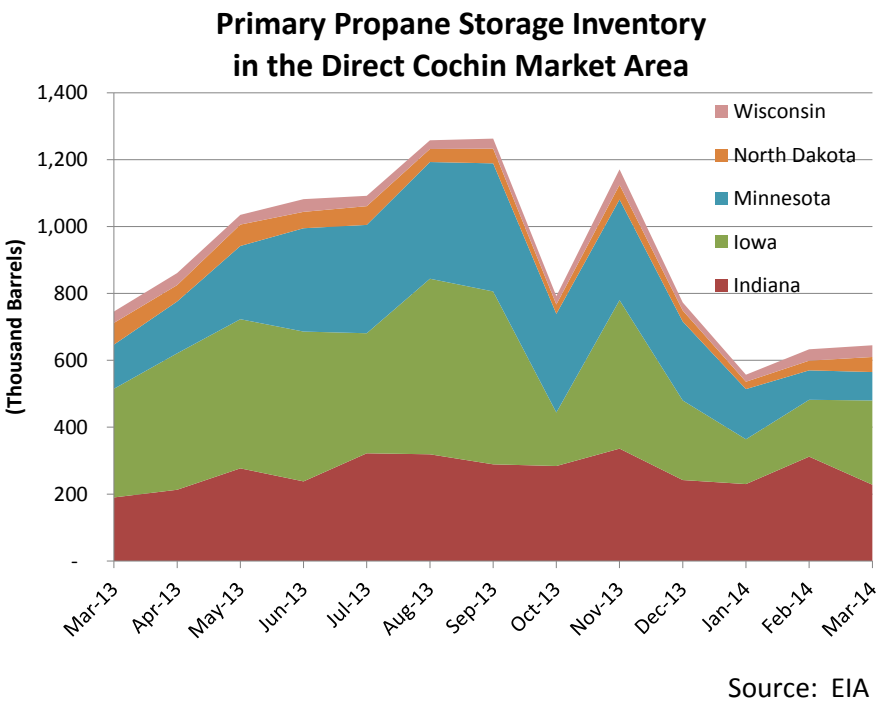
Primary Propane Storage in the Cochin Market Region

Propane Storage At Refineries, Gas Plants and Bulk Storage Facilities
(Thousand Barrels)

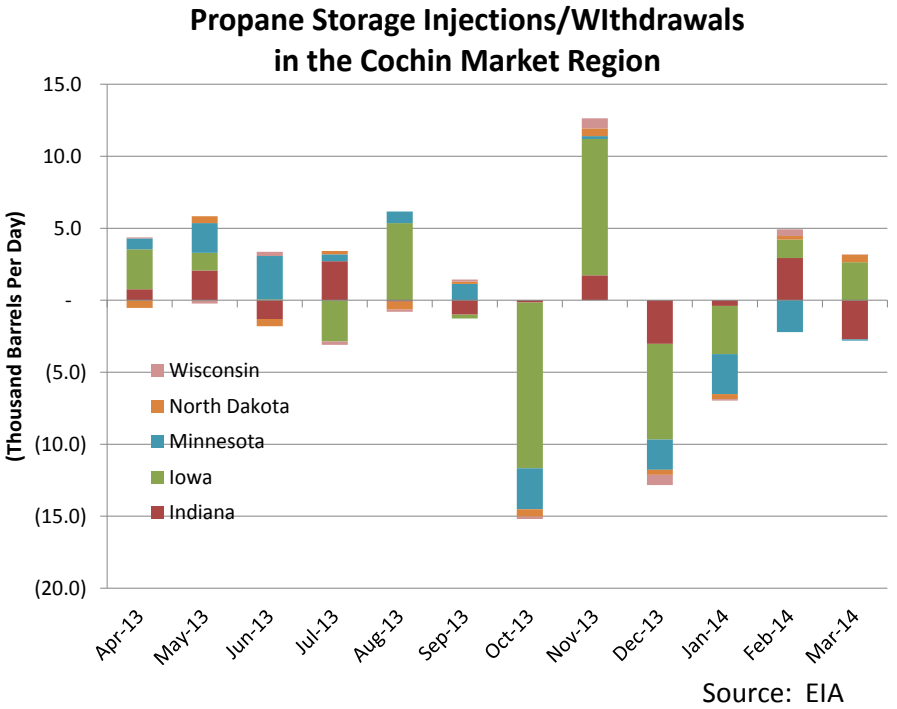
	Maximum Propane in Storage (2004-2014)	Peak 2013 Storage	Available Unutilized Storage (Sep-2013)
Total U.S.	**71,689**	**64,651**	**7,038**
Total PADD 2	**27,383**	**24,444**	**2,939**
Direct Cochin Market Region	**1,543**	**1,355**	**188**
Indiana	503	336	167
Iowa	530	525	5
Minnesota	394	383	11
North Dakota	70	65	5
Wisconsin	46	46	-
Other Significant States in PADD 2			
Kansas	18,605	13,323	5,282
Michigan	4,113	3,242	871
Illinois	1,203	953	250
South Dakota	32	24	8

