

# 14<sup>th</sup> U.S. - China Oil & Gas Industry Forum

**BUILD CROSS-BOARDER ENERGY COOPERATION  
PROMOTE CHINA-US LNG TRADE**



**Shaolin Li**

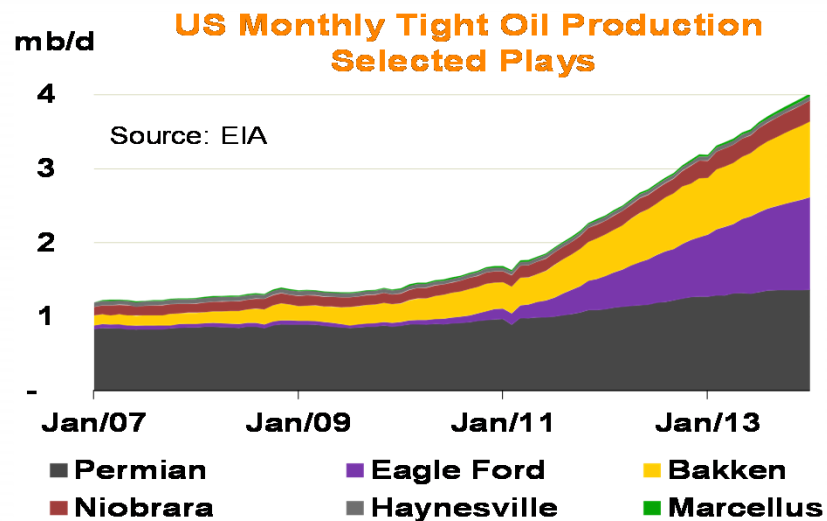
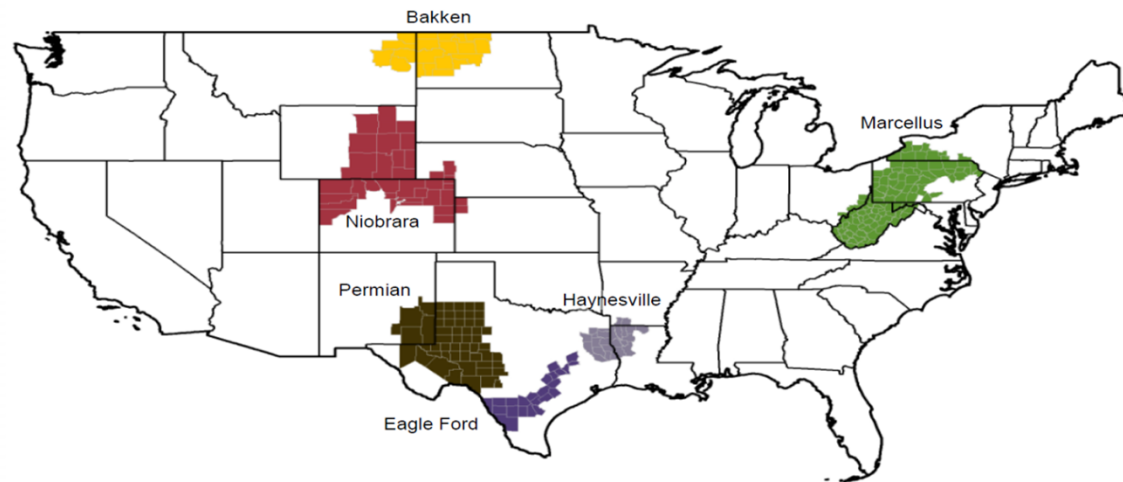
**PetroChina International (America) Inc.**



