

# New Era of Global Polyolefins: Retaining Value in a Volatile New World

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Townsend Solutions | 02-26-2017



## Disclaimer

- ▶ The information in this presentation stems from the experience, knowledge and databases of Townsend Solutions. Information has been arrived at following careful consideration and enquiry but fairness, completeness or accuracy are not guaranteed. The opinions, as of this date, are subject to change. We do not accept any liability for your reliance upon them.

## Agenda

- ▶ Where volatility comes from?
- ▶ Different Regions, Different Solutions
- ▶ Conclusions

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# Agenda

## ▶ Where volatility comes from?

1. Economy

▶ Different Regions, Different Solutions

▶ Conclusions

# Economic Drivers

Global economy: Current situation and potential impacts



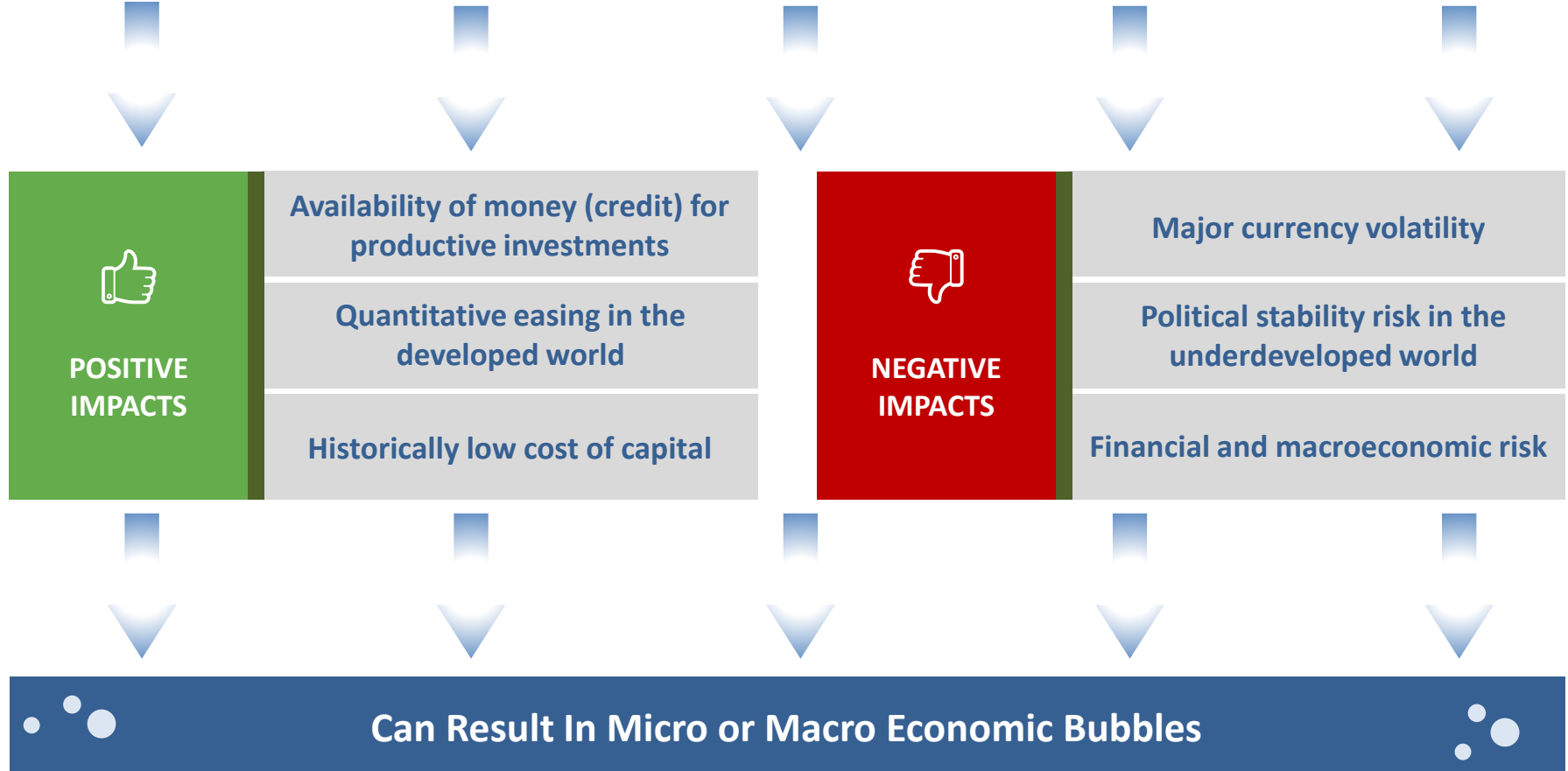
**Lower:**  
COMMODITY PRICES



**Lower:**  
INTEREST RATES

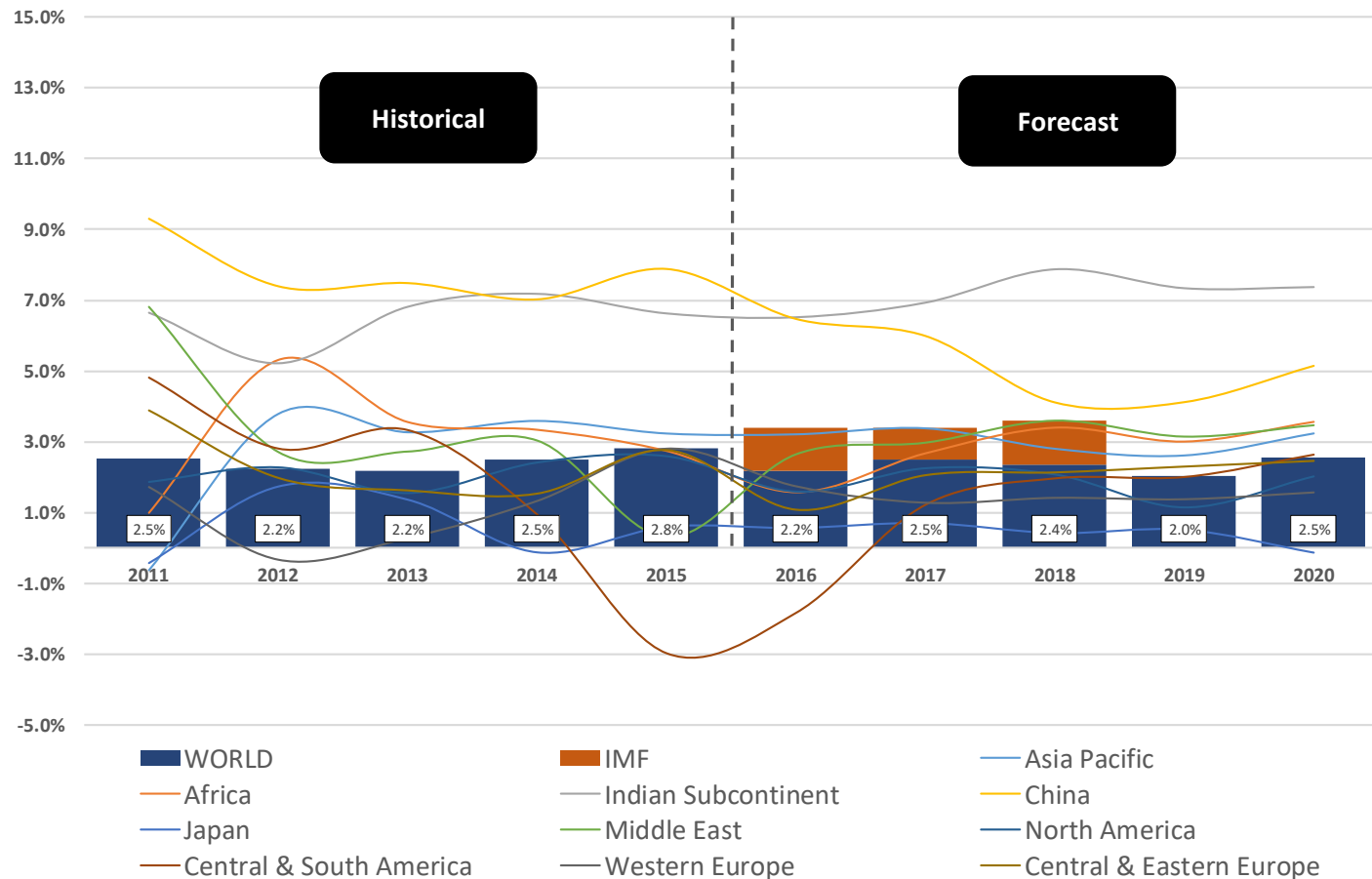


**Limited:**  
ECONOMIC GROWTH



# Economic Results

GDP Growth by Region



- **Global growth in 2016 was the weakest since 2008–09**, owing to a challenging first half marked initially by turmoil in world financial markets
- According to IMF, projection is that global growth will rise to a rate of 3.4% in 2017 and 3.6% in 2018
- Much of the better growth performance expected in 2017 and next stems from improvements in some large emerging market and low income economies that in 2016 were stressed