Source: EIA

Primary Propane Storage In The Cochin Market Region



Source: EIA



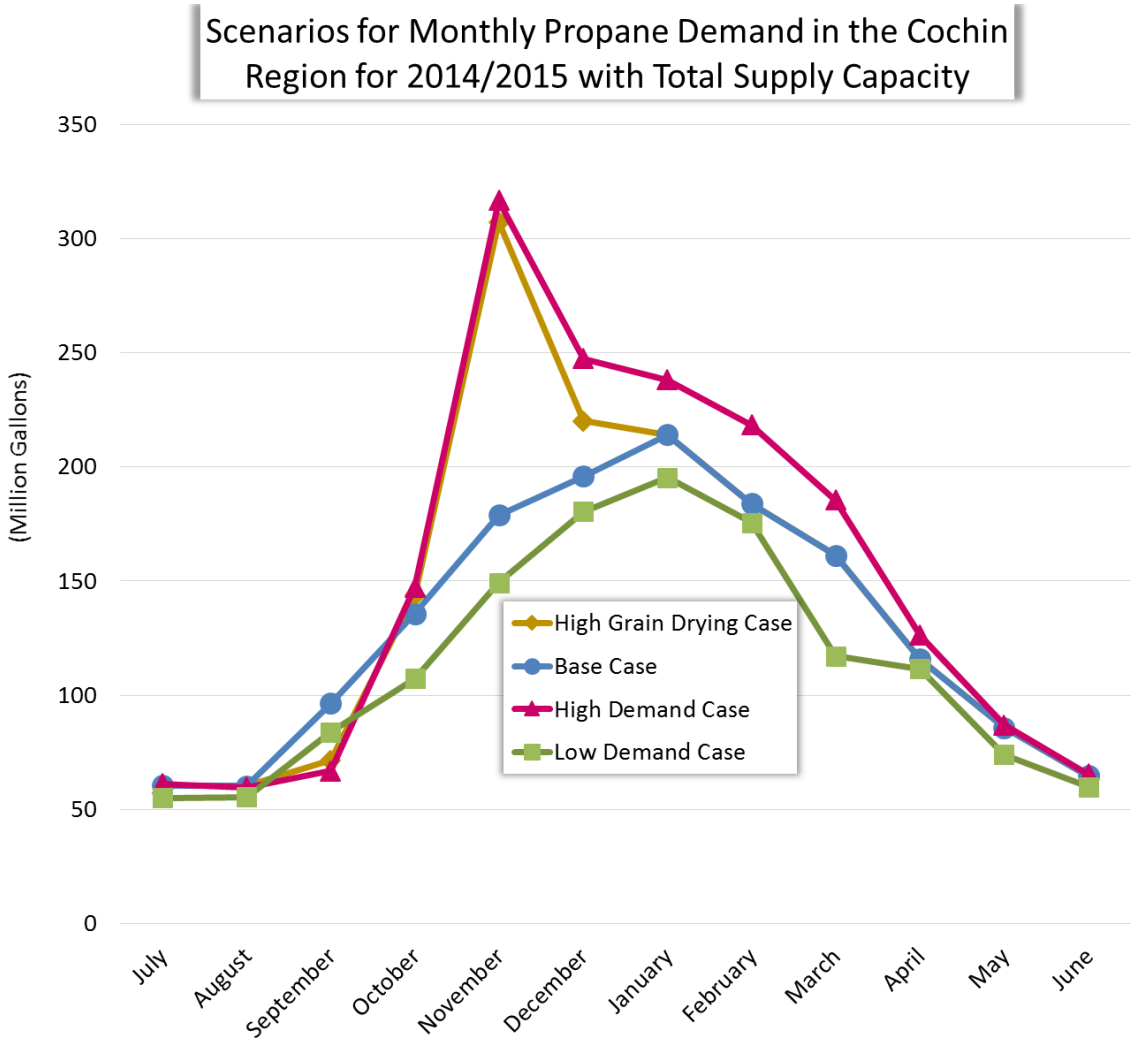
Source: EIA

Marketer Storage

- Industry estimates suggest marketer storage in the Midwest is about 8 to 10 days of peak winter demand
  - Marketer storage provides operational flexibility, not seasonal storage capacity
- Loss of Cochin, and increased reliance on rail, increases the amount of operational storage capacity required
- At current market conditions, storage additions cost about $3-$4 per gallon of storage for expansions at existing plants, and $5-$6 per gallon of storage for greenfield storage developments
  - The current order backlog for new storage tanks is around 15 months