# Outline

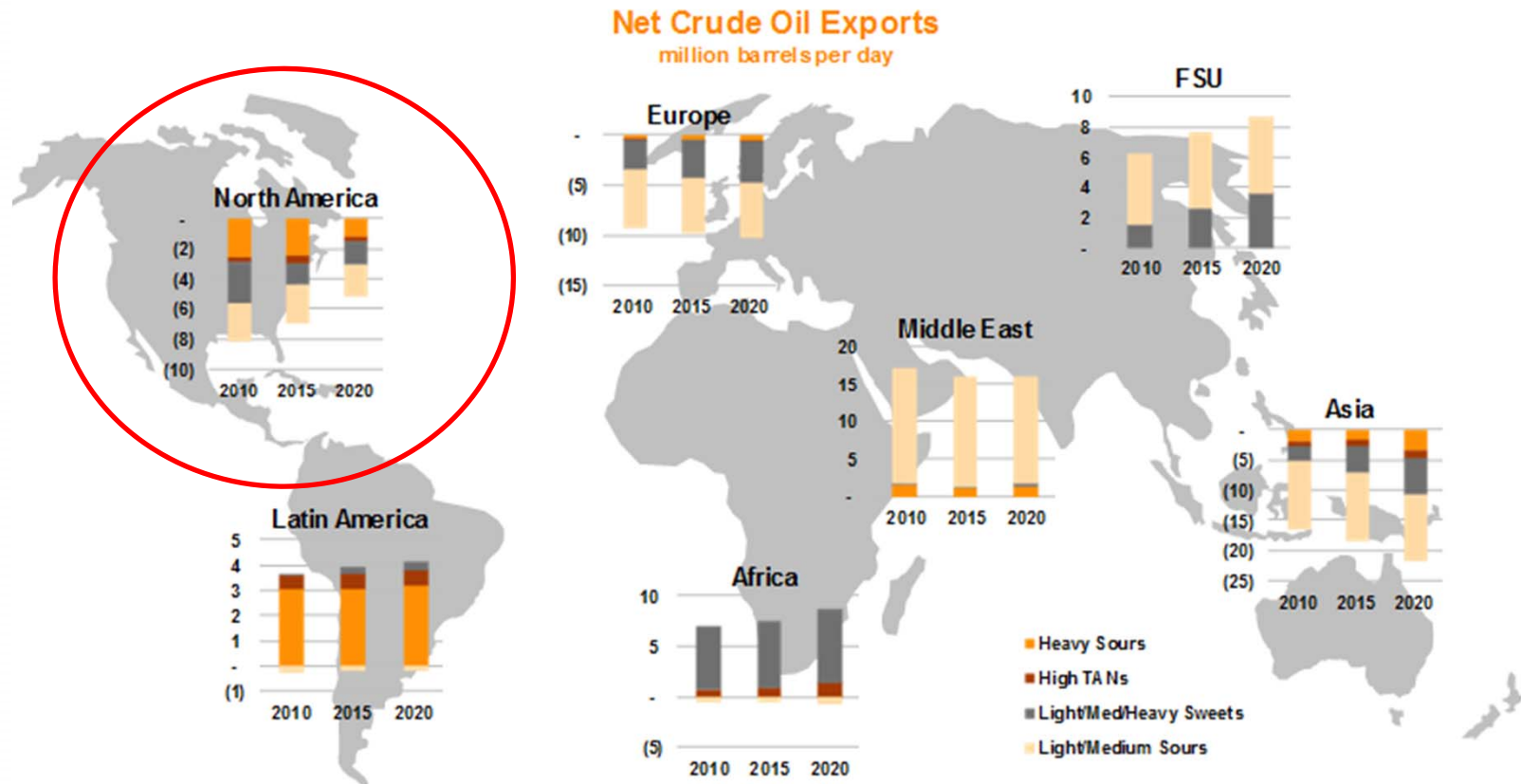
- **U.S. Energy Industry Changes and Trends**
- **U.S. LNG Export Outlook and Policy Issues**
- **China Natural Gas Market and Facilities**
- **Comments & Suggestions**

## ➤ U.S. Shale Oil/Tight Oil Production Rapid Growth



- EIA predicts, by 2020 U.S. crude production could reach as high as 14 million BPD, before gradually reduces.
- Production is mostly alleviated by technology revolution in crude E&P sector.
- Six major oil fields in the U.S. contribute 90% of total production, with Eagle Ford and Bakken at 2/3.
- The shale oil revolution has tremendous implications to U.S. refining industry, crude export policy, energy supply and demand, international trading.

## ➤ North American Crude Squeezes Out Imports



- In 2010, North American crude import was about 8 million BPD, the number is predicted to reduce to 5 million BPD, mostly light sweet crudes displaced.