Source: Townsend Solutions



# Agenda

## ▶ Where volatility comes from?

1. Economy

2. Energy

▶ Different Regions, Different Solutions

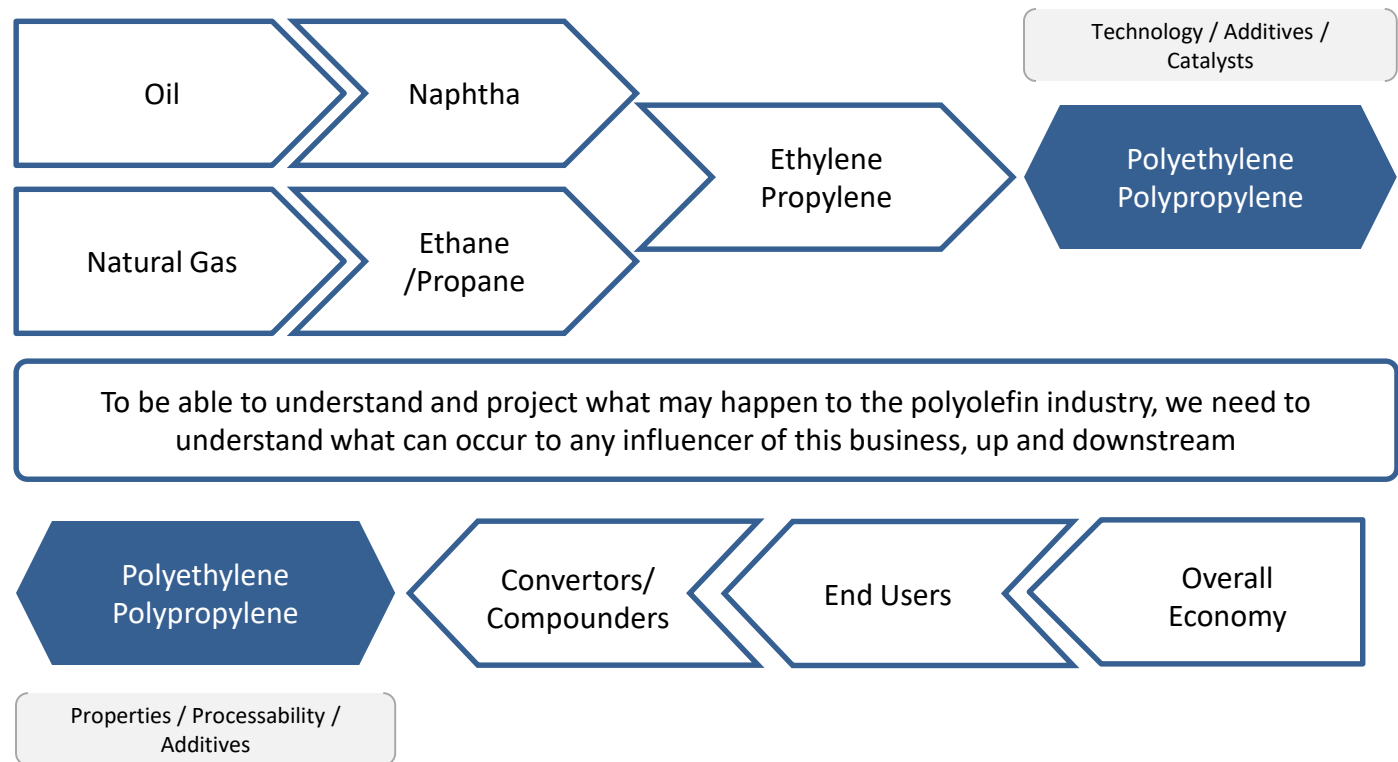
▶ Conclusions



# Drivers of the Polyolefin Industry

Understanding the polyolefin *value chain* is key to analyzing the impacts of new technologies or products in the market place

## Value Chain Analysis



# Main Sources of Energy Today

Energy-resource markets are “cyclical”, when oversupplied, prices crash rapidly and output goes down as well. When prices have suffered enough, demand tends to pick up again, putting pressure on prices and producers to produce more, making the market attractive again.

## Carbon-Based

Oil



Natural Gas



Coal



## Renewable

Nuclear

?

Hydro



Wind



Solar



Renewables continued to grow and, even only representing close to 3% of global primary energy consumption, was responsible for 50% of new power capacity in 2015.

# Main Sources of Energy Today

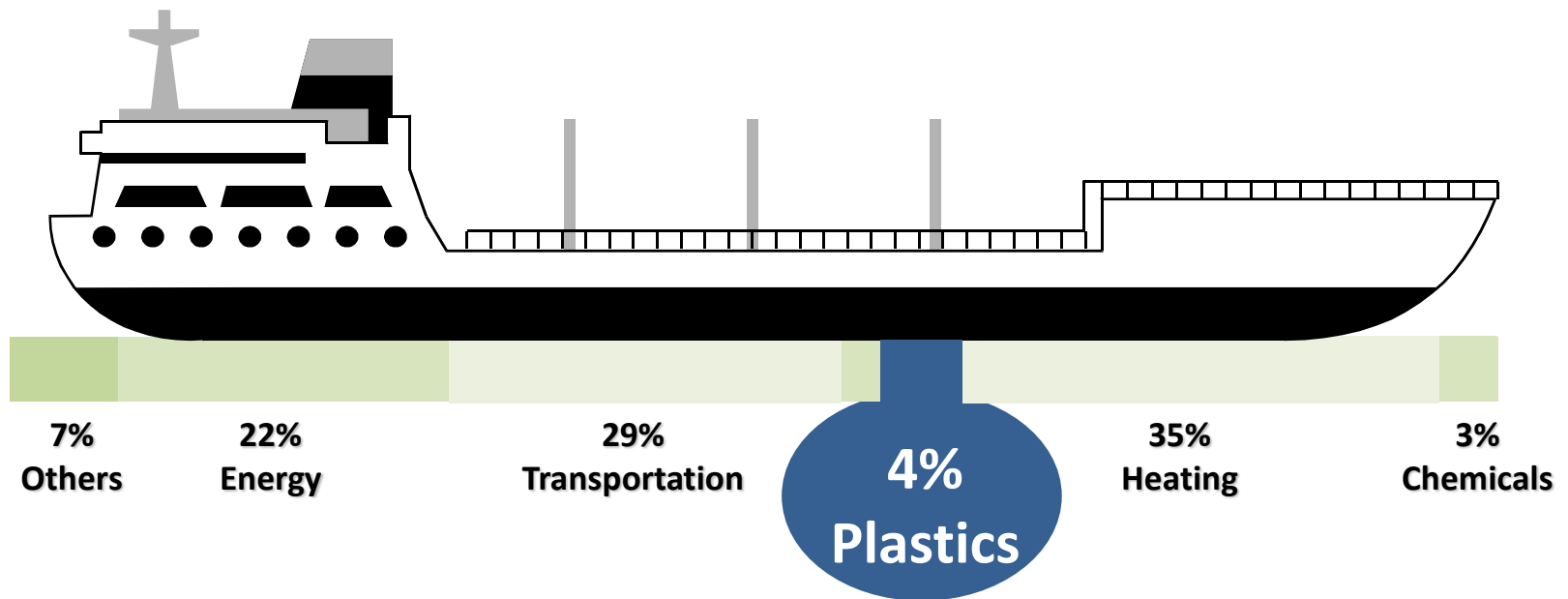
The relationships between the energy commodities are changing, and that the markets for NG, NGLs, oil and renewables are tied together in ways never seen before.

What happens in NG impacts NGLs, which influences crude oil, which loops back to the gas market. **There was a time when you could live out your career in the gas business, or the NGL business, or the crude business and get by with knowing very little about the other markets. Those days are gone forever**



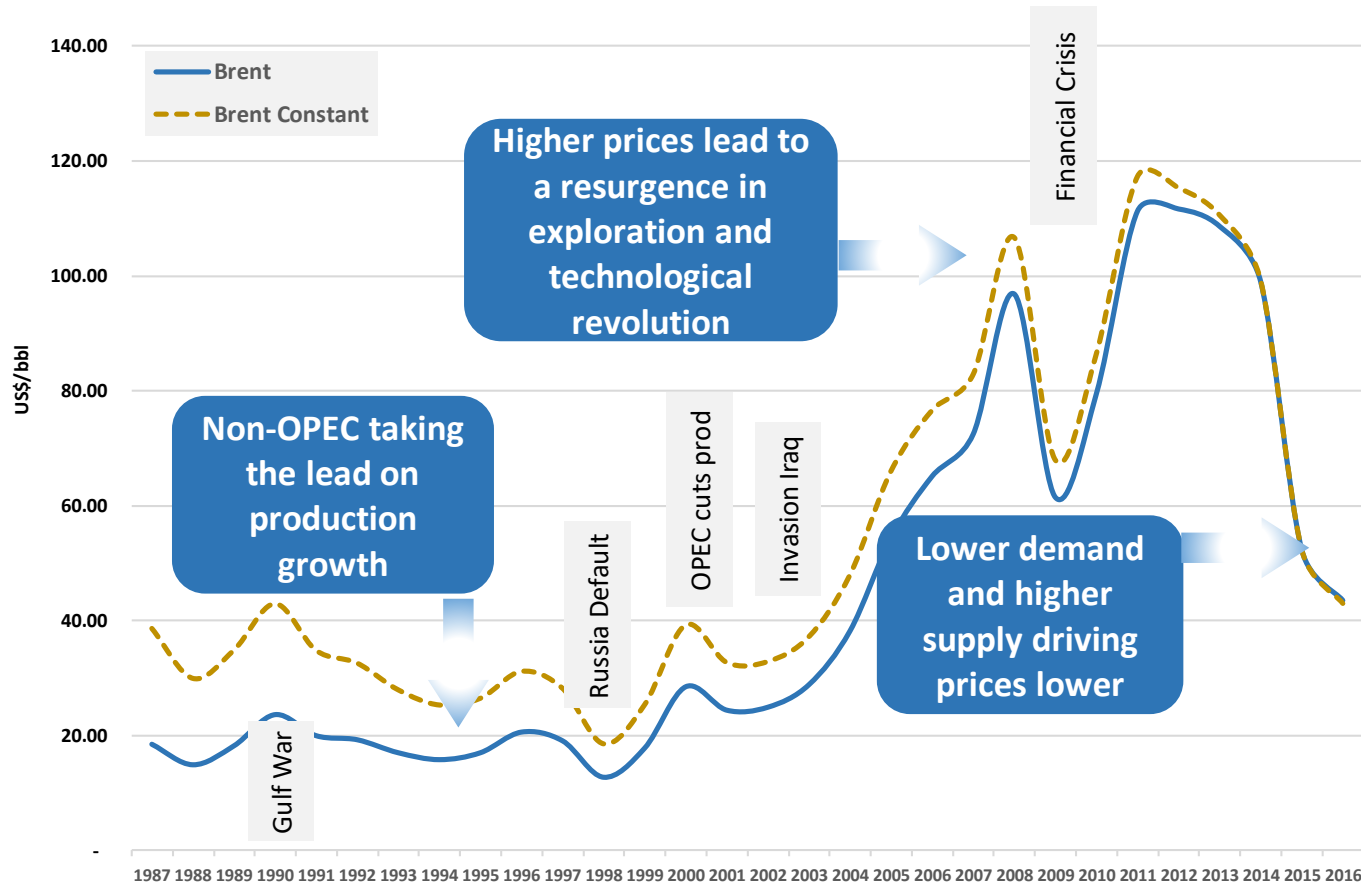
# Oil & Gas and Plastics

Only 4% of total consumption of oil & gas is used to produce plastics



# Oil Prices?

Crude Oil Brent Prices Current vs Constant 2015 US\$



Source: Townsend Solutions



- **Global consumption of oil grew at 1.5% per year in the last 5 years**, lower than the average pace seen in the cycle before
- According to Townsend Solutions, projection is that global growth will decrease even further to a rate of 1.0% in the next 10 years
- In 2015 production outpaced consumption, 3.1% vs 2.0%. In 2016 this trend was reversed, production went up 0.5% and consumption 1.3% (preliminary)

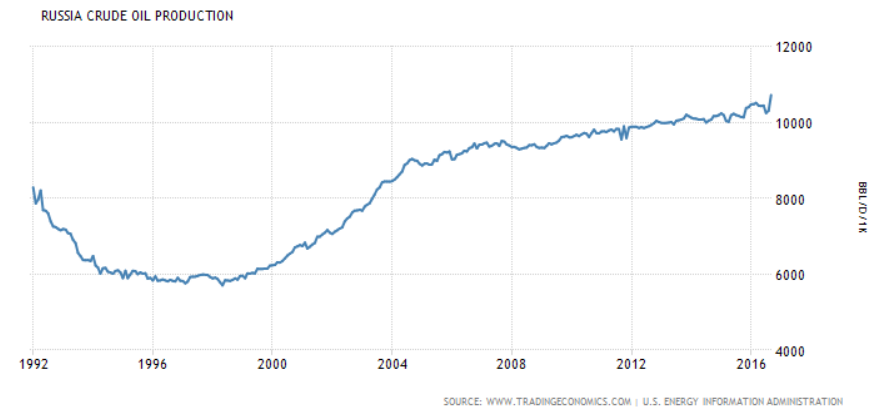
# Supply, demand and expectations influencing the oil price

## Pressure on Demand:

- Sluggish economies in Western world and a slowdown in China's economic growth rate account for the bulk of the drop in demand on a global basis.
- Greater efficiency on the use and consume of oil.