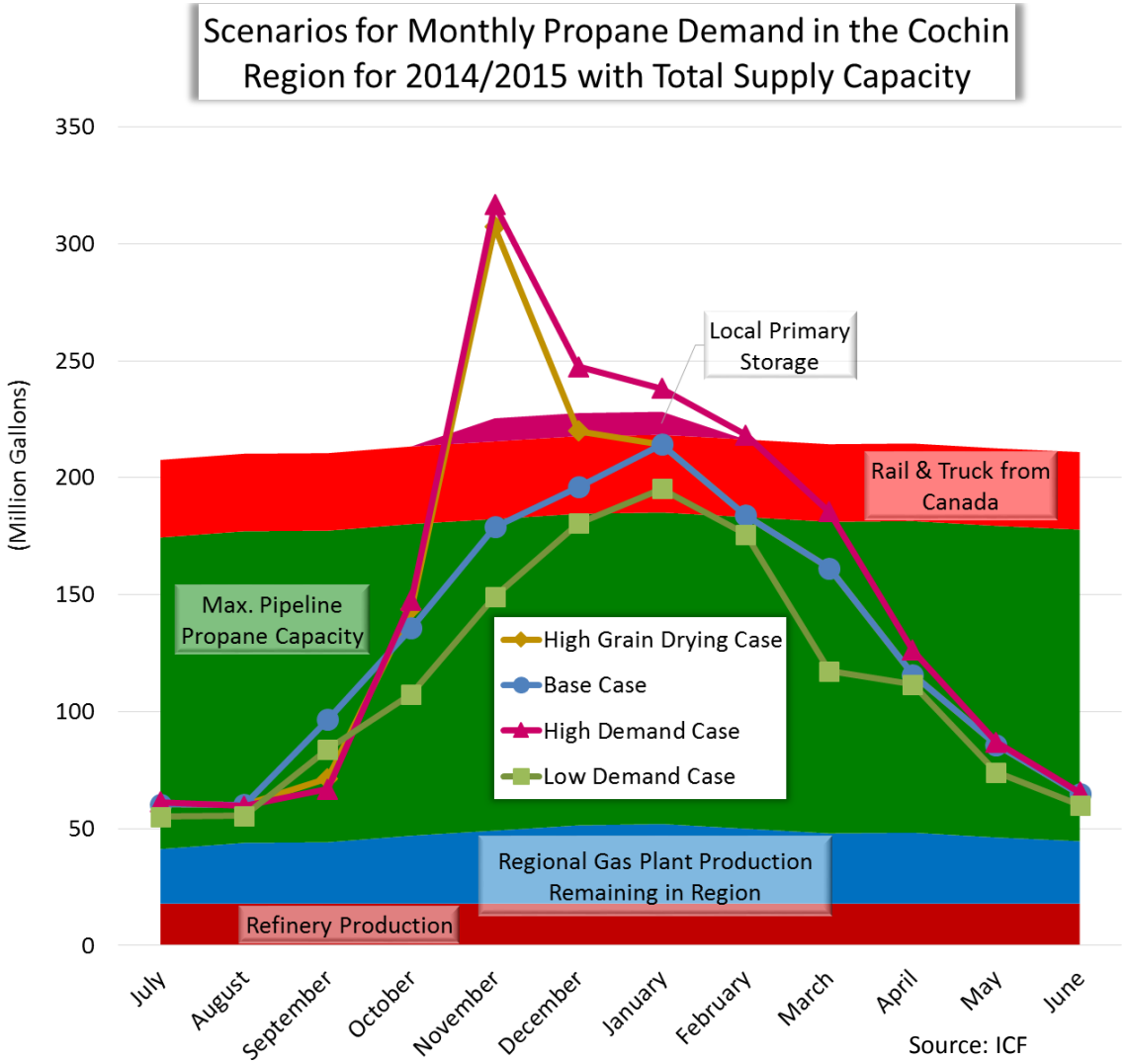
2014/2015 Propane Year Demand Scenarios

- Low Demand
  - Warmer than normal weather
  - Drier than average grain harvest)
- Base Case Demand
  - Normal weather
  - Average grain drying
- High Grain Drying Demand
  - Very wet & late (2009) harvest
  - Normal winter weather.
- High Demand
  - Very wet & late (2009) harvest
  - 2013/14 winter weather.



