

Liquids From Shales

11th Annual Tulane Engineering Forum

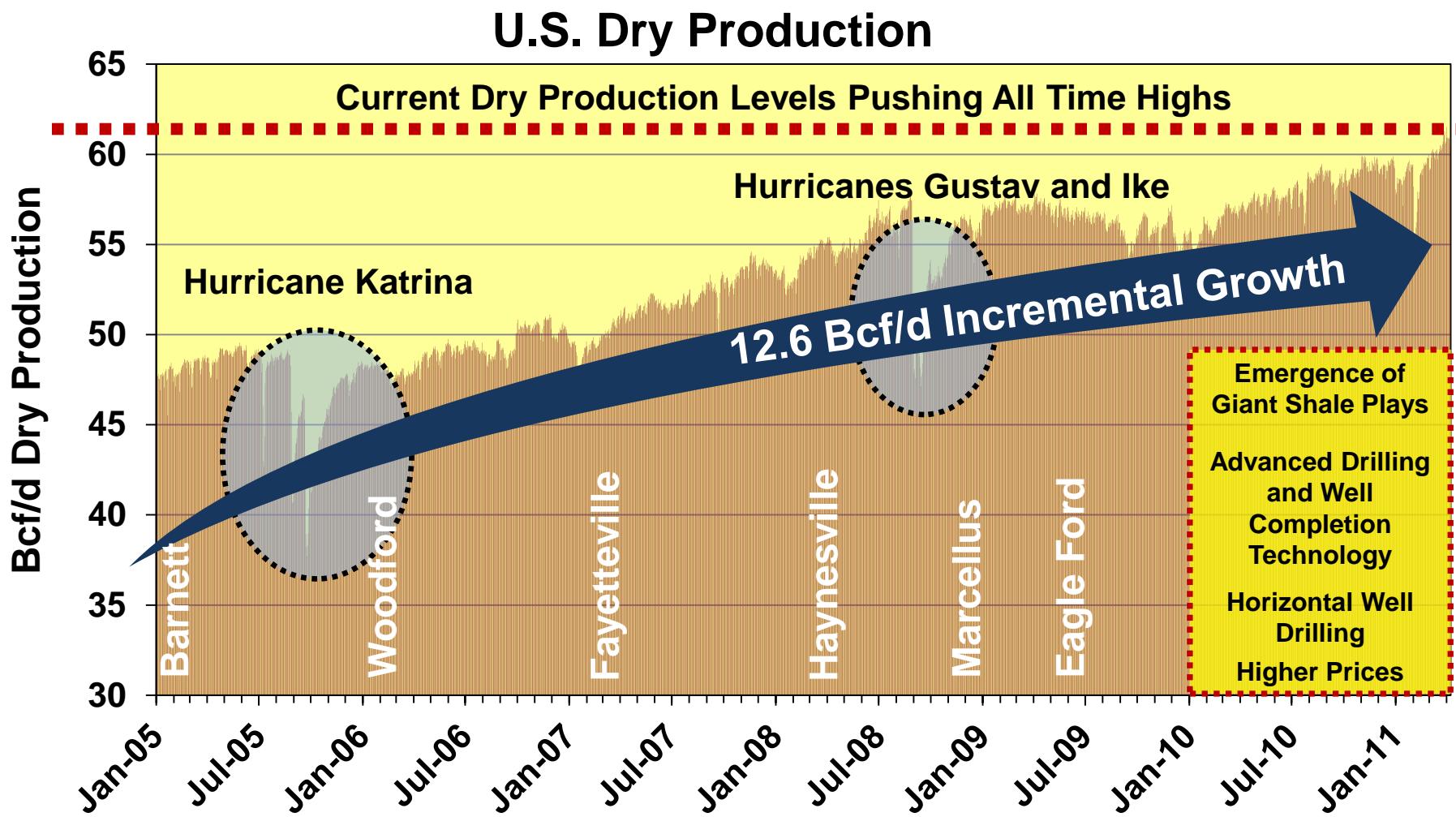
Tom Sherman
April 15, 2011

Agenda: Liquids From Shales

- **U.S. Supply Overview**
- **Resource Plays**
- **Price Relationships Between Dry Gas, Wet Gas and Crude**
- **Where Do the Liquids Come From?**
- **Shifting Corporate Strategies – Rigs Do Their Talking**
- **Economics of Liquid Plays**