## Pressure on Supply:

- Crude oil supply was growing faster than expected - the result of the shale revolution that has enabled US production to rise dramatically over the past several years.
- Russia's output rose to record highs.
- Iraq reached record levels of output of oil in 2015
- And now expectations over Iran.



**The combination of shrunken demand and rising supply has resulted in significantly lower oil prices around the world. As of Jan 20<sup>th</sup>, 2016, the benchmark WTI crude was at \$29.06/barrel, the lowest point since Nov 3<sup>rd</sup>, 2003 when oil reached \$28.86/barrel**

Source: Townsend Solutions

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1. Economy
2. Energy
3. New Technologies

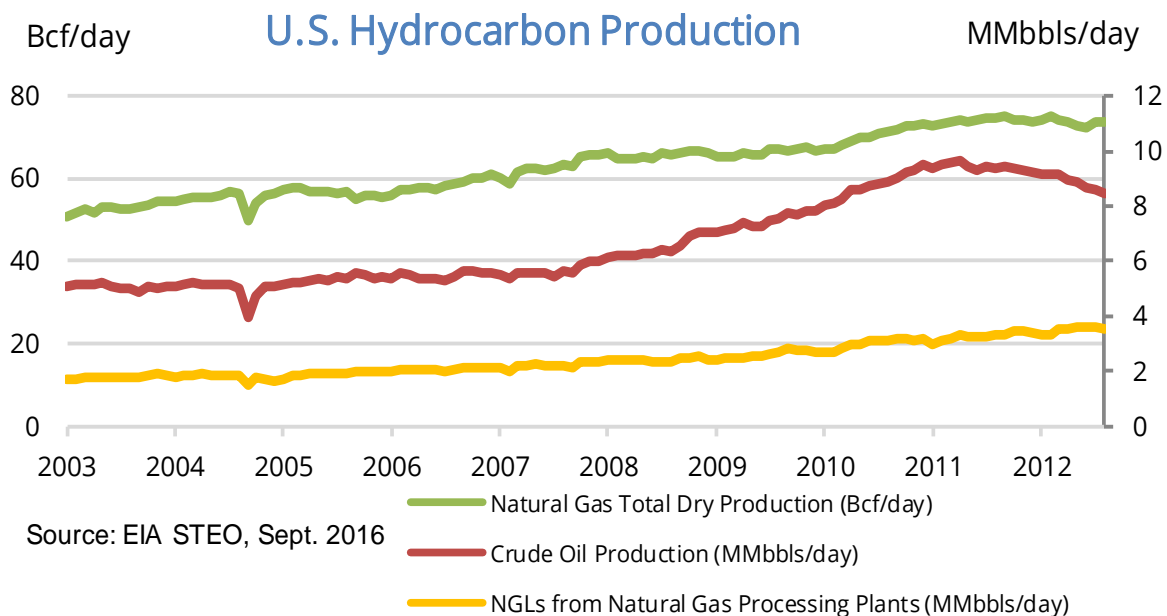
## ▶ Different Regions, Different Solutions

## ▶ Conclusions

# Shale Impact on all three Hydrocarbon Products

The shale energy revolution has quickly grown U.S. hydrocarbon production this decade and will continue to change the price correlations between natural gas, NGLs and crude oil

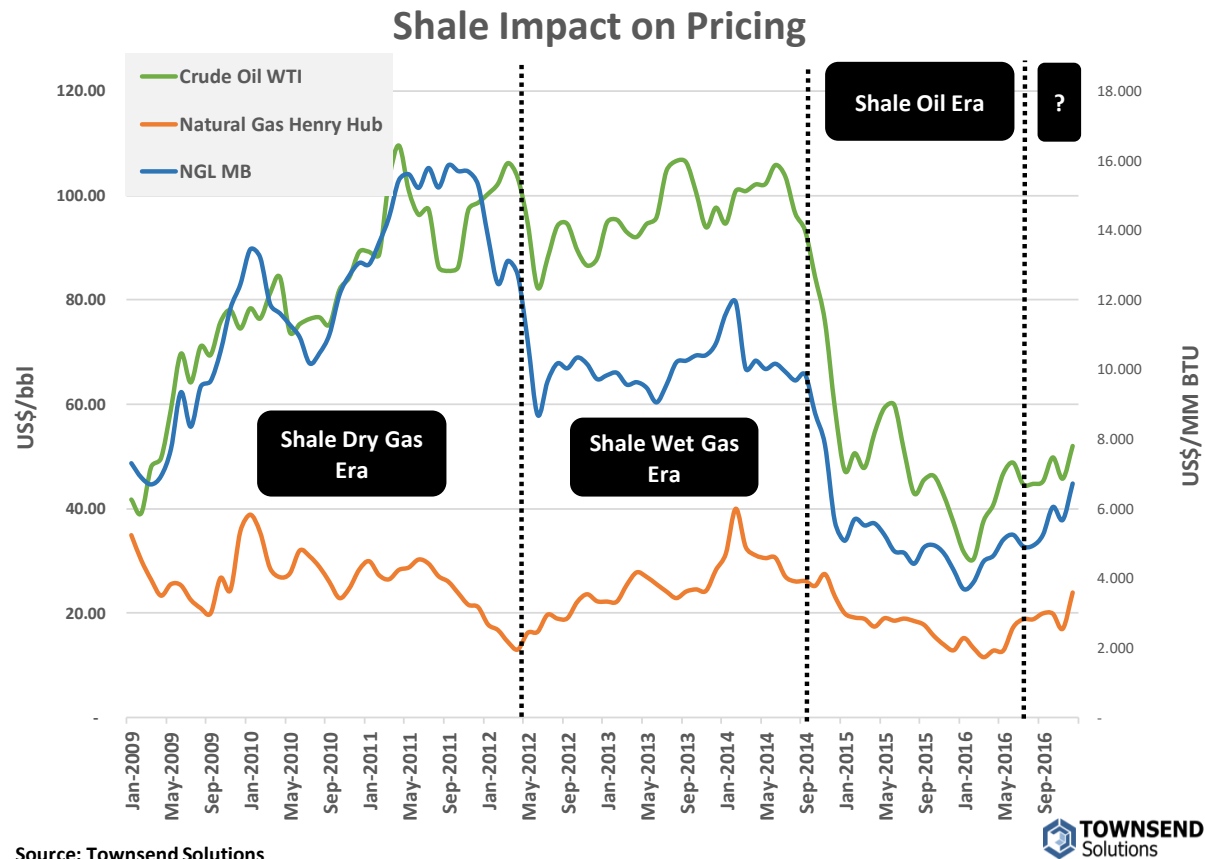
The enhanced fracking production methods began impacting U.S. hydrocarbon production volumes significantly early this decade



- Natural gas was targeted first with the largest growth in the pre-2010 to 2012 timeframe
- Crude production has increased most significantly from 2012 to 2015
- NGLs growth curve has been steady but moderated by the shortage of processing/fractionation facilities in the shale regions



# Shale Impact on all three Hydrocarbon Products

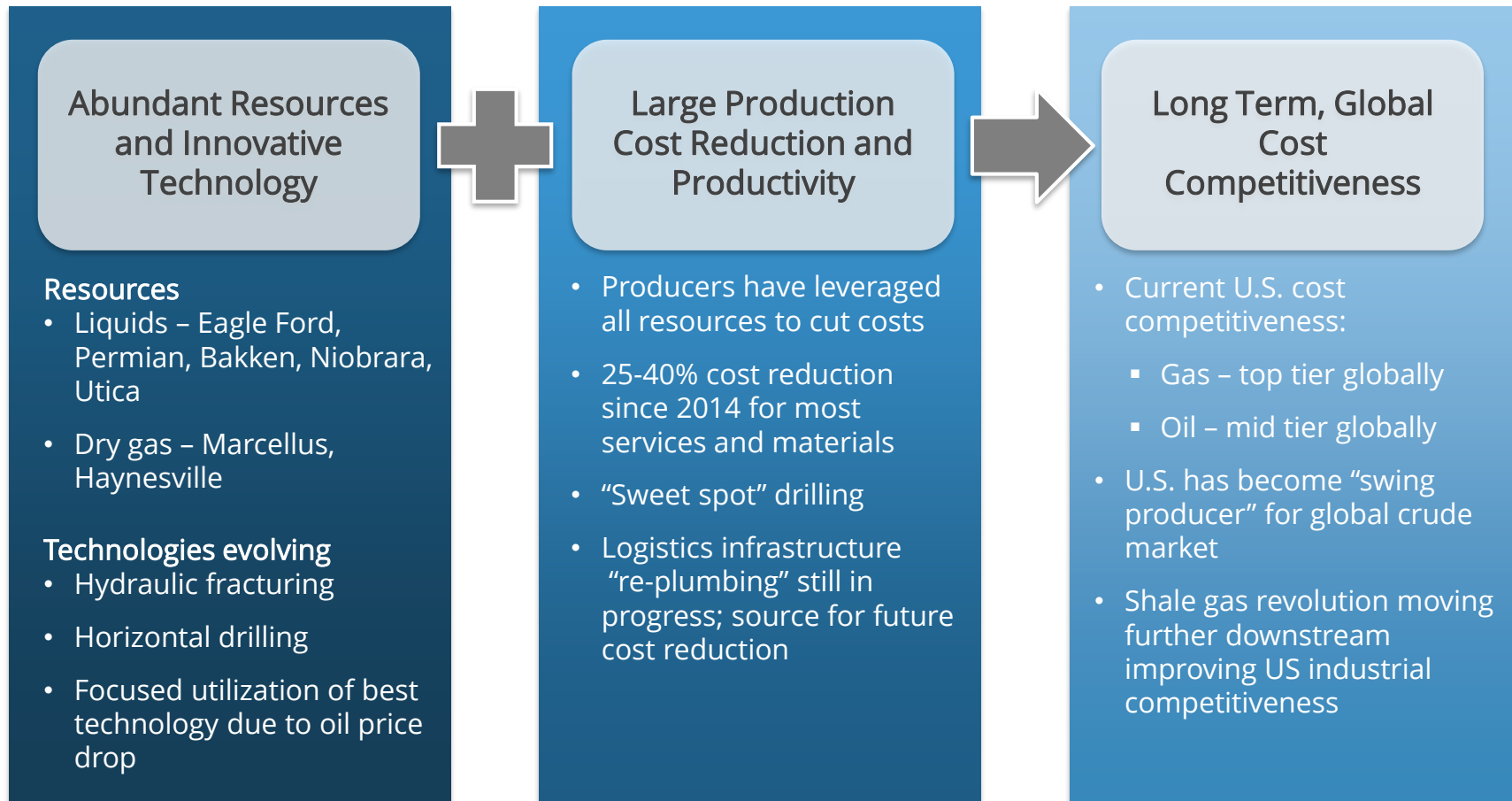


Rapid production growth coupled with insufficient processing and logistics capabilities has impacted the prices