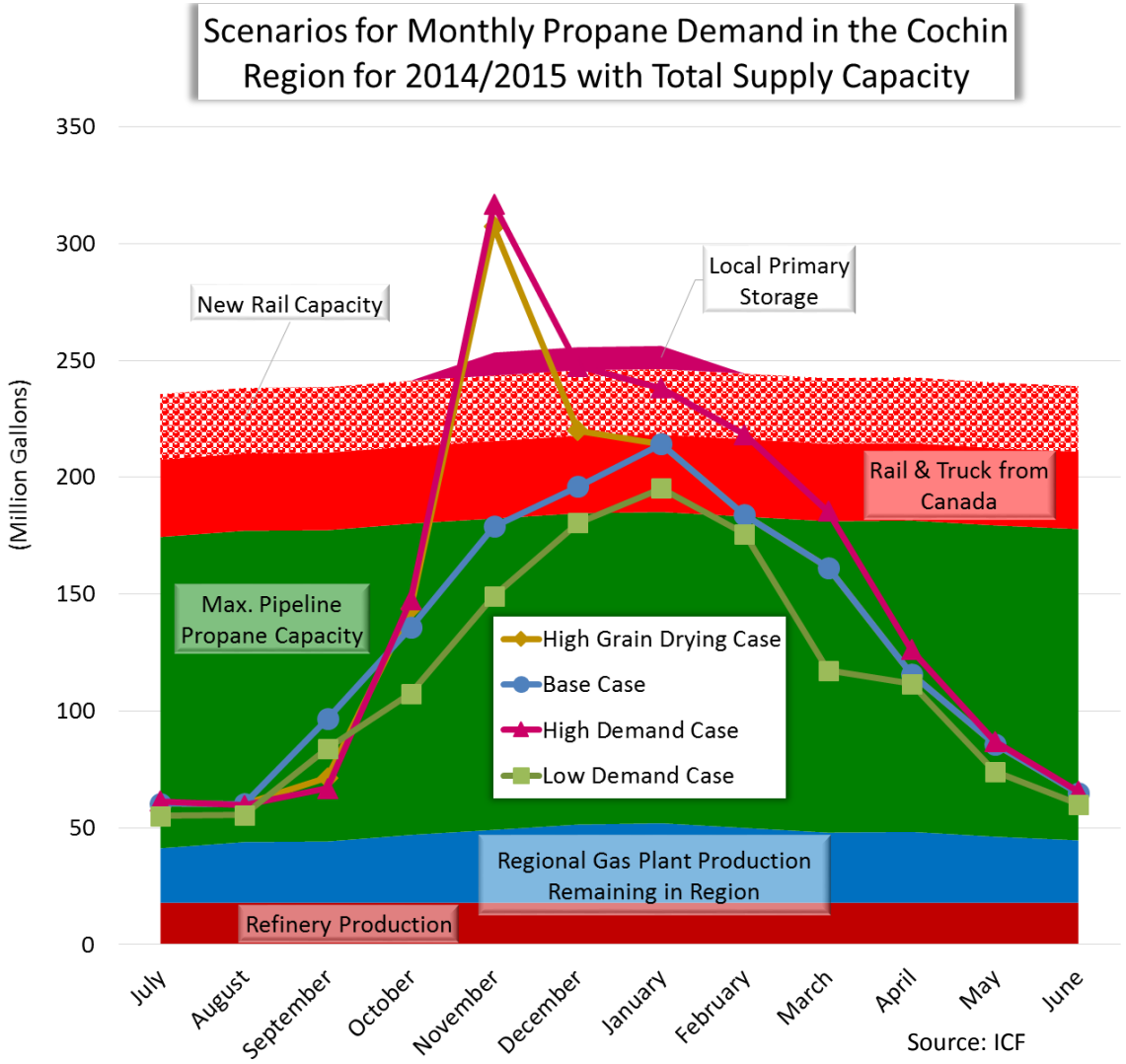
2014/2015 Propane Supply/Demand Balance Without Cochin

- Majority of requirements will be met with existing pipeline systems:
  - MAPL
  - ONEOK North
  - TEPPCO
- Canadian supplies will continue to enter the region via rail and truck



2014/2015 Propane Year Demand Scenarios and Potential Propane Supply

- New regional capacity will be sufficient to meet cold winter weather, but not peak grain drying demand
  - Rail transport from the Bakken and Canada
  - Truck transport from Conway
- If everything works as designed
  - Unlikely during a peak demand event



Conclusions

- The reversal of the Cochin Pipeline does not change the broad propane supply picture.
  - Canadian supply currently transported to the Midwest on the Cochin Pipeline will continue to be available to the Market.
  - Propane supply from Canada, the Bakken, and other regions will continue to grow.