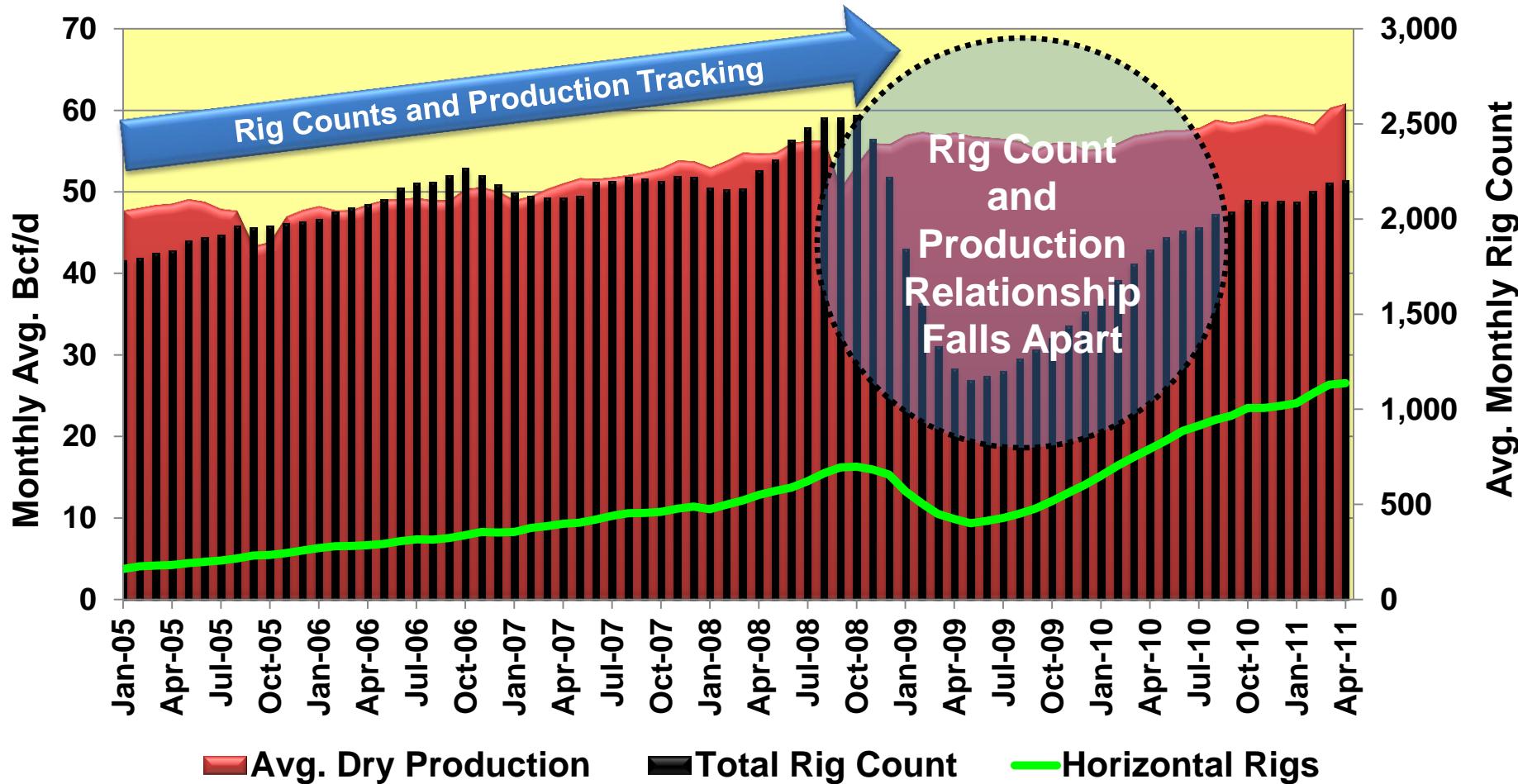
Strong Production Growth Since 2005



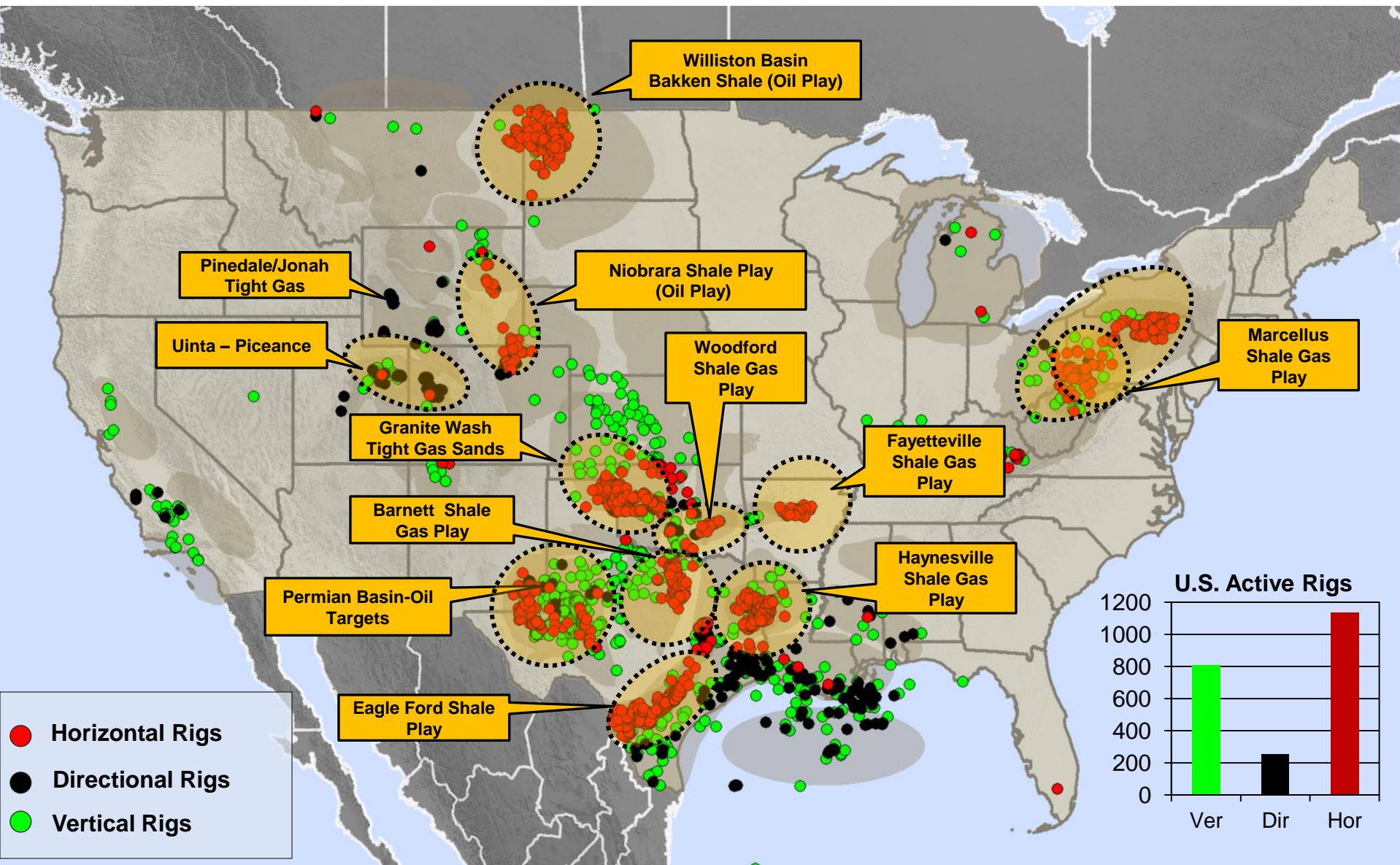
U.S. Production vs. Rig Count

Weak Prices Fail To Curtail Production as Efficiencies Overtake Declines

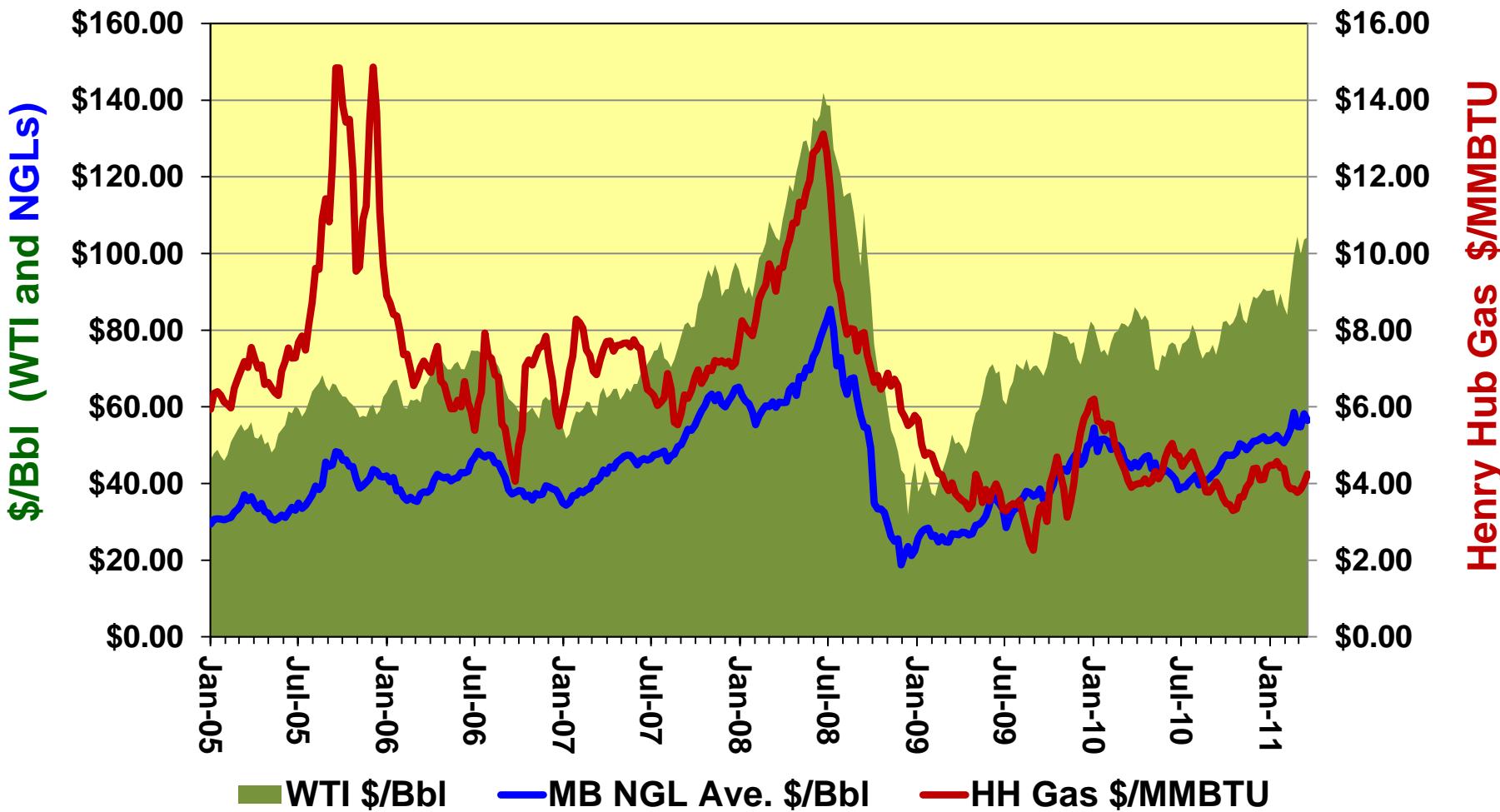
Lower U.S. 48 Dry Production



U.S. Active Rig Locations: Resource Plays Dominate

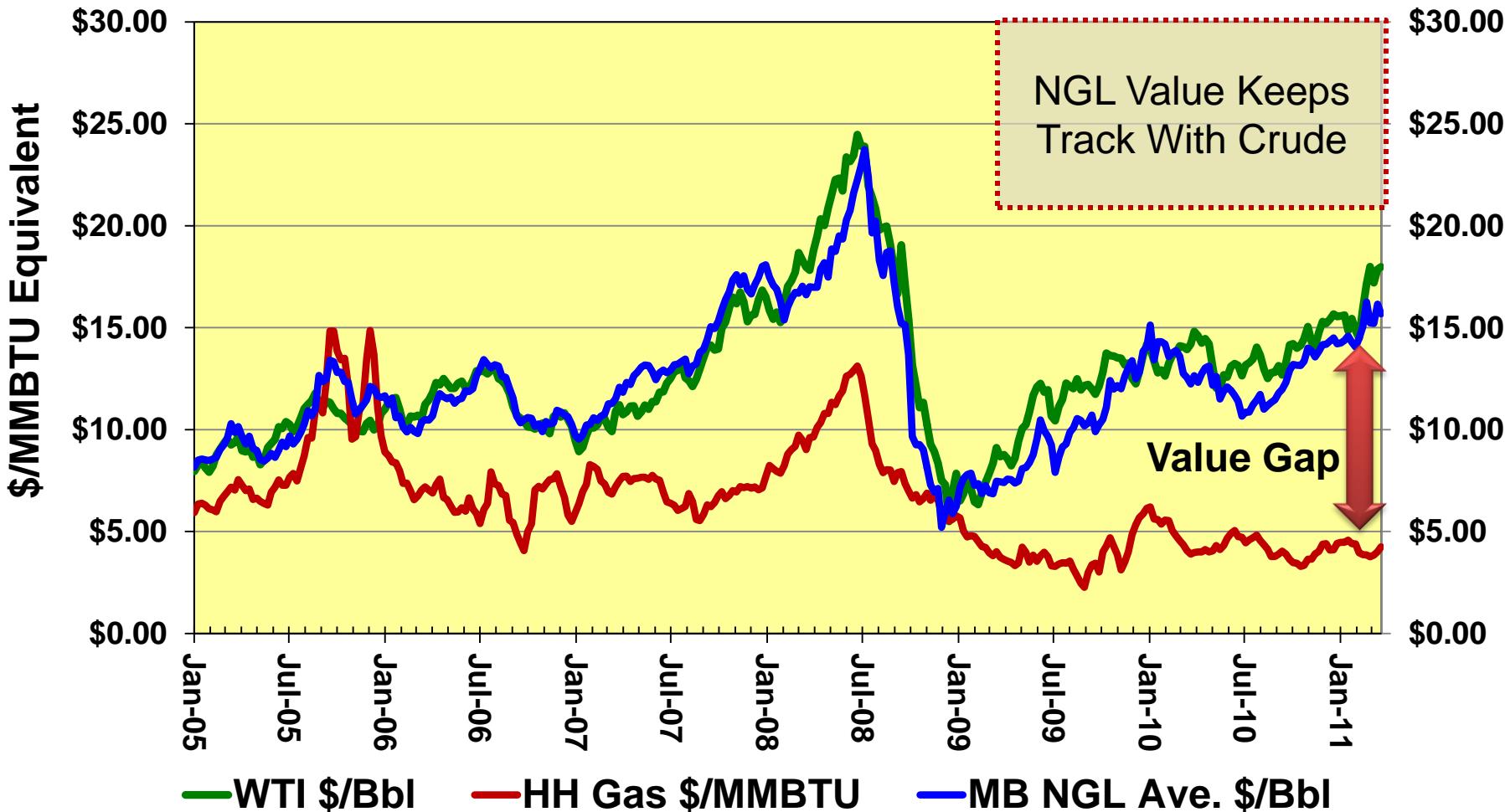