- With rapidly growing natural gas supply beginning in the 2009 timeframe, pricing never recovered to pre-Great Recession levels
- As shale producers began targeting liquid plays, NGL volume quickly outpaced US processing growth and prices dropped significantly in 2012
- Same movement with Oil beginning in 2014

Since January 2016, oil prices have increased 64%, natural gas is up 57% and NGLs are up by 64% as flattening/lowering production has begun to turn the supply/demand balances

# Shale Continues to Improve Cost Competitiveness



**U.S. shale producers have reduced costs for survival sake in low energy price environment over the past two years. The improved cost structures will have long term benefits to U.S. energy and petrochemical global competitiveness.**

# Agenda

## ▶ Townsend Solutions

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4. Future Expectations

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# Globalization: Risks

## Top 5 Global Risks in Terms of Likelihood

**2007**

Breakdown of critical information infrastructure

Chronic disease in developed countries

Oil price shock

China economic hard landing

Asset price collapse

**2016**

Large-scale involuntary migration

Extreme weather events

Failure of climate-change migration and adaptation

Interstate conflict with regional consequences

Major natural catastrophes

## Top 5 Global Risks in Terms of Impact

**2007**

Asset price collapse

Retrenchment from globalization

Interstate & civil wars

Pandemics

Oil price shock

**2016**

Failure of climate-change mitigation and adaptation

Weapons of mass destruction

Water crisis

Large-scale involuntary migration

Severe energy price shock

 **Economic**  **Environmental**  **Geopolitical**  **Societal**  **Technological**

Source: World Economic Forum  
2007-2016, Global Risks Report

Note: Global risks may not be strictly comparable across years, as definitions and the set of global risks have evolved with new issues emerging on the 10-year horizon.

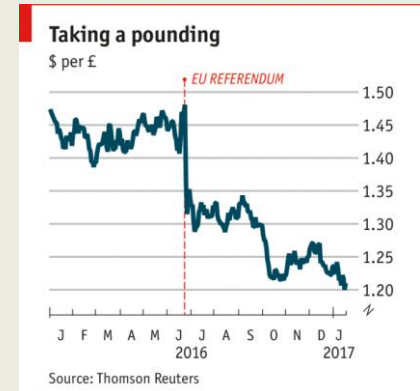
# Uncertainties, Risks, Opportunities



- **Donald Trump's economic policy** is causing headaches at the Federal Reserve. Should he splurge on tax cuts and infrastructure spending, the central bank would probably want to raise interest rates faster this year to stop the economy from overheating. But Trump could fail to deliver the fiscal stimulus that markets expect; Republicans in Congress, for instance, are unlikely to support huge infrastructure spending. At the last Fed meeting, about half of the attendees incorporated a fiscal boost of some kind into their economic forecasts. Yet some argued that Trumponomics could reduce growth; they are probably worried about the possible imposition of trade barriers.

- **Britain's departure from the EU.** Britain will leave the single market and the customs union, and will thus be able to negotiate its own trade deals with third-party economies, starting (it hopes) with America, ideally with a "phased process of implementation" afterwards covering things like immigration controls and financial regulation.

- Questions abound, cliff hangers and EU reactions. The pound is likely to fall further.



# Uncertainties, Risks, Opportunities



- The International Energy Agency **said oil prices would be more volatile in 2017**, despite OPEC's output curbs.
- American shale-oil production will probably recover and a recent decline in Chinese production could reverse.
- China's largest oil fields are aging rapidly and the country's output is falling 5% per year even as prices rise. Advanced technology can only mitigate the decline rate, but can't reverse the structural trend. China is the 6<sup>th</sup> largest oil producer in the world.
- Main concern is the lack of investment following two years of low prices.

- **Oil markets are going to stabilize this year**, according to OPEC's Secretary General.
- Speaking in Venezuela, Mohammed Barkindo also voiced optimism that OPEC economies will improve as a result of last year's producer agreement.
- It comes after Saudi Arabia said the Kingdom is committed to cutting its output and is prepared to extend the supply deal if necessary.



# Major Question Marks

Mexico	<ul style="list-style-type: none"><li>- Legislation to reopen its doors to foreign producers</li><li>- Abundant Oil &amp; Gas conventional (offshore) and unconventional (shale)</li></ul>
Venezuela	<ul style="list-style-type: none"><li>- “Chavism” economic model paying its toll</li><li>- Economy is oil dependent and production is declining</li><li>- To sustain the economy, oil prices need to be above \$150/bbl</li></ul>
Iran	<ul style="list-style-type: none"><li>- Speed to resume exports</li><li>- Ability to pump more oil in the short term</li></ul>
Iraq	<ul style="list-style-type: none"><li>- War against IS</li><li>- Oil from Kurds</li></ul>
North Sea	<ul style="list-style-type: none"><li>- Declining production and rising costs</li></ul>
Russia	<ul style="list-style-type: none"><li>- Economic crisis, Ruble</li><li>- Putin foreign affairs policy</li></ul>
• • World	<ul style="list-style-type: none"><li>- World economy growth</li><li>- China</li></ul>

# Oil Prices

## Goldman Sachs

7 Mar 2008

**"Goldman now sees average selling prices of \$95 a barrel for 2008, \$105 a barrel for 2009 and \$110 a barrel for 2010. The high end of its range is now \$135 a barrel - but Goldman hinted that prices could be headed even higher.**

**"As the lack of supply growth and price-insulated non-OECD demand suggest a future rebound in U.S. gross domestic product growth or a major oil supply disruption could lead to \$150-\$200 a barrel oil prices," Goldman said." (MarketWatch)**

**Reality 2009 WTI Crude \$61.65, 2010 WTI Crude \$79.40**

27 Oct 2014

**"Goldman says brings forward medium-term bearish outlook and sees Q1 2015 WTI crude at \$75/bbl vs \$90/bbl previously" (Reuters)**

**Reality 1Q2015 WTI Crude \$48.55**

11 Sep 2015

**"The global surplus of oil is even bigger than Goldman Sachs Group Inc. thought and that could drive prices as low as \$20 a barrel." (Bloomberg)**