## ➤ U.S. Crude Oil Export Policy

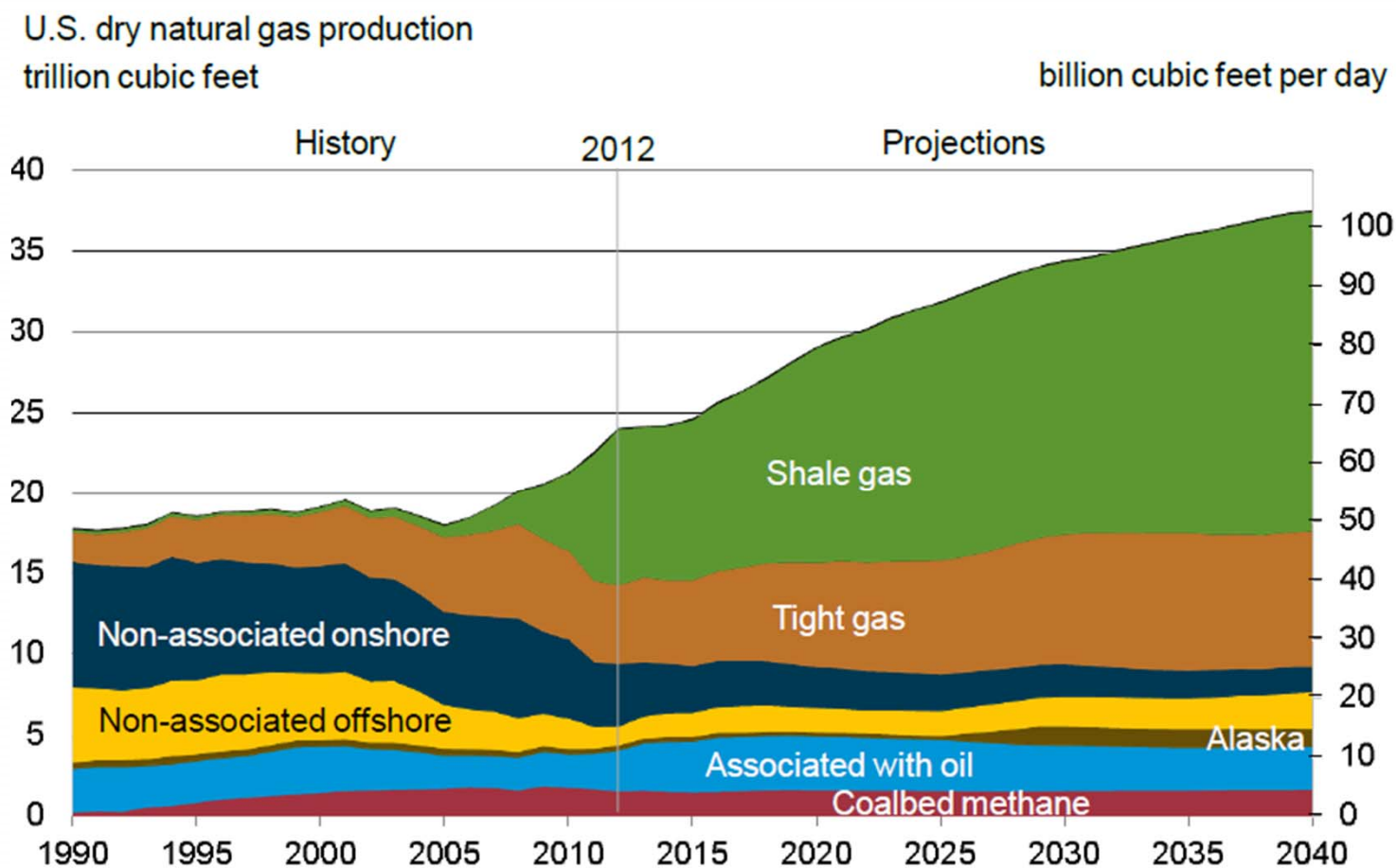


- U.S. domestic crude production grows faster than the domestic refineries can consume, which puts increasing pressure on crude export policy change.
- In response to Arab nations' crude embargo, U.S. passed "Energy Policy and Conservation Act" in 1975, and other similar acts, together restrict crude export. Although the U.S. President can grant exceptional permissions due to national interest.
- In 2011, U.S. Department of Commerce had issued 45 permits, and the number went to 66 in 2012, and 113 in the following year. Currently most of the export grade is light sweet crude going to East Canada refineries.
- It is unlikely to see a full scale change to U.S. crude export policy, while the market reacts by exporting lightly processed condensate, which is not categorized as crude oil.

Million Bbl Per Year	Production	Consumption	Import	Export
2010	1997	5374	3363	15
2011	2063	5404	3261	17
2012	2375	5489	3121	25
2013	2721	5590	2817	44