Gas, Oil and NGL Price Comparison

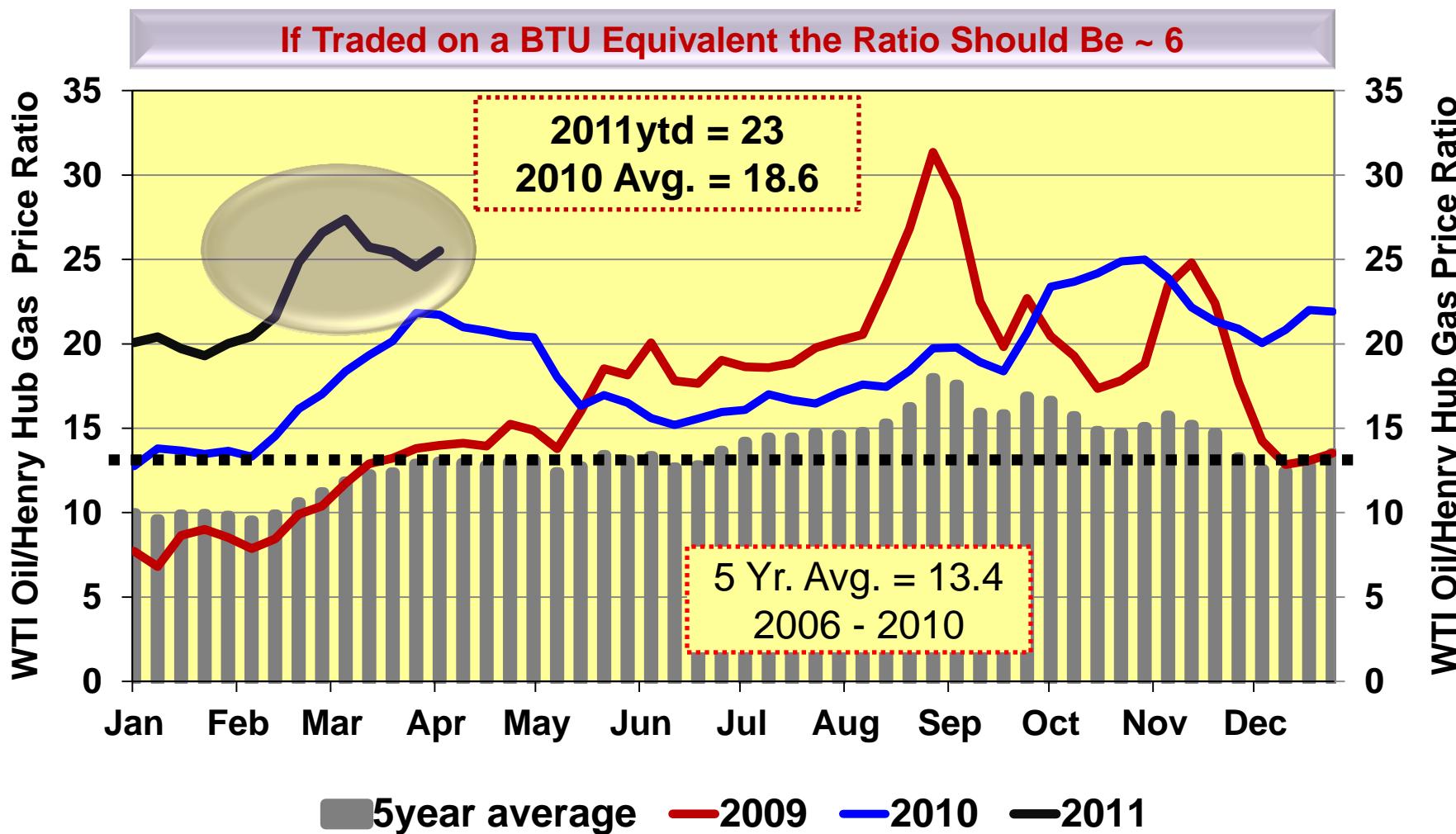


Source: ICE, EIA

Gas, Oil and NGL Price Comparison: MMBTU Equivalent



Gas and Oil Not Trading On BTU Equivalent



Source: ICE, EIA

Characteristics of World Class Liquids Shale Plays

**When All These Come
Together – Lease
Prices Soar.**

\$5,000 - \$10,000 /acre

Application