  As a result, the loss of the Cochin is a transportation issue rather than a supply issue.

- The Cochin currently provides much of the swing capacity to move propane into the upper Midwest.
  - Significant excess capacity to meet peak requirements
  - Direct access to major storage capacity in Alberta

  Replacement of the Cochin requires replacement of the flexibility provided by the Cochin, as well as the supply delivered by the Cochin.`

- The supply options currently available to replace the Cochin lack the flexibility to meet peak requirements provided by the Cochin

The Propane Market Environment Has Changed

- Propane production growth means that supply will be abundant.
  - However, it may not be where it is needed.
  - And domestic consumers will have to compete with international shippers.
- Summer storage builds at the major supply hubs will no longer be automatic.
- Access to swing supplies during the winter is becoming more difficult due to changes in transportation infrastructure.
- If marketers don't know where their winter supply is coming from, it probably won't be there when they need it.

Near Term Implications

- Propane markets will adapt to the loss of the Cochin. However, the transition will take time, and the market is not yet ready to replace the full functionality of the Cochin
- For 2014/15 the new infrastructure needed to replace Cochin will not be fully in place.
  - A high grain drying/cold winter like 2013/14 will severely stress the supply infrastructure
  - The degree of stress will depend on storage inventory levels throughout the Midwest at the start of the grain drying season.
- By 2015/16, transportation markets should be capable of replacing the Cochin, but continuing limits on access to Alberta storage may still create significant issues.

Longer Term Implications

- While the market will adapt to the loss of the Cochin pipeline, the energy industry will not replace the flexibility provided by the pipeline
  - Spare capacity to meet seasonal swings in demand
  - Direct access to Canadian propane storage.
- As a result, loss of the pipeline will lead to long term increase in propane supply and price volatility and uncertainty in the Cochin market region.
- The short term supply uncertainty, and long term increase in supply and price volatility and uncertainty will change the way that many marketers plan for supply in the region.

Changes in Marketer Supply Strategies to Adapt to the Loss of the Cochin

- Changing attitude about supply planning
  - The increase in propane export capacity means that summer storage builds will no longer be automatic, and storage in inventory at Mont Belvieu and Conway may be held by exporters.
  - "If you don't know where your winter supply is coming from, it probably won't be there when you need it."
- Building additional flexibility into supply plans
  - Adding storage capacity
  - Multiple sources of supply, particularly for rail
  - "Don't put all your eggs in one basket"
- Avoiding over-reliance on the pipelines:
  - The pipelines are likely to be constrained more frequently than in the past
  - "All of my competitors will be waiting in line at the pipeline terminal"
- Planning on going further for supply
  - "If I have to go to Conway, or further, I will"

Could Last Winter Happen Again?

1) Crop drying
2) Cold weather
3) Propane exports
4) Capacity outages and constraints
5) Canadian demand and inventory
6) Cochin Pipeline
7) The weather in Europe
8) Propane storage inventories

Will it Happen this Winter?

- Grain Drying
  - Corn acreage is down somewhat
  - The corn planting season is equal to or slightly behind last year
- Propane inventories
  - Still lower than 2013
  - But the inventory build has been faster than 2013
    - *15.5 million barrels since March, vs. 5.3 million barrels in 2013.*
- Propane export capacity
  - Growth will be slower than 2013
- The Cochin Pipeline is gone

Planning for the 2014/15 Winter

- Physical system changes will be difficult to implement prior to the 2014/15 winter if arrangements are not already in place
  - 24 month waiting time on new rail cars
  - 15-18 month waiting time on new storage tanks
- Marketer Options
  - Build winter allocation on the pipelines and with major suppliers
    - *Encourage summer fills*
    - *Search for additional summer load*
    - *Fill storage off of the pipeline*
  - Diversify rail supplies to minimize rail uncertainty
  - Contract with major suppliers with diversified supplies
  - Hold and fill physical storage capacity at Conway and other locations

A Detailed Look at the Impact of Cochin Pipeline Reversal on Propane Markets in the Midwest

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By:
Michael Sloan
Principal
ICF International
Msloan@icfi.com
703-218-2758

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Presented by:
Michael Sloan
ICF International
9300 Lee Highway
Fairfax Virginia
22031