**Source: EIA**

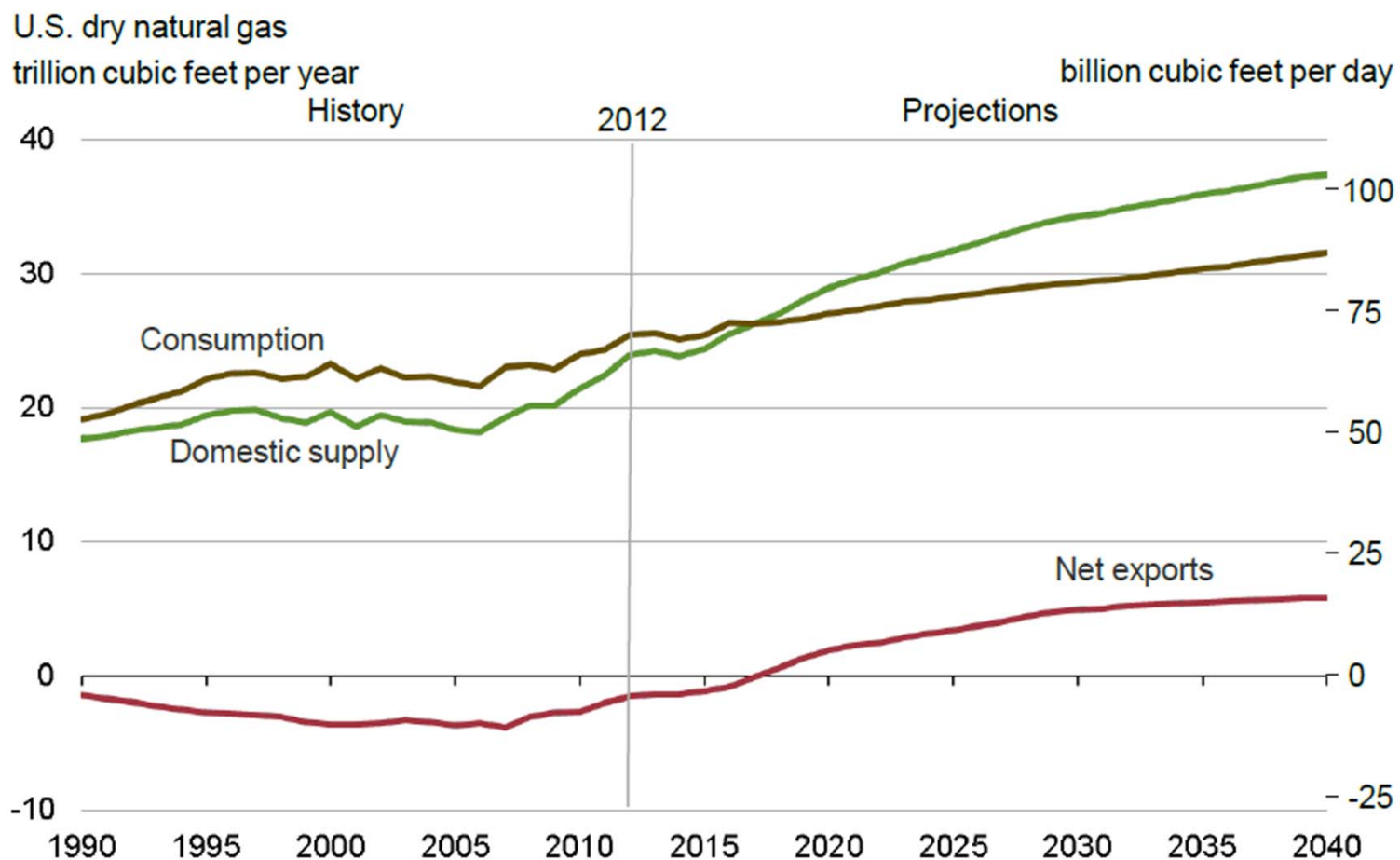
## ➤ US Domestic Supply Growth



Source: EIA, Annual Energy Outlook 2014 Early Release

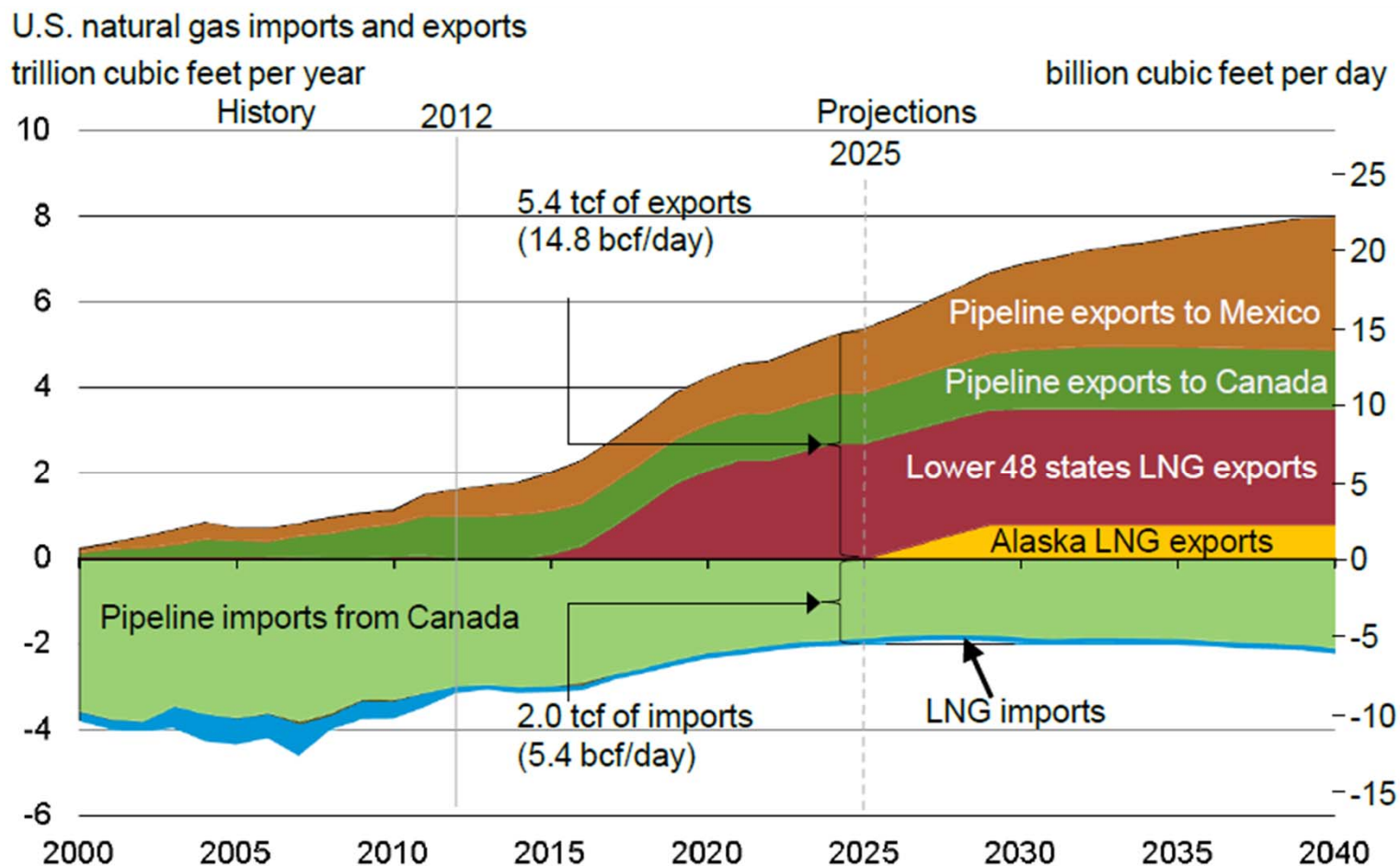


## ➤ US Become Net Exporter By 2016



Source: EIA, Annual Energy Outlook 2014 Early Release

➤ By 2020, US NG Exports will Exceed 4 TCF  
(80 Mtpa) with 50% LNG



Source: EIA, Annual Energy Outlook 2014 Early Release



## ➤ Opportunities & Challenges



- Technological innovation in E&P sector led to tremendous production growth in U.S. domestic shale oil & gas which drives depressed the prices for oil, natural gas, and NGLs.
- U.S. domestic refining industry, petrochemical industry have undergone modifications of the manufacturing processes to take full advantage of the feedstock price. Price advantages supports the competitiveness of U.S. energy business, and has significant implications to the global energy industry.