of Horizontal
Drilling
Technologies

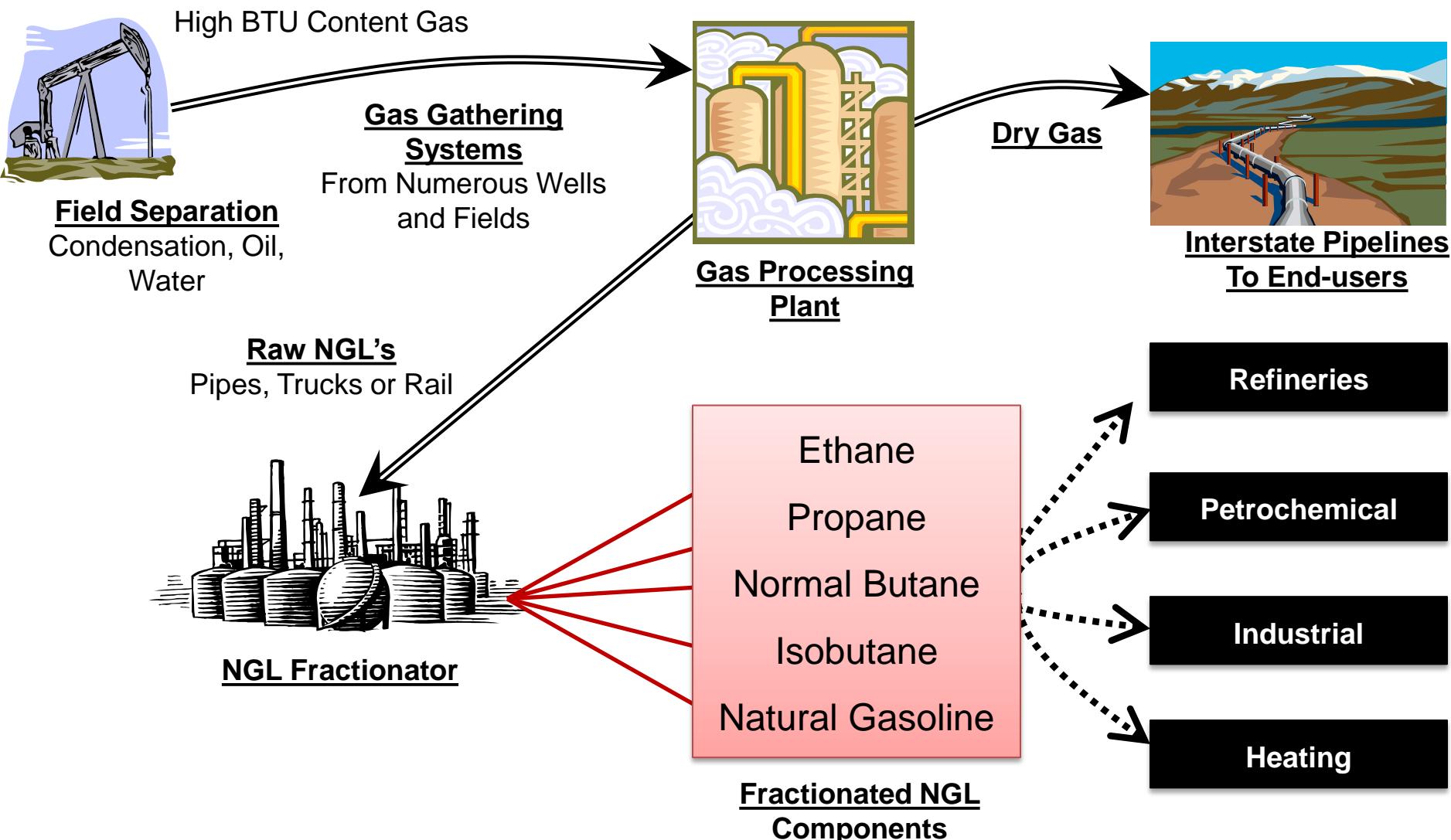
Repeatable
Over a Large
Area

Large In-
Place
Reserve
Base

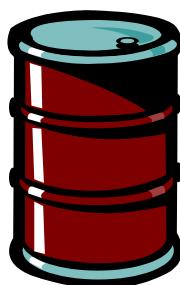
Combination
Of Liquids
and Gas –
Key Geologic
Criteria

Bakken Shale
Eagle Ford
Marcellus (SW)
Niobrara Shale
(Emerging)

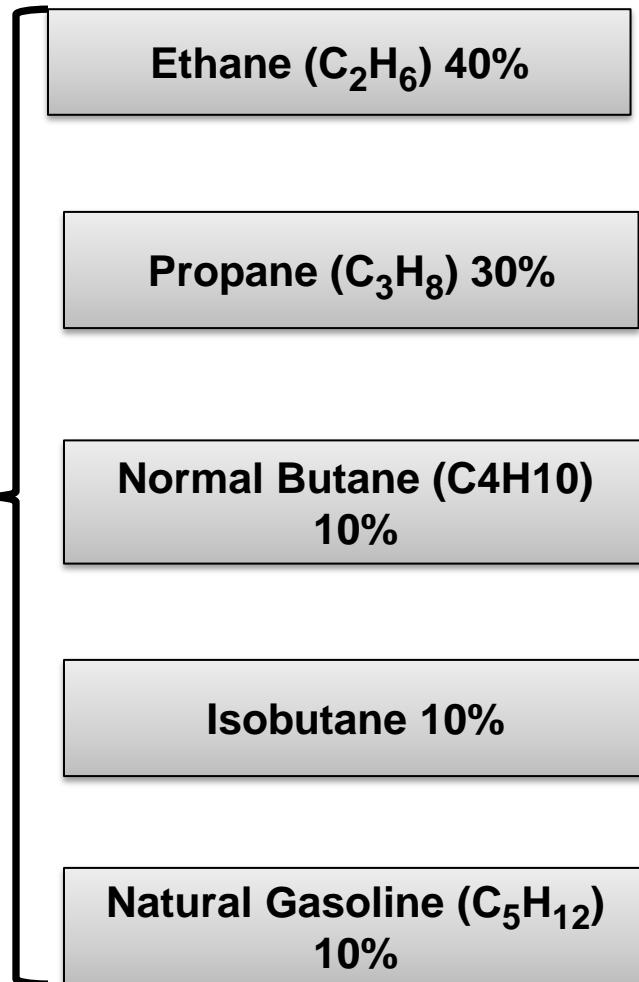
Natural Gas Liquids (NGLs)