**Reality 2015 WTI Crude \$52.37**

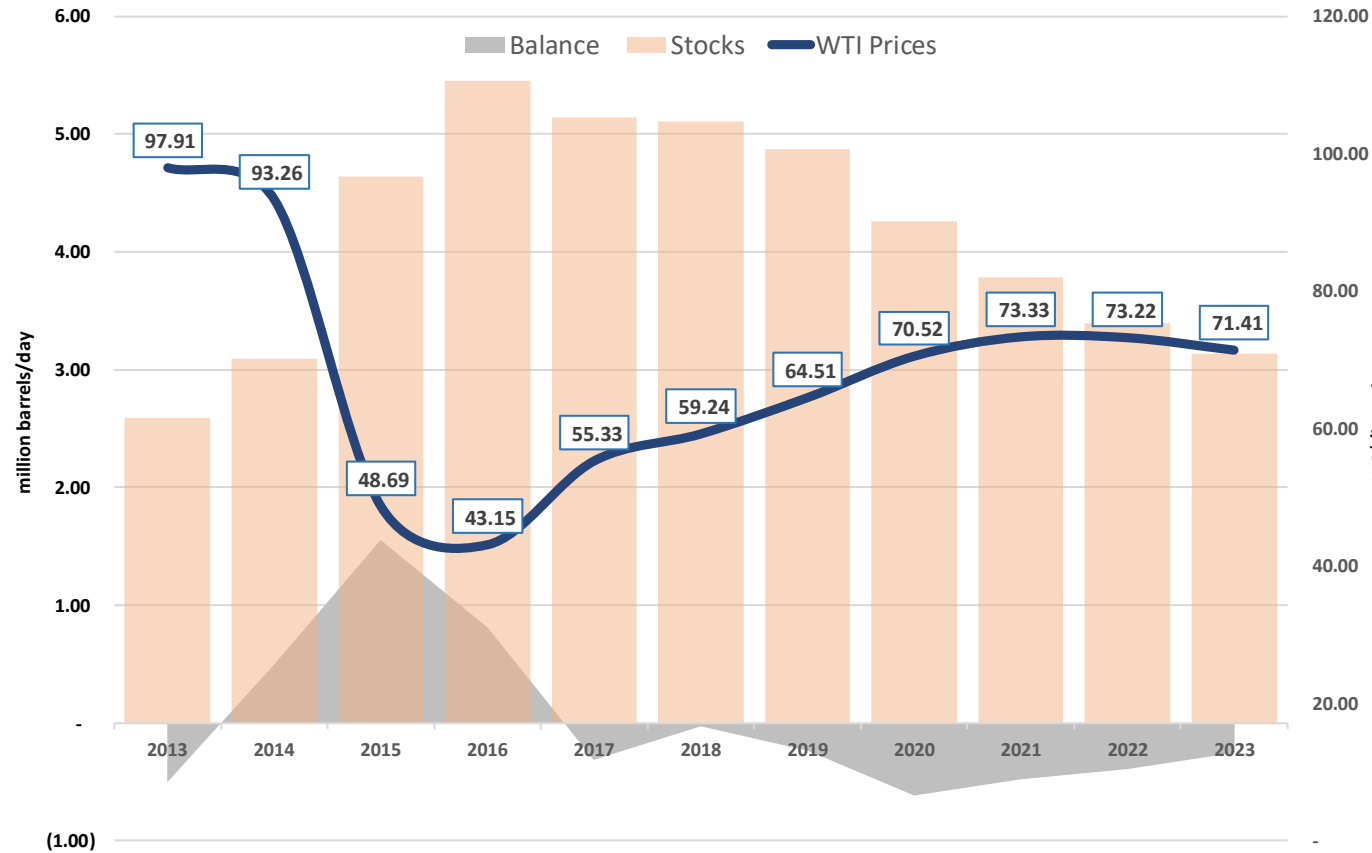


# Oil Price Forecast

## Key Assumptions

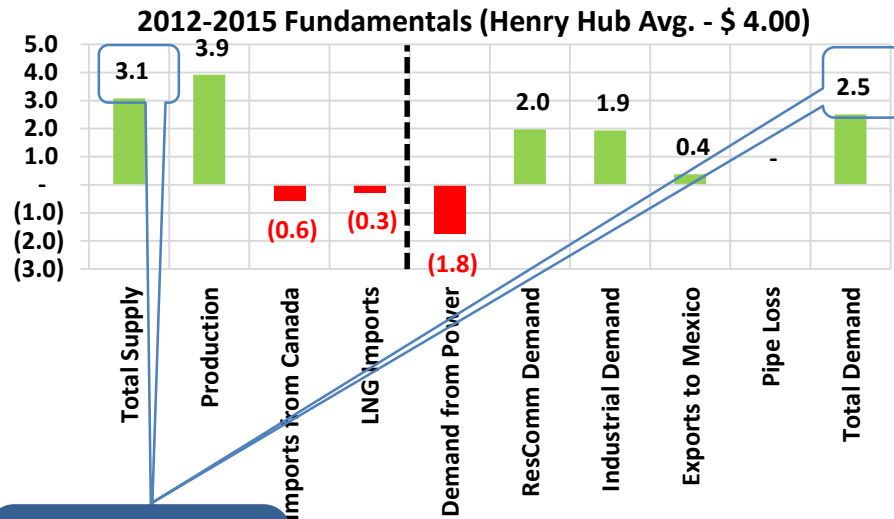
- Continued low oil price environment over next two to three years with prices slowly trending up
- Continued low global crude and US natural gas prices will lower US NGL output during rising demand period causing US NGL feedstock prices to hurt downstream competitiveness
- Competitive shale gas development in other countries besides US in the longer term (5 – 10 years?)

Global Oil Balance vs WTI Prices



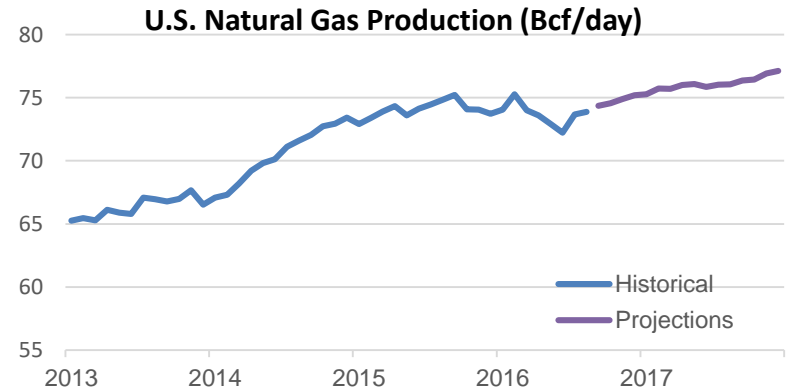
Source: Townsend Solutions

# Natural Gas market

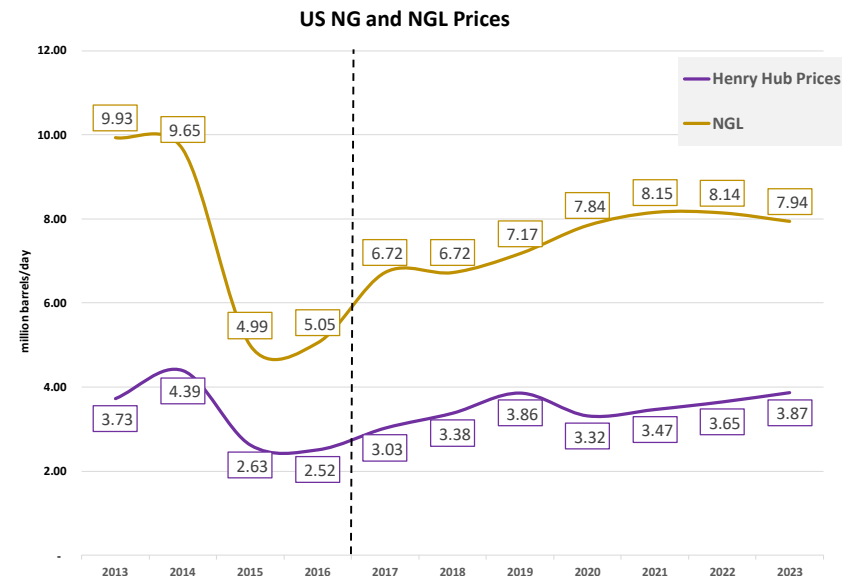


Net Long 0.6  
Bcf/d

Since natural gas is more of a domestic market globally, regional price differences have a large impact on gas competitiveness in each region



Source: EIA, September 2016



Source: Townsend Solutions

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# Different Regions, Different Solutions



# According to their competitive advantages

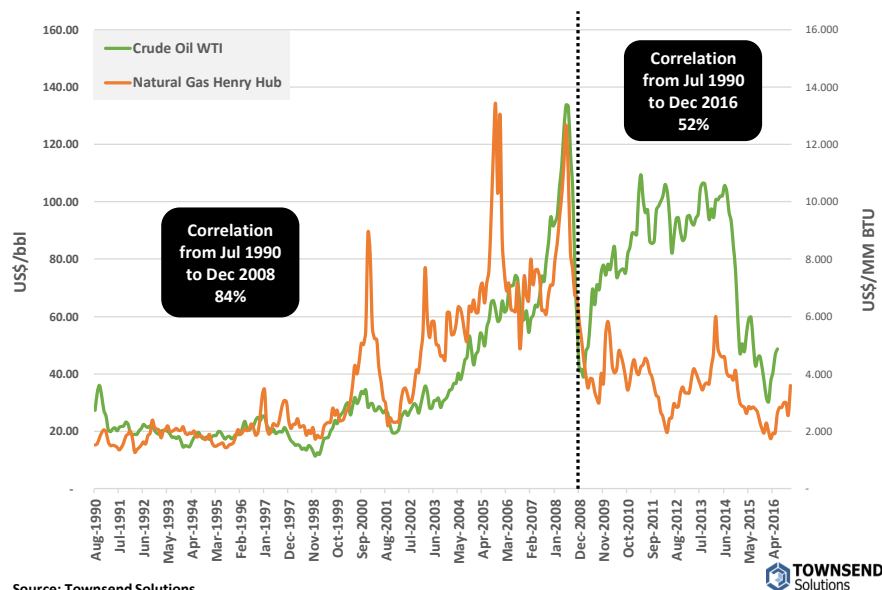
A light gray world map with white outlines for countries. The continent of North America is highlighted in a darker gray. A text box is positioned over the highlighted area.

## *North America*

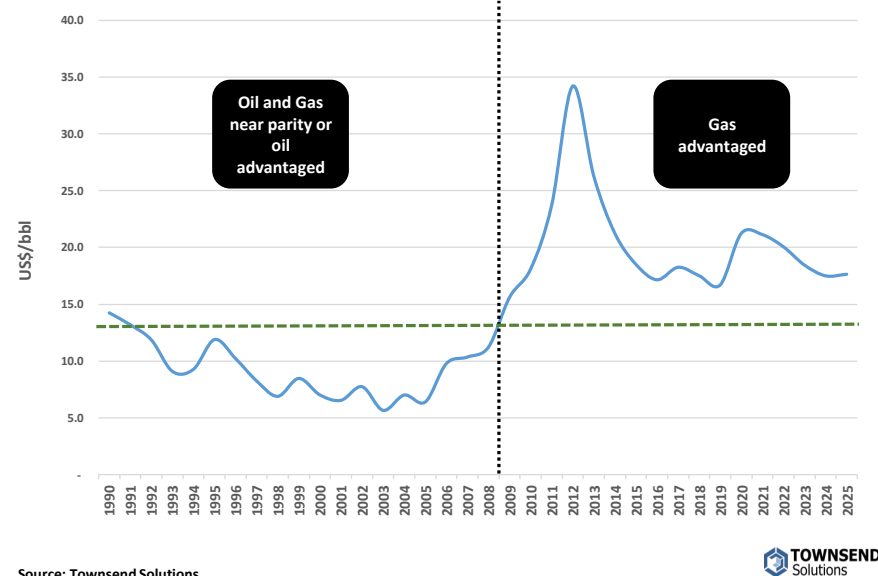
- Massive investment in new ethane/ethylene capacity
- Investment in on-purpose C3 technology

# Shale has Disconnected Oil and Gas Prices

Correlation Oil Prices vs Natural Gas



Parity Oil Prices vs Natural Gas



The shale revolution caused a disconnect between oil and gas prices in US

- The price correlation between these two products went from an almost perfect 84% correlation to a total despair of 52% correlation

The price ratio of oil to gas is critical to competitiveness

- 14.6 is the dividing point
- Oil (Naphtha) has the advantage below 14.6
- Gas has the advantage above 14.6

With the disconnection of oil, gas and NGL prices in the U.S., it is important to understand the continually changing domestic and global interrelationships

# Shale Impact to U.S. NGLs Continues to Evolve

**U.S. “liquids” shale plays currently have an abundance of NGLs, especially ethane and propane**

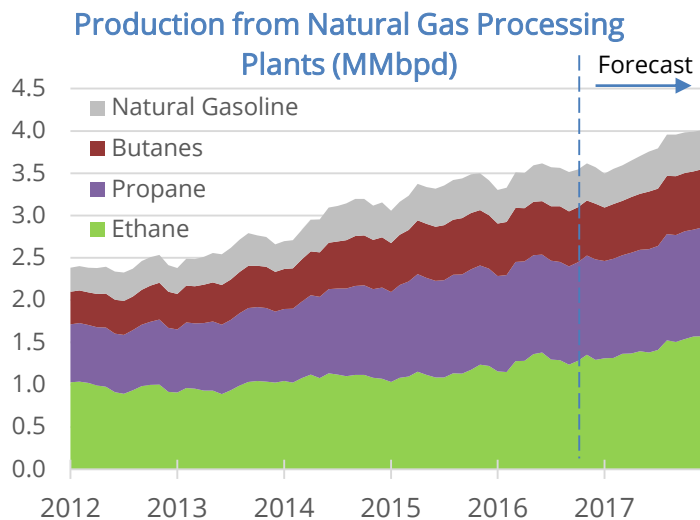
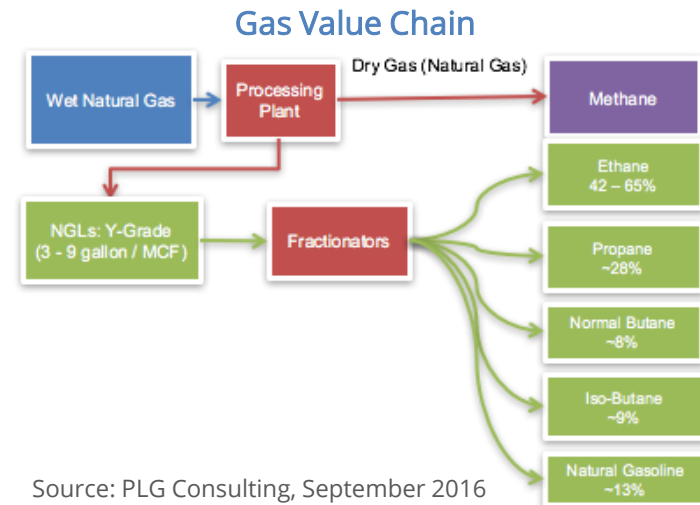
- Production rose by 1 MMbd over past five years driving widespread ethane rejection
- NGL oversupply has led to low price NGLs in U.S.
- Gas processing, fractionation, and pipeline infrastructure mostly in place
- Gas processors will likely decrease ethane rejection by ~300 Mb/d as demand grows over next five years