- Surplus U.S. domestic oil & gas remain to be a important topic for further studies. The U.S. should be more proactive in securing foreign markets, especially in emerging markets, to build a long-term, stable, and profitable trading cooperation.
- Currently the U.S. is no immediate need to revised its crude export policy, however, LNG export has great potential to be exported on a larger scale. Petrochemical exports will improve the U.S. economy, increase employment, and reduce international trade deficit.



# Outline

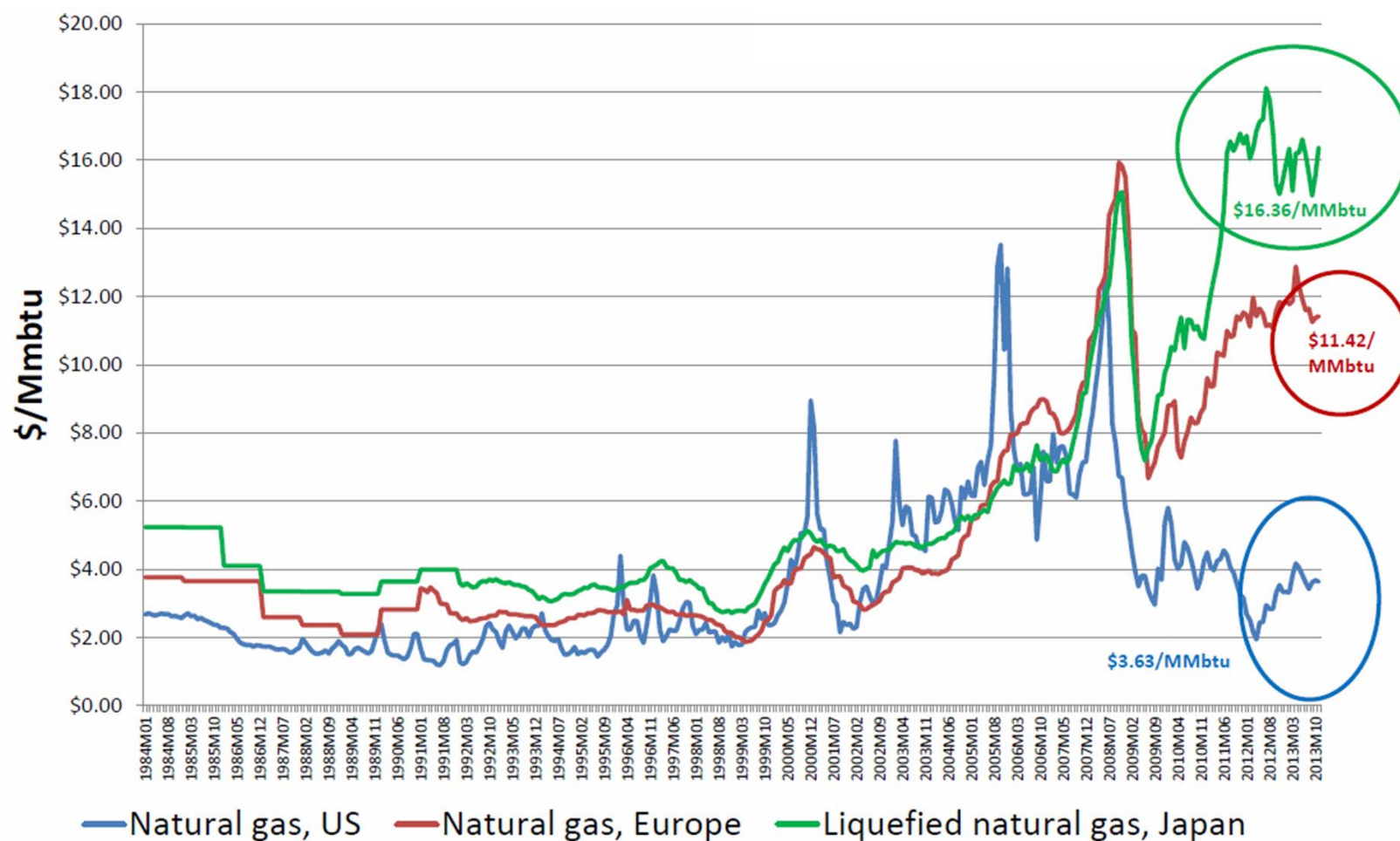
- **U.S. Energy Industry Changes and Trends**
- **U.S. LNG Export Outlook and Policy Issues**
- **China Natural Gas Market and Facilities**
- **Comments & Suggestions**