Components of NGL Barrel



1 Avg.
NGL
Barrel



Compounds

Ethylene

Propylene,
Heating Fuel

Butylene

Isobutylene

Major Uses

Building Block for Most
Plastics

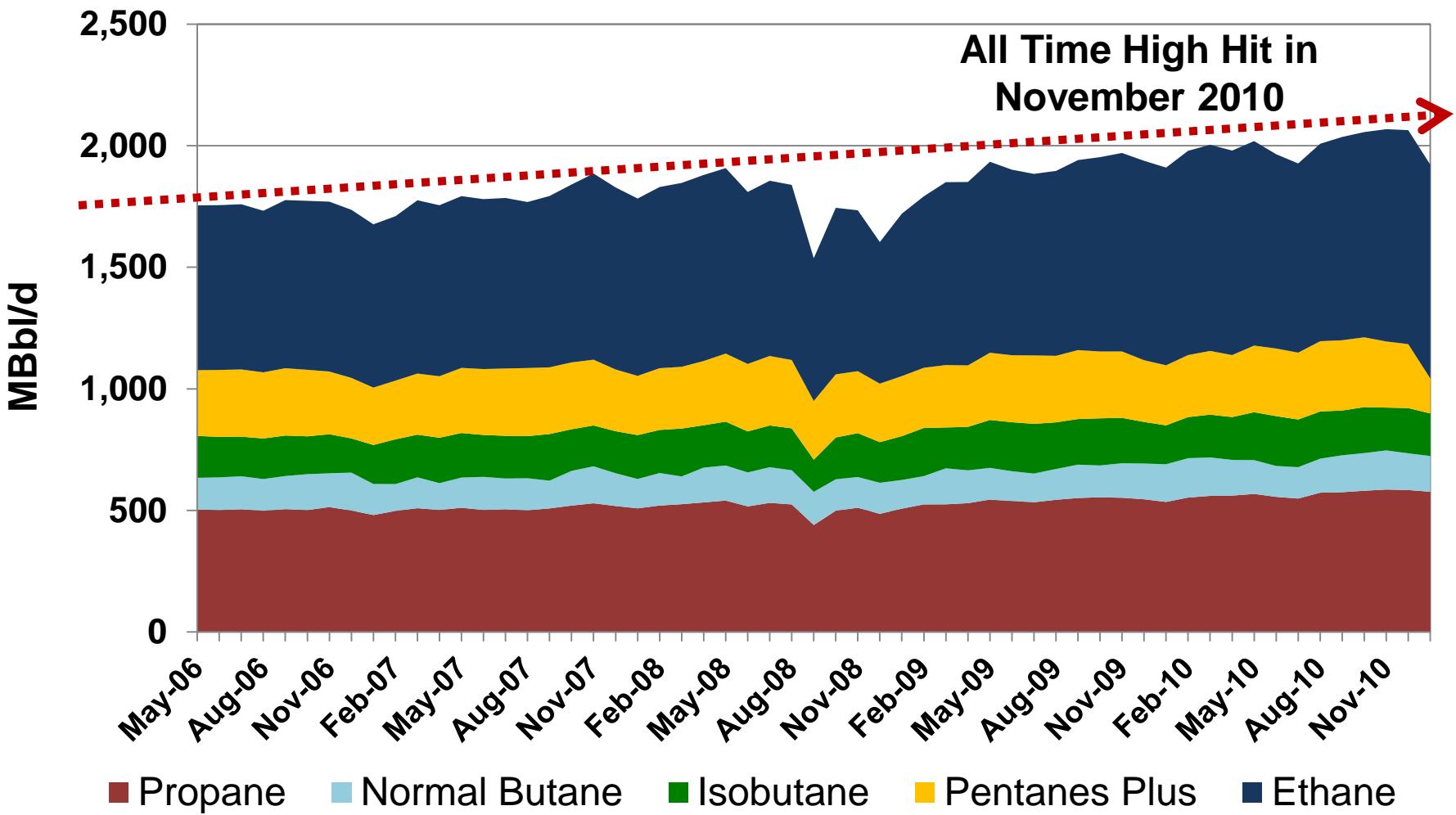
Res/Com Heating,
Paints, PVC,
Adhesives

Refrigerant,
Propellants

Refrigerant,
Propellants