**Current ethane oversupply will be reduced due to:**

- Growing domestic petchem demand – 600 Mbd to be added in next three years
- Growing exports – 300 Mbd from 2016 to 2018
- Potentially flat/slowing production if in low crude price environment over next five years

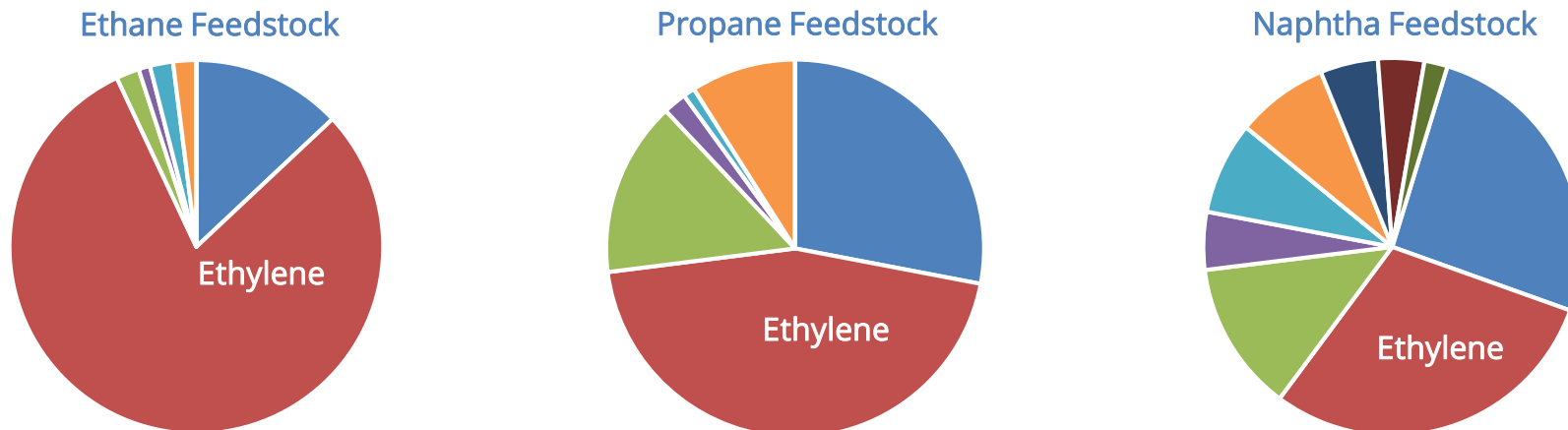
**NGL pricing expected to rise as supply/demand tightens which raises new questions:**

- If NGL prices rise significantly, will shale drillers be able to react and target NGL-rich shale zones to drive higher overall returns?
- Will the increased supplies have pipeline access to adequate processing and fractionating capacity?



# Shale Gas impacting Ethylene Feedstock

Ethane feedstock drives large ethylene output - Product yield from various ethylene cracker feedstocks:



Source: US Association of Energy and Economics,; Brooks, Robert 'Modeling the North American Market for Natural Gas Liquids' Published 31 May 2013

- Ethane as a feedstock drives tremendous ethylene yield, but lower yields of other products (especially propylene)
- Shale NGLs produce between 42% to 65% ethane after fractionation which has caused most new crackers in US to be 100% ethane-fed
- Europe, Latin America, and Asia crackers are predominately fed by naphtha; Middle East mostly uses ethane

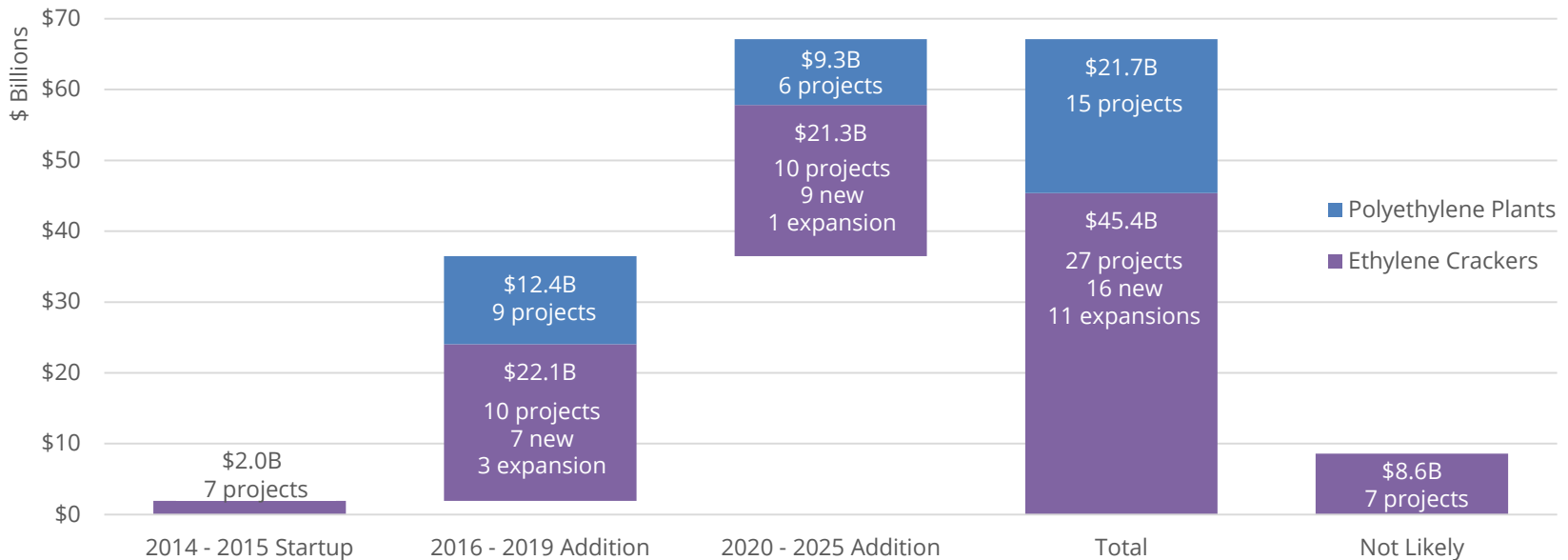
(Yield by weight)	Ethane	Propane	Naphtha
Fuel Gas	13%	28%	26%
Ethylene	80%	45%	30%
Propylene	2%	15%	13%
Butadiene	1%	2%	5%
Mixed Butanes	2%	1%	8%
C5+	2%	9%	8%
Benzene	0%	0%	5%
Toluene	0%	0%	4%
Fuel Oil	0%	0%	2%



# Massive NA Facility Investments in Process

US steam cracker and polyethylene plant investment growth has been building since early this decade

- All of the U.S. projects to date have been expansions and debottlenecking
- World scale facilities will begin to be commissioned this year
- More than \$65 B of crackers and polyethylene plant investment predicted by 2025 in the U.S.



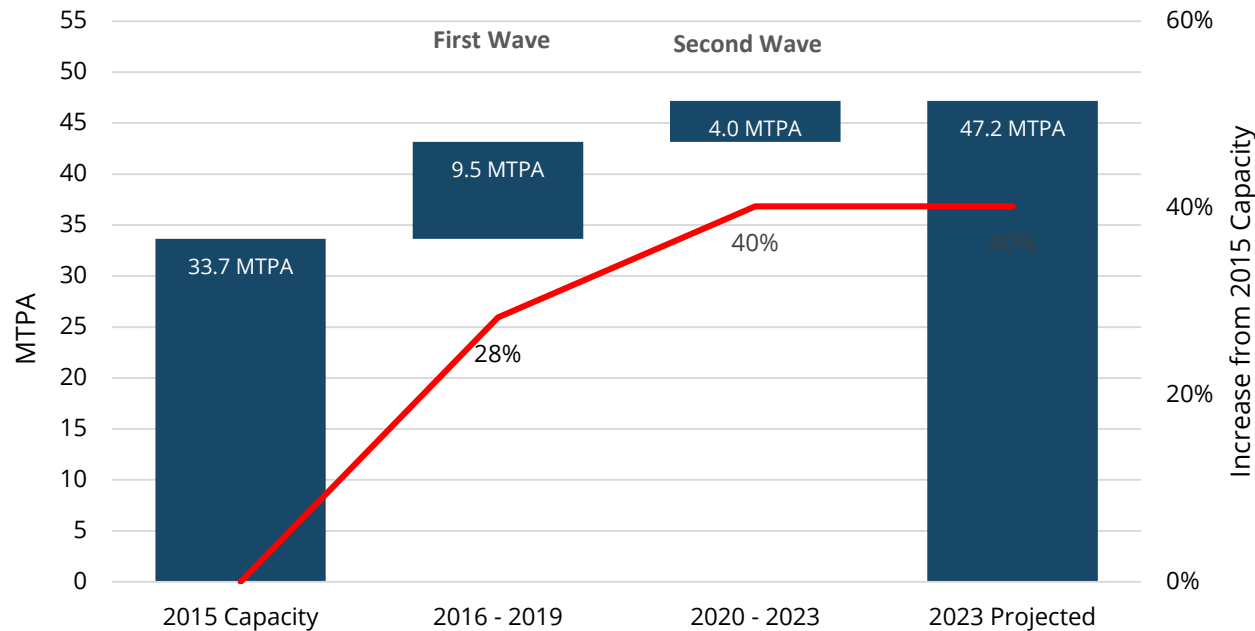
Source: PLG's SHIELD

**World scale steam crackers feed multiple polyethylene units – mostly integrated in same facility**

# North American Cracker Expansion Plans (2016-2026)

## Forecasted ethylene capacity growth will come in waves

- Initial wave is largest capacity increase in North American history – 30% growth over four year period (2016-2019)
- Second wave in design phase for early next decade (2020-2023)
- Third wave (2024-2026) may be required to meet increasing global demand – these projects still in feasibility stages and Final Investment Decisions may take several years to complete



### “Third Wave” crackers in feasibility phase include:

- TOTAL
- Formosa
- Williams
- Badlands
- Braskem
- Exxon/SABIC

These projects represent an additional 6 MTPA of potential ethylene capacity during the 2024-2026 timeframe.