## ➤ Basics of Liquefied Natural Gas (LNG)



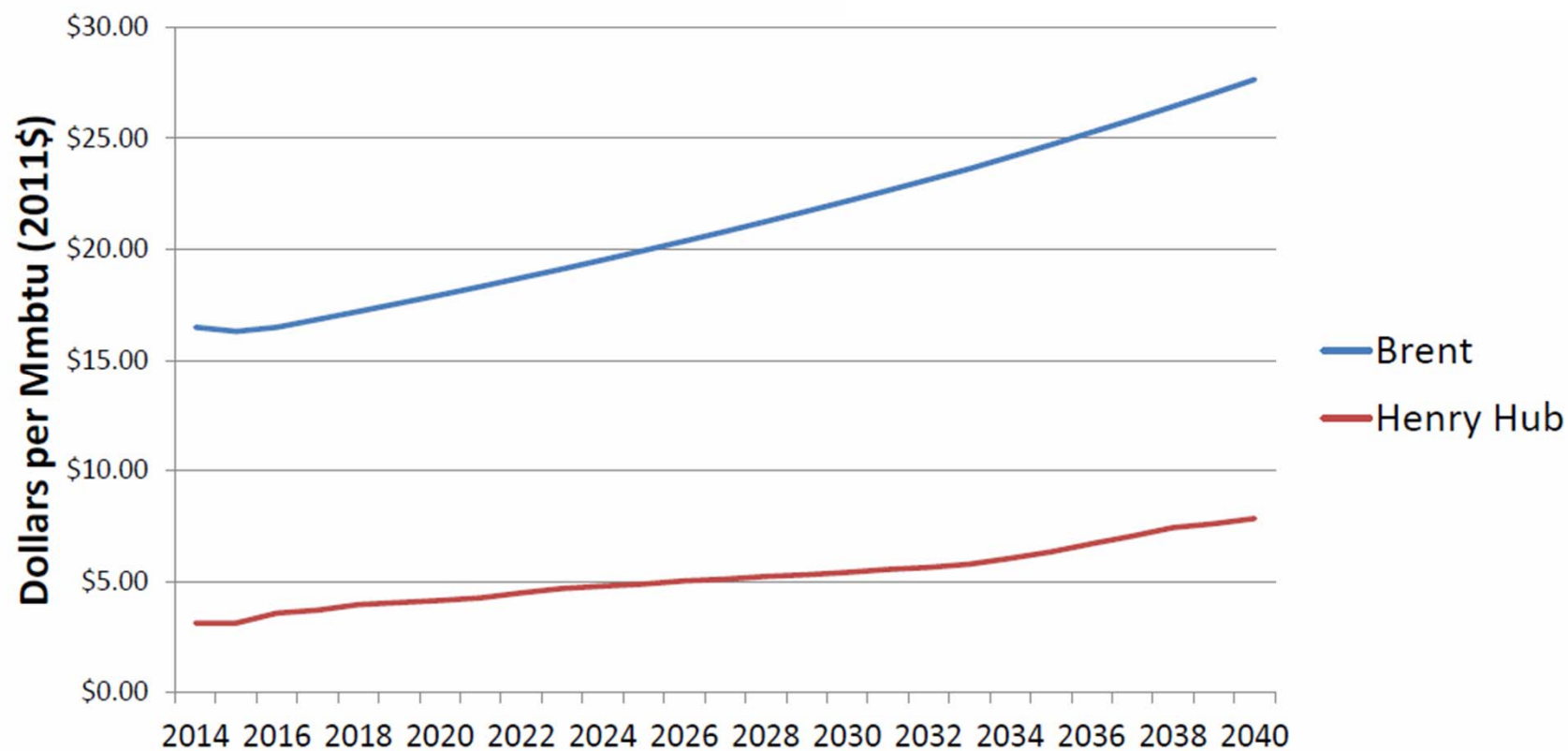
- LNG is clean energy, odorless, noncorrosive, nontoxic liquid
- LNG formed when natural gas cooled to -260 F
- In liquid state, the volume shrinks by about 600 times, making it easy to store and transport via vessel
- LNG has been safely handled for decades
- LNG not stored under pressure and its not flammable in its liquid state
- LNG vessels have made more than 135,000 voyages without major accidents or safety problems
- LNG has played a greater role in industrial, residential, and commercials uses