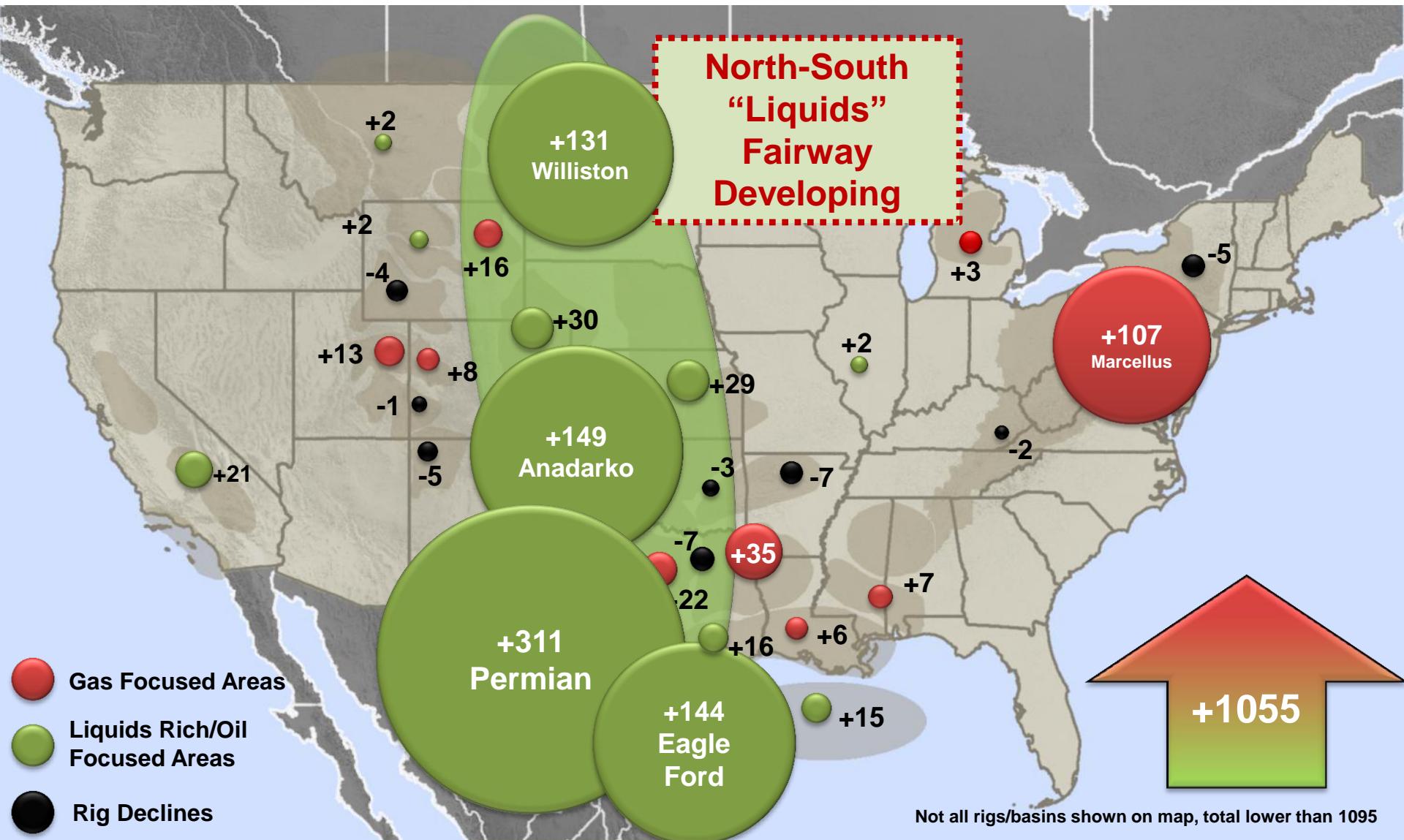
Petrochem Feedstock,
Motor Gasoline

U.S. NGL Production - Gas Plants



Liquid Rich Plays Attract Attention

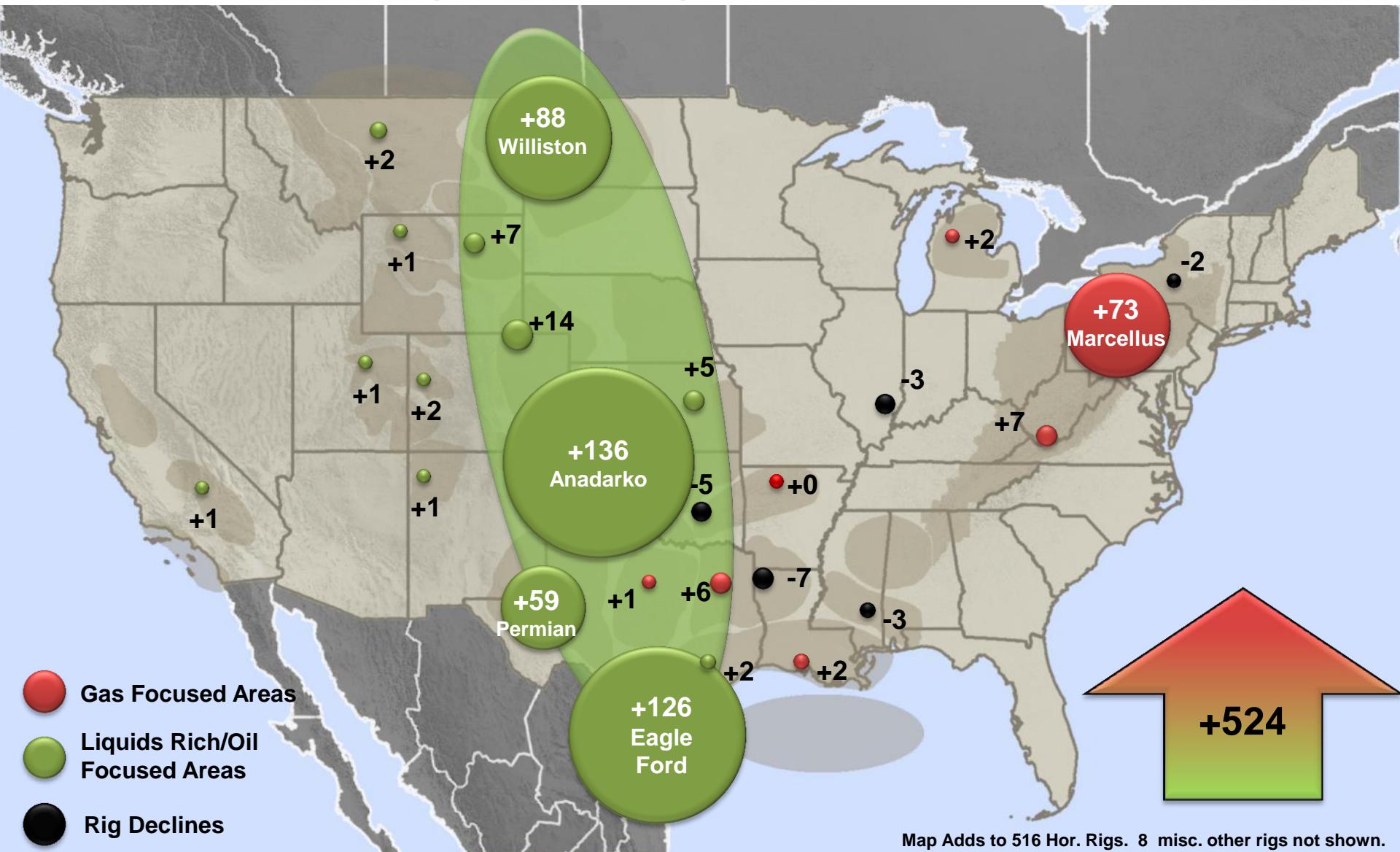
Rig Additions Since Recent Low - May 2009



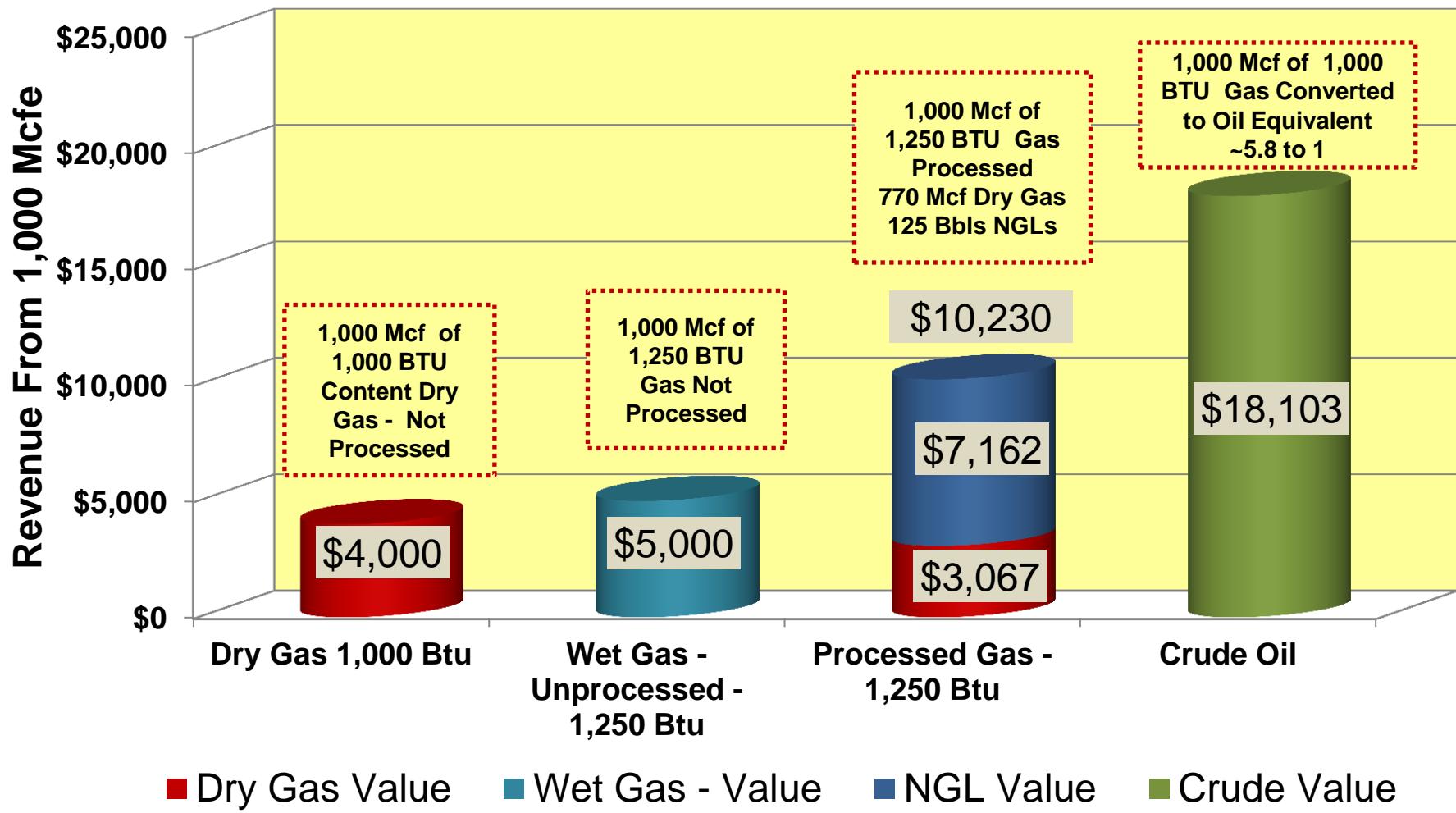
Not all rigs/basins shown on map, total lower than 1095