During the Third Wave, ~10 world scale crackers will be needed globally to meet increased demand. NA has the potential for a good share of the new crackers due to competitive feedstock and growing domestic polyethylene market.

# According to their competitive advantages

## *North America*

- Massive investment in new ethane/ethylene capacity
- Investment in on-purpose C3 technology

## *Middle East*

- Hurdles in the way – possible shortage of gas
- Pursuing downstream expansion

# Challenges in the Middle East



- Chemical and petrochemical chain support an estimated 840,000 jobs in GCC
- Companies became leading global players (internationalization to assure outlets for GCC production)



- Initiatives to develop non-associated gas production under way but face long lead times
- JV's account for 60% of petrochemical capacity – unlikely international partners interested in investing in the region without the same feedstock advantage



- Downstream plastic processing investments lagged behind expectations so far
- Not enough gas available for further expansions (new gas availability most likely to be supplied at a higher price)
- Some of the new projects under construction have to use different feedstock slate (Saudi Kayan/butane, Sadara/naphtha)
- Gap in management and technical capabilities

# Saudi Arabia Increasing Feedstock Prices

## Ethane

The price of ethane, as of 2016, will rise 133%, to \$1.75/million Btu from 75 cts/million Btu, bringing Saudi ethylene producers closer to those in the United States

## Methane

The price of methane, a feedstock used to produce methanol and ammonia, among others, rises from 75 cts/million Btu to \$1.25/million Btu, an increasing by 67%



Reduction of subsidies to raise government revenues following higher defense spending and the collapse in the price of oil.

State revenues dropped in 2015 to 608 billion Saudi riyals (\$162.0 billion) against the targeted SR715 billion. Crude oil accounted for 73% of that total.

# Iran is the Key in the Short Term

**Iran has a 38% market share of petrochemicals in the Middle East but produces only 4.8% of the world's petrochemicals despite having some of the largest crude oil and natural gas reserves**

- Petrochemical projects are expected to start up in Iran by the end of March 2017:
  - Second phase of the Kavian Petrochemical complex – 1 million metric tons/year (MMt/y) of ethylene
  - Second phase of Morvarid Petrochemical – Ethylene and ethylene glycol (EG)—will become operational
- Three units at the Bushehr Petrochemical complex will become operational in 2018:
  - Bushehr complex will be able to produce 1.65 MMt/y of methanol; 1 MMt/y of olefins; 550,000 metric tons/year of EG; and 300,000 metric tons/year of acetic acid
- The Marjan methanol plant, also known as the 7th Methanol Project, will also start up in 2018
- Iran has broken ground at Tabriz on an ethylene pipeline project. Iran is planning to build petrochemical plants in the vicinity of Tabriz, northwestern Iran, to transform the region into a petrochemical hub.
  - The 154-kilometer pipeline will transport 200,000 metric tons/year of ethylene from Miandoab, Iran to Tabriz for producing a range of petrochemicals.

# According to their competitive advantages

## *North America*

- Massive investment in new ethane/ethylene capacity
- Investment in on-purpose C3 technology

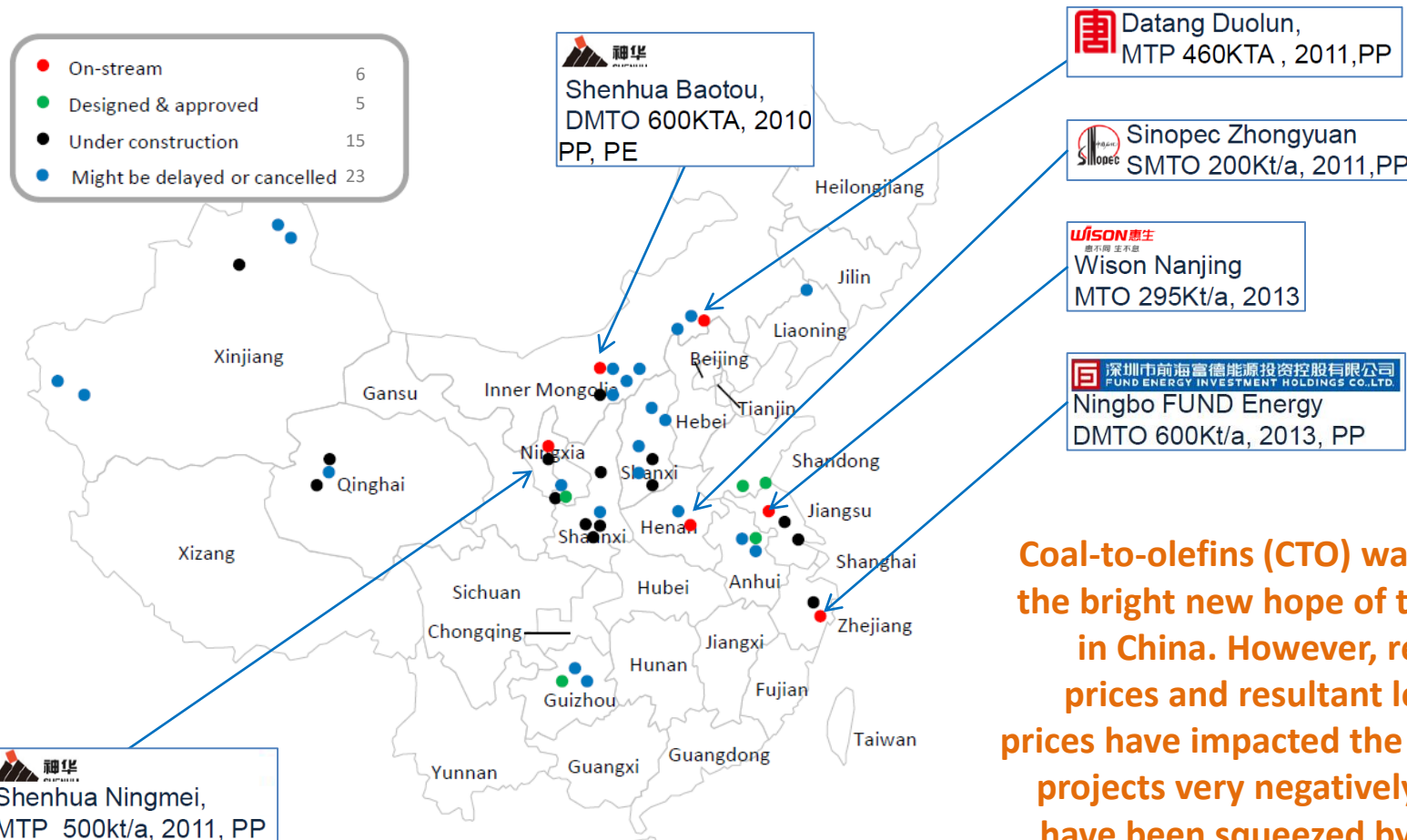
## *China*

- Proven reserves of 1.94 trillion tons of coal
- Growing domestic wealth leading consumption

## *Middle East*

- Hurdles in the way – possible shortage of gas
- Pursuing downstream expansion

# Coal to Olefins in China



**Coal-to-olefins (CTO) was once regarded as the bright new hope of the olefins industry in China. However, recent low crude oil prices and resultant lower global olefins prices have impacted the economics of such projects very negatively, and CTO margins have been squeezed by over 50% in 2015, compared with 2014. This has cast a shadow of doubt on the viability of these highly capital-intensive investments.**



# Chinese coal chemicals

- Chinese Northwest regions host 76% of country's total reserve
- Coal-consuming market is mainly located In the economically developed East and South regions
- Coal from NW is almost entirely transported by railways to ports in North China and then transported by ships to the East and South. A significant amount is also transported by rail directly to the Central and East
- Beyond those plants already in operation, 43 new CTO or MTO projects have been announced

## Main risks:

- Chinese government tight control on project approval
- Water supply constraints
- High capital costs
- Logistics and lack of infrastructure in the NW part of the country
- Currently, the rail capacity is severely limited and the cost to bringing coal from the NW to the East and South is very high. As a result, the coal price in the NW is significantly below the market prices in the East and South
- Coal gasification produces 7x more greenhouse gases than natural gas and is water-intensive

## China's MTO Production

Year	Capacity (kt)	Output	Op Rate (%)
2010	156.0	38.2	24.5%
2011	176.4	69.4	39.3%
2012	176.4	138.0	78.2%
2013	266.0	160.7	60.4%
2014	633.0	270.5	42.7%
2015	1,031.2	465.0	45.0%
2020E	1,800.0	1,200.0	66.7%

Source: Townsend Solutions

# China pollution: Over 80% of rural water in north-east 'undrinkable'

- **More than 80% of rural wells in China's north-east contain water unsafe for drinking**, water ministry officials say.
- The figures come amid rising concerns for the environment affecting water and air quality, with the government seeking to cut down on pollution.
- Much of that focus is targeted on the industrial north, which is one of the country's most heavily polluted areas.
- The water ministry last week released a report showing most of the samples drawn from over 2,000 shallow underground wells in the north and east in 2015 were of poor quality:
  - More than 30% were of Grade IV quality, which is suitable only for industrial and agricultural use
  - Nearly 50% were Grade V, which is water unfit for human consumption of any type
- The ministry said drinking water for **urban areas** across the country came from deep underground aquifers which had water of "overall good quality", with **85% meeting national water quality standards**.