Horizontal Rig Additions Since – Jan. 2010

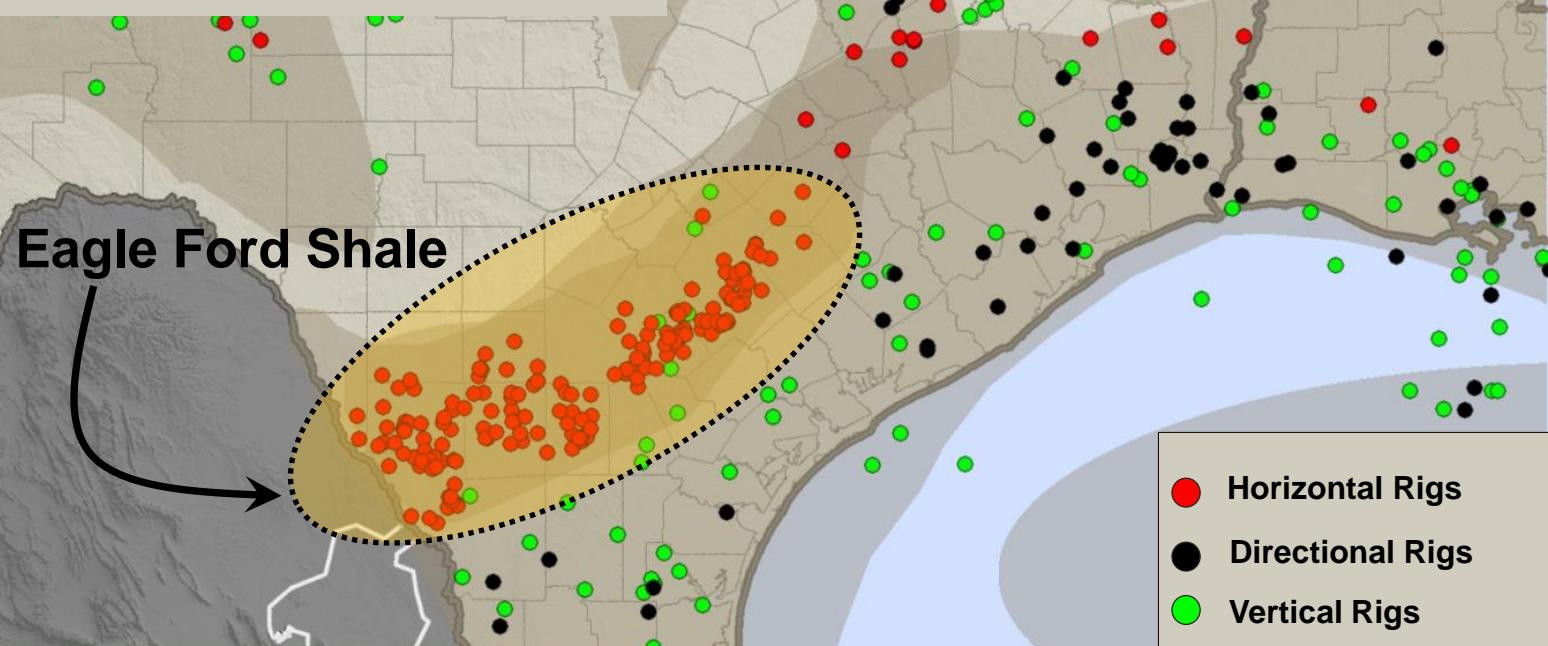
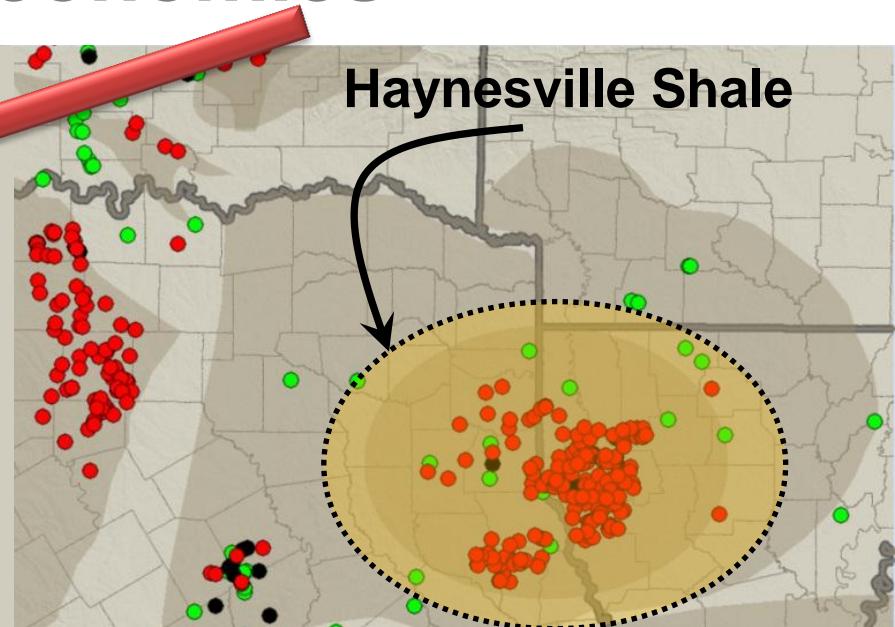
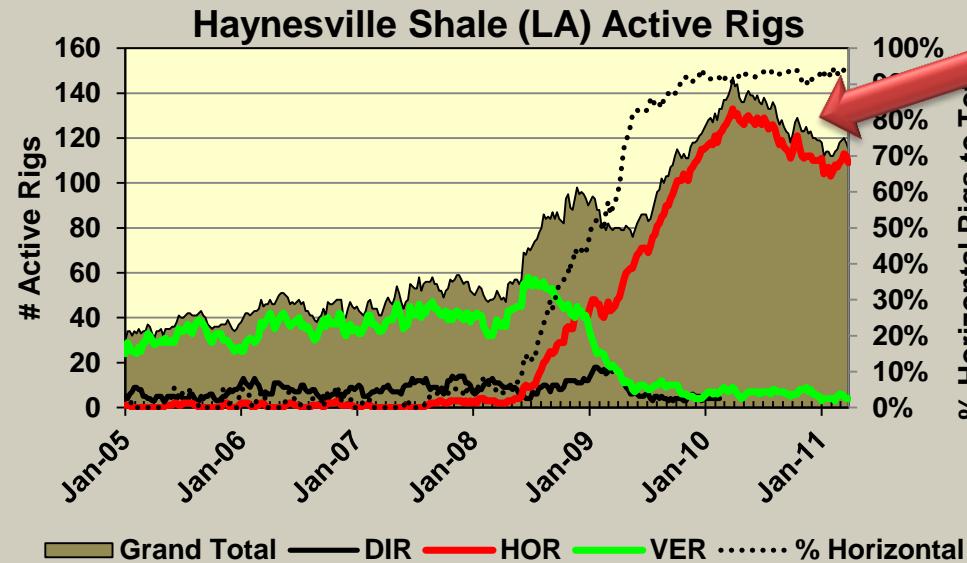
Transfer of Drilling Technology To Liquid Rich and Oil Plays



The Move To Crude --- Liquid Uplift \$\$



Shale Play Economics



Shale Play Economics

Haynesville - Dry Gas Region:

D&C = \$8.5 million
IP = 12,000 Mcf/d
BTU = 1020
1st Year Decline = 80%

Breakeven = \$3.66

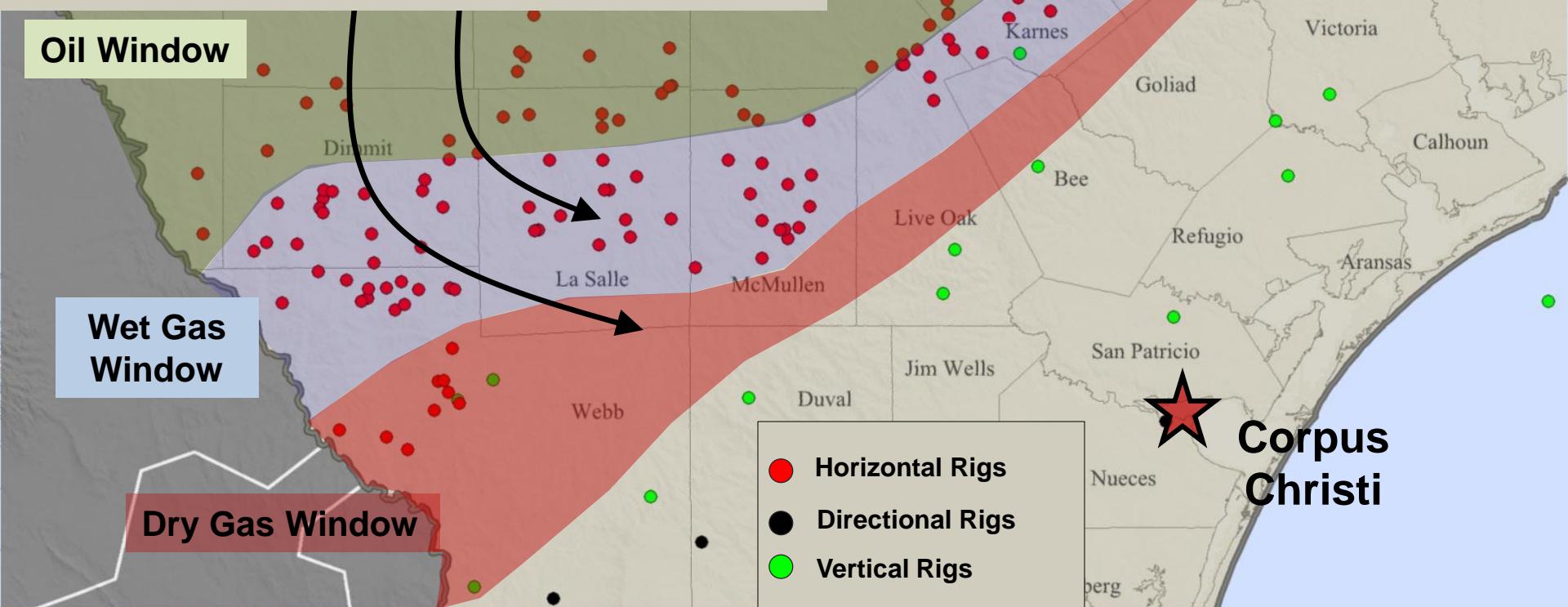
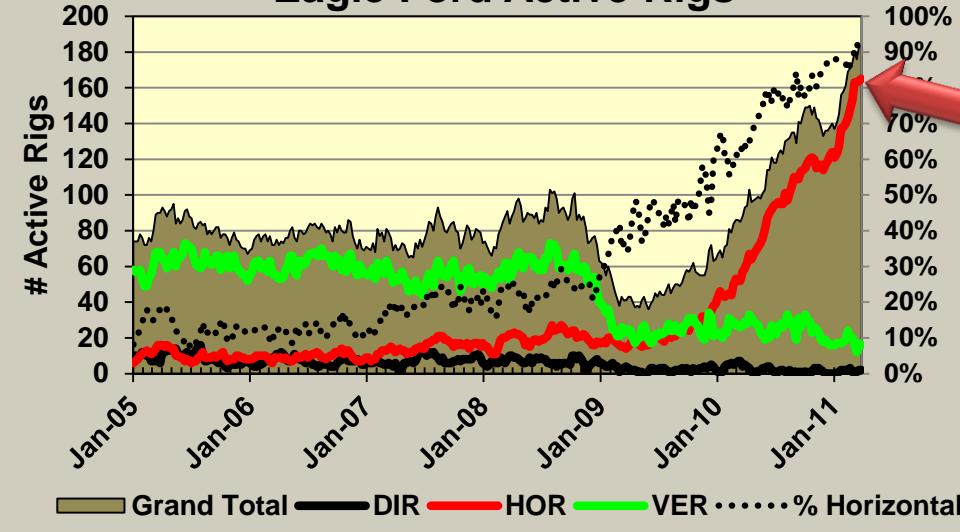
IRR @ \$4.95 = 14.5%
(Two Year Average Forward Curve)

Haynesville Shale

Eagle Ford Shale

- Horizontal Rigs
- Directional Rigs
- Vertical Rigs

Eagle Ford Active Rigs



Wet Gas Region w/Condensate:

D&C = \$7.5 million

IP = 5,000 Mcf/d

Condensate = 250 Bbls/d

BTU = 1,250

1st Year Decline = 71%

NGL's = 125 Bbls/MMcf

Residual Dry Gas = 23% Shrink

Breakeven = < \$1.00

IRR @ \$4.95 = 63%

(Based on Two Year average Forward Curve)

Wet Gas Region:

D&C = \$7.5 million

IP = 5,000 Mcf/d

Condensate = Assume No Condensate

BTU = 1,250

1st Year Decline = 71%

NGL's = 125 Bbls/MMcf

Residual Dry Gas = 23% Shrink

Breakeven = < \$1.00

IRR @ \$4.95 = 35%

(Based on Two Year average Forward Curve)

Dry Gas Region:

D&C = \$8.5 million

IP = 9,000 Mcf/d

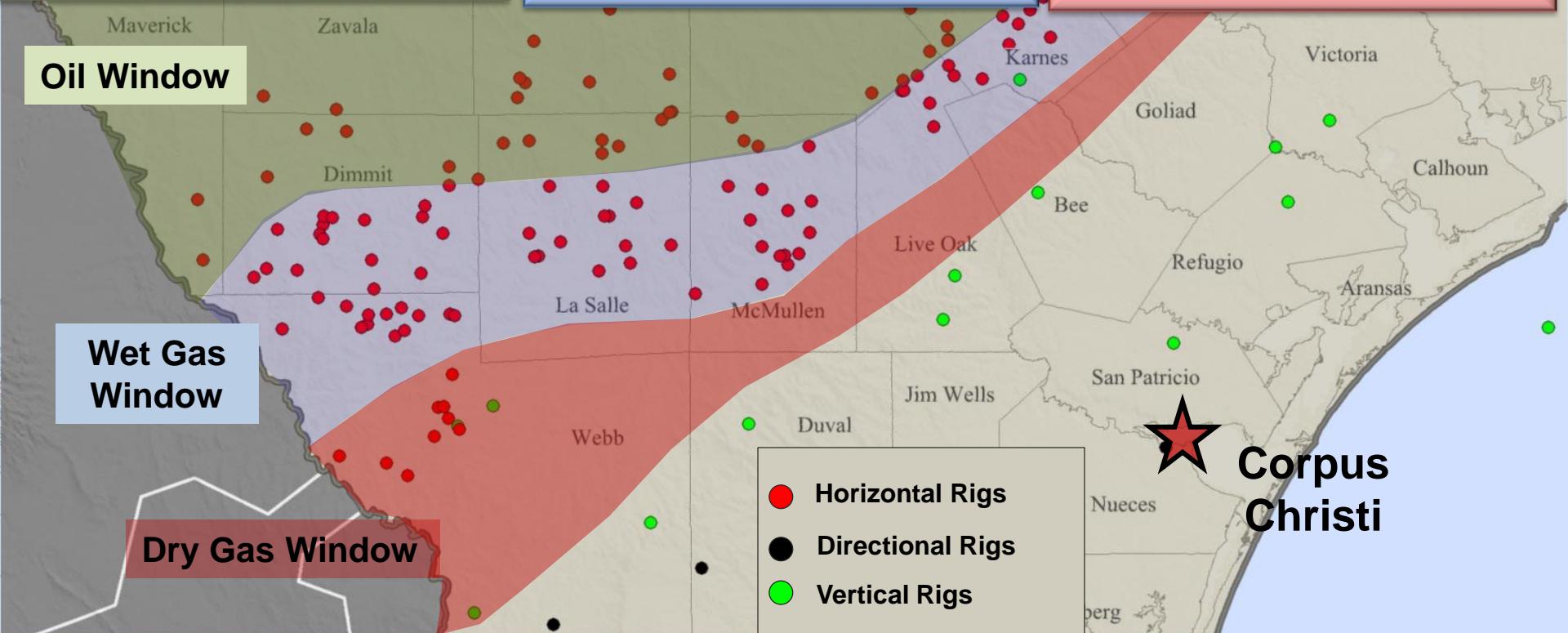
BTU = 1020

1st Year Decline = 77%

Breakeven = \$4.56

IRR @ \$4.95 = 3%

(Based on Two Year average Forward Curve)



Key Takeaway Points

- **U.S. Supply Has Been Pushed to Record Levels Due to Shale Gas Plays**
- **Natural Gas Prices Have Remained Low Due to Excess Supply**
- **Natural Gas Liquids Increasing as a Result of New Wet Gas Plays**
- **NGL Prices Tracking Crude Prices**
- **Producers Are Adjusting Strategies to take Advantage of Higher Liquid Prices**
- **Economics Very Attractive in Wet Gas and Crude Plays**

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