Source: BBC

# Chinese Government started acting

Focus	Details
Prohibiting construction of small scale projects	Prohibiting construction of CTO projects with a capacity of 500,000 TPA or below. Large scale coal conversion projects whose capacity exceeds the above criteria should be subject to NDRC's review and approval
Controlling the layout of new projects and the development speed of CTO	Strictly restricting the development of CTO projects in coal input provinces; cautiously developing MTO projects with imported methanol in coastal areas; studying building large scale olefin projects by centralized utilization of existing methanol facilities up to economic scale Developing CTO moderately
Reducing environmental impacts of new projects	Strictly arranging layout of CTO projects in provinces having abundant coal reserves and relatively rich water resources
Improving energy efficiency & reducing resource consumption	Setting basic requirements for coal consumption, fresh water consumption and energy efficiency of coal to olefin demonstration projects during 12th five-year plan

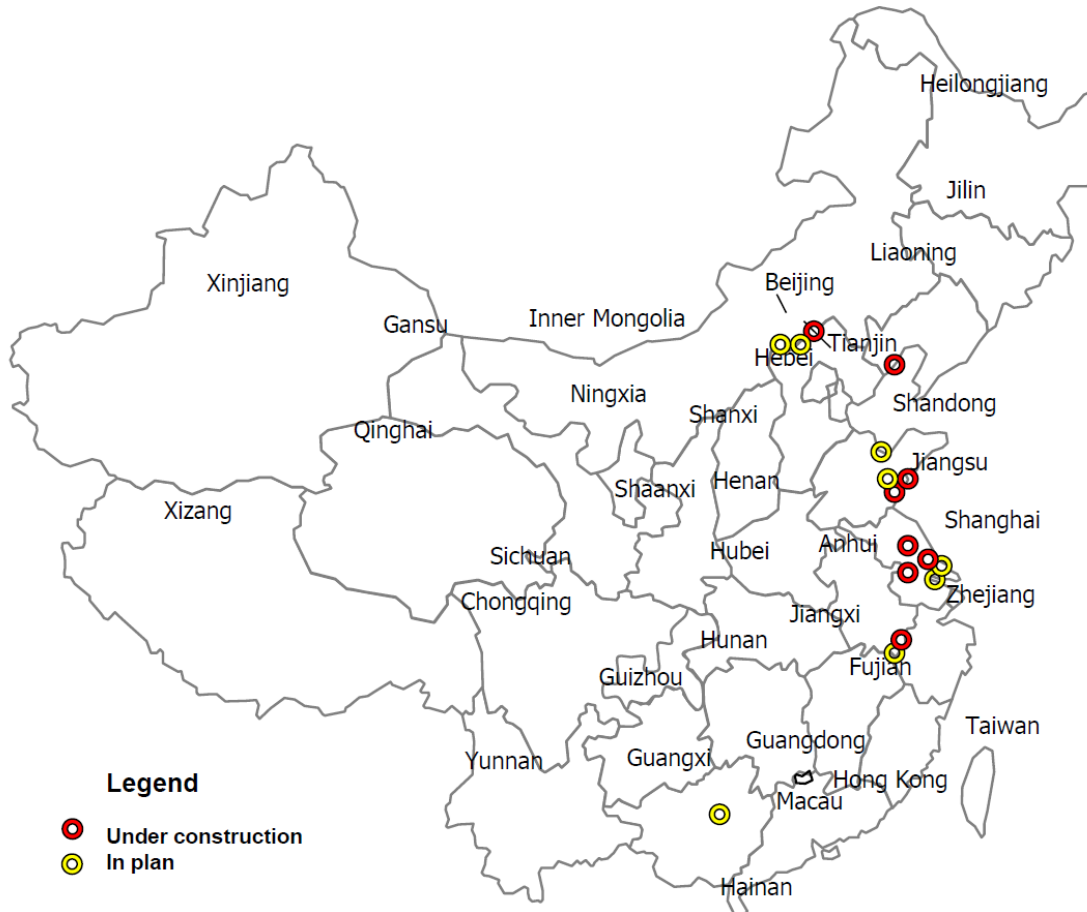
## Revelations

China government is cautious about developing coal to olefins

- minimum scale requirements to ensure asset efficiency, supplement of oil based olefins
- Highly paying attention to environmental impact
- Restrictions on development of projects in water scarcity regions
- Strictly monitoring carbon emission

Source: CNCIC

# PDH Projects in China



- Nearly 16m tons/y reported under construction or planning stage
- Most relying on imported propane (Middle East and US)
- Fluctuating margins
- Delays are expected

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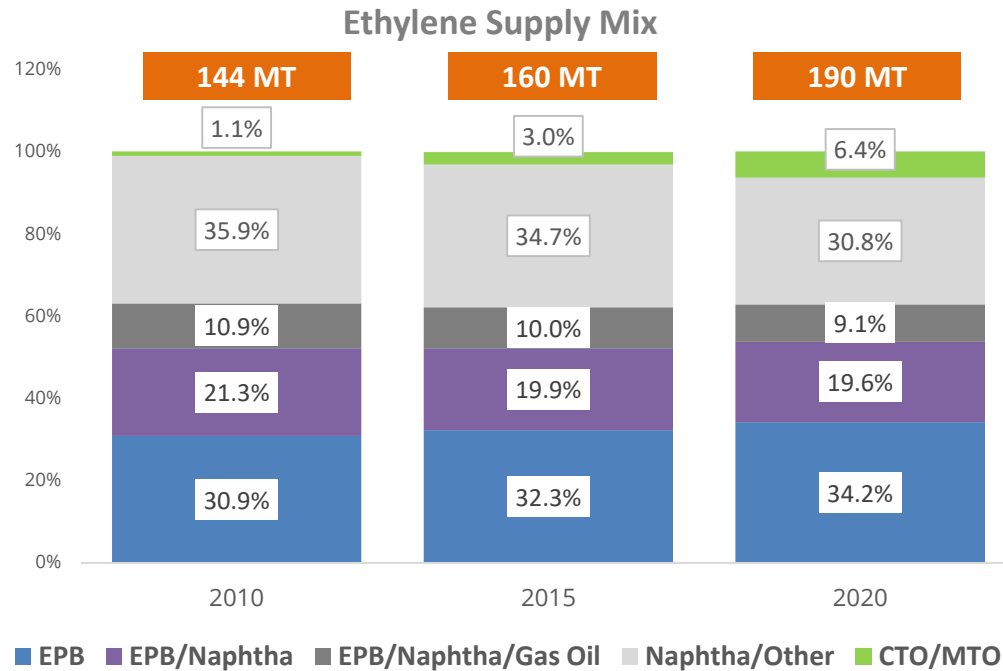
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# Shale Gas Impacting Ethylene Feedstock Share

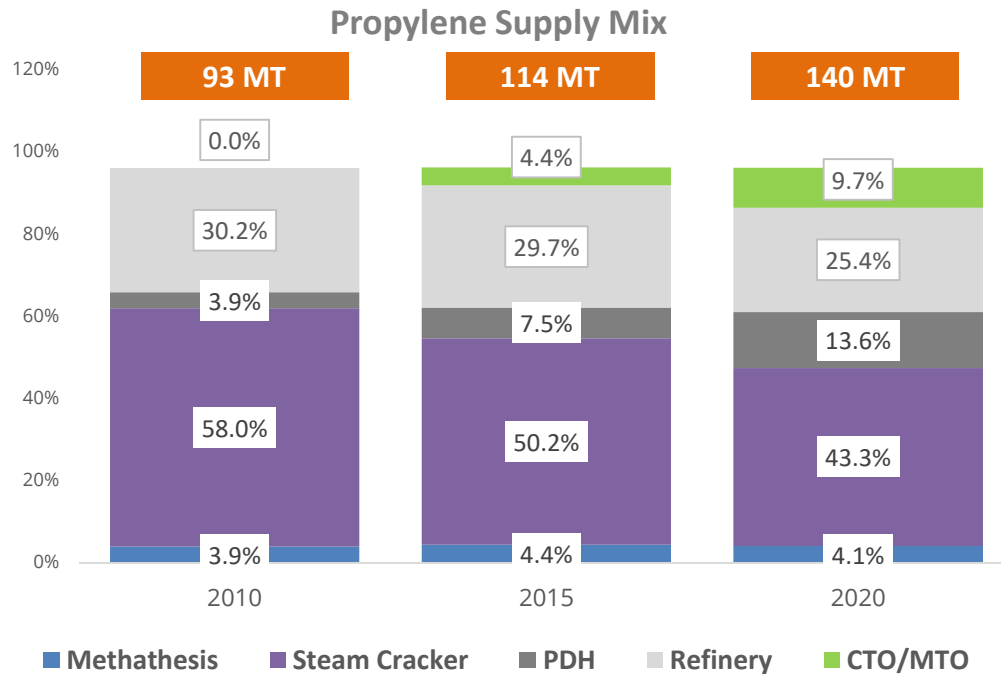


**US/Middle East ethane-based ethylene major advantages include:**

- Abundant supply
- Low cost
- Lower emissions
- Lower water consumption
- Competitive capital cost

**Ethylene dynamics are shifting in favor of lighter feedstocks (NGLs – E, P, B)**

# Shale Gas Impacting Propylene Feedstock Share



**Not a major country/region stands out:**

- Limited availability of traditional supply (crackers/refineries)
- Plenty availability of propane
- High capital cost (on-purpose)

**Propylene dynamics have shifted in favor of on purpose technologies**



# Different routes

	Natural Gas	Naphtha	Coal
Main Regions	Middle East, North America & former USSR Countries	Europe, Latin America & Asia (ex-China)	China
Feedstock cost	+	-	+
Source	ME & USSR, conventional NA, unconventional	Oil	Coal mining
Process	Ethane cracking	Naphtha cracking	CTO/MTO
Investments	Mainly in North America, 197 chemical projects, investments of \$150bn	investments in new Asian countries (eg Vietnam)	17 CTO plants to start-up in 2014-2017, 9.2mt/y of C2/C3
Emissions	+	-	- - (7x more GHG than NG)
Ethylene Cash Cost	+	-	- -
Water Consumption	+	+(0.80-2.17 t/t olefins)	- - (15-20 t/t olefins)
Capital Cost	+	+	- -

Source: Townsend Solutions



# Key Assumptions, Uncertainties, Opportunities

## Key Assumptions

- Continued low oil price environment over next two to three years with prices slowly trending up
- Middle East will remain the low cost producer of petrochemical feedstock but not with the competitiveness it had before
- China will not be able to quickly develop cost competitive and environmentally friendly CTO/MTO processes
- New projects in Asia but with limited impact in the overall market

## Uncertainties

- **Continued low global crude and US natural gas prices will lower US NGL output during rising demand period causing US NGL feedstock prices to hurt downstream competitiveness**
- Rising US petrochemical construction costs, slow permitting, and skilled labor availability may impact future projects
- Competitive shale gas development in other countries
- Ability of Iran and Central Asia/CIS to quick develop new petrochemical complexes (sanctions?)
- **Propylene? Where, how, at what price**

## Opportunities

- U.S. shale producers will focus on quickly growing NGL output if prices rise significantly
- Derivatives markets still growing in North America absorbing the extra volume coming from new crackers
- Consumption per capita of derivatives still low in the developing world – India to become a major outlet for derivatives in the mid-long terms
- **~10 world scale crackers will be needed globally to meet increased demand**

# Different Possible Strategies in a Volatile World



It's a new market, new competition, new drivers

- ☐ Invest or execute joint projects in new low-cost feedstock regions
- ☐ Partnerships to sustain/raise your global position
- ☐ Integration/Footprint is key



Regional market dynamics matter more than ever, access to markets is key as maximizing logistics and production across different plants and regions



Develop new outlets for your product, creating the ability to raise your presence in the global market



“Lean and fit”, when the market reshapes, it's time to reshape your organization, focus migrates from sales to marketing & R&D

# Thank You!

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