## ➤ International Natural Gas Prices



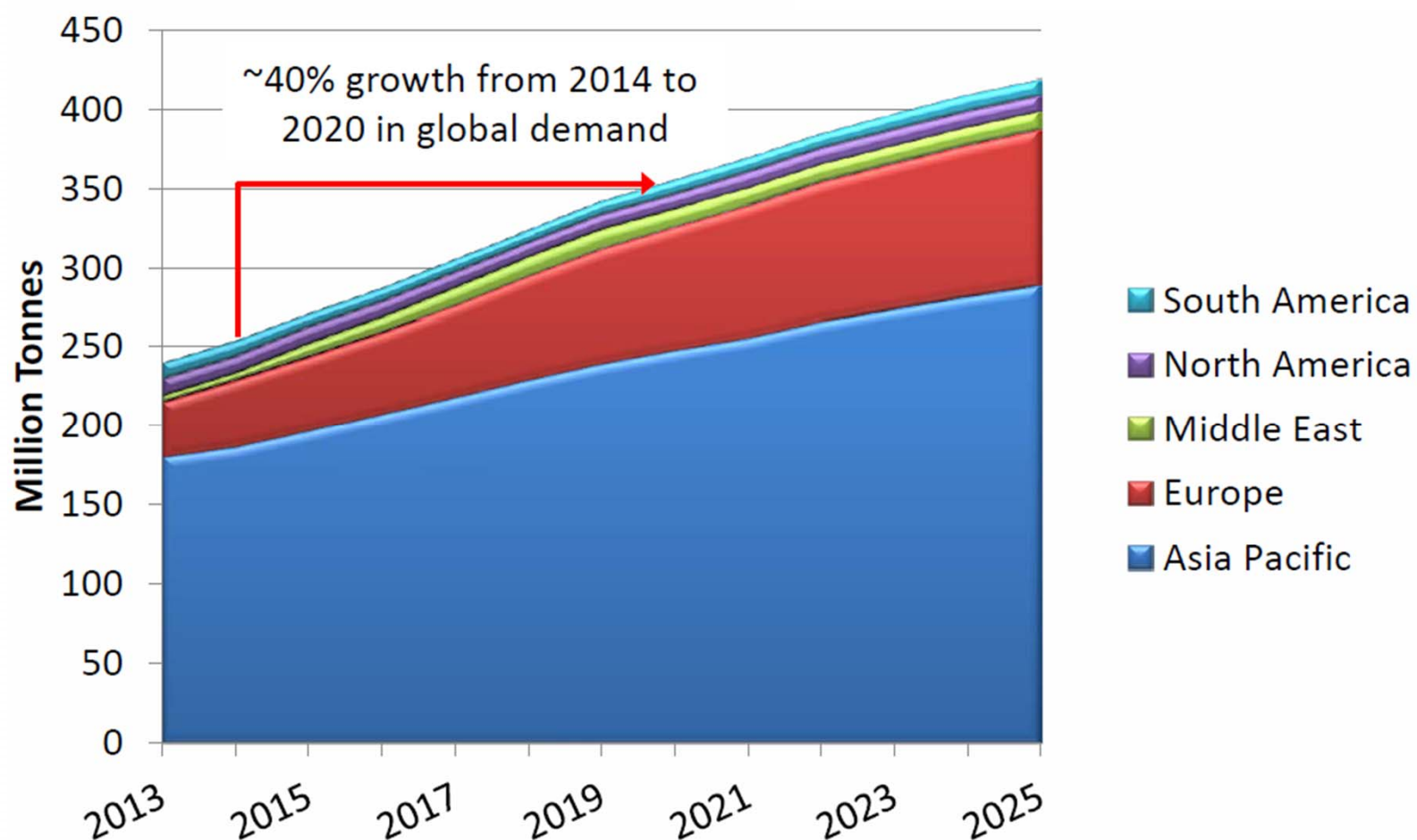
Source: World Bank Pink Sheets Dec 2013

## ➤ US Natural Gas Price Forecast



Source: EIA AEO 2013 Reference Case

## ➤ Global LNG Demand



Source: Poten & Partners Global LNG Outlook Nov 2013



## ➤ U.S. LNG Exports Benefits



- Increase employment opportunities
- Generate revenues, promote economic growth
- Reduce trade deficit
- Help the industry operate efficiently by maintaining production levels, thereby enhancing energy security
- Increase domestic production of associated natural gas liquids (NGLs), putting downward pressure on prices of chemical manufacturing feedstock

## ➤ FERC LNG Project Approval Process



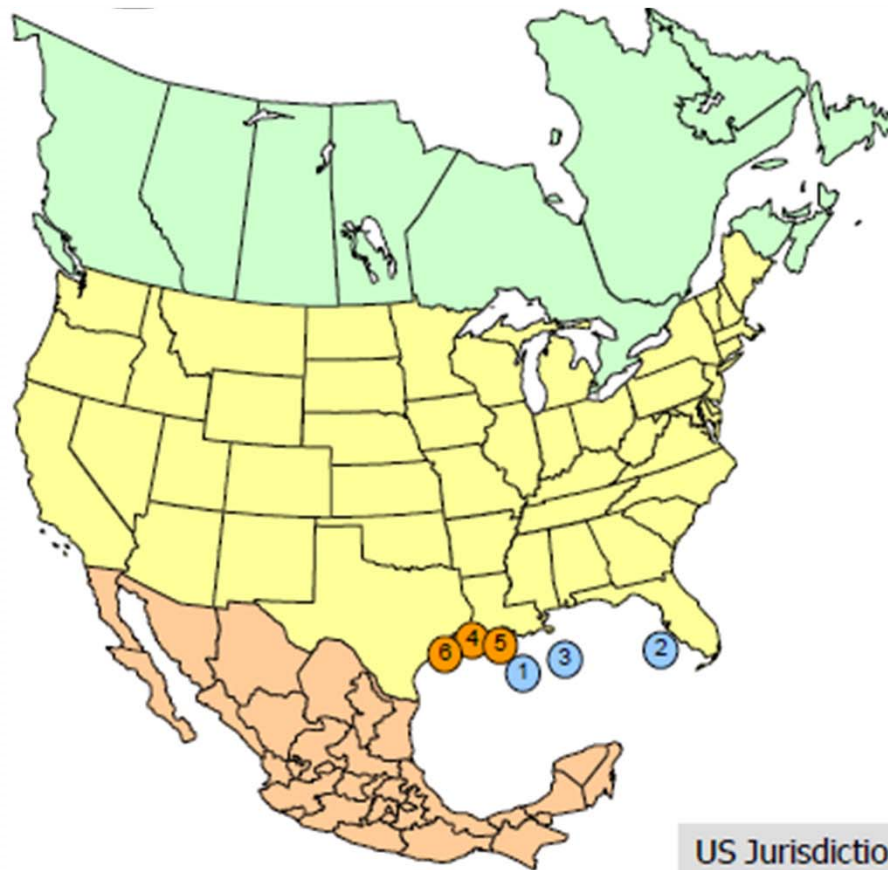
- Under the Natural Gas Act, Federal Energy Regulatory Commission (“FERC”) possesses regulatory authority over construction, interconnection and operation of pipelines and facilities used to transport natural gas in interstate commerce.
- This authority includes onshore LNG facilities and offshore LNG facilities.
- FERC approval process is elaborate and transparent.
- Detailed filings required, including engineering and design information, maps and diagrams, an environmental report, pro forma tariffs and initial rate services, as well as financial and operational information.
- Even an uncontested application can take between 8-12 months for FERC to review and issue decision, while most of the applications took 20 or more months to get approved.

## ➤ DOE LNG Project Approval Process



- The Department of Energy (“DOE”) is the agency responsible for authorizing exports of LNG.
- The authorization process for the export of the LNG commodity to countries with which the U.S. has a free trade agreement (“FTA countries”), is predictable and less burdensome than the authorization process for exports to countries with which the U.S. does not have a free trade agreement (“non-FTA countries”).
- By law, applications to export LNG to FTA countries are deemed to be in the public interest and must be granted without delay or modification.
- FERC approval is usually a pre-condition for DOE decision.
- Approving period: 2-3 months for agency authorization.

## ➤ North American Approved LNG Import/Export Terminals



As of August 15, 2014

\* Expansion of an existing facility

### US Jurisdiction

- FERC
- MARAD/USCG

### Import Terminal

#### **APPROVED - NOT UNDER CONSTRUCTION**

##### **U.S. - MARAD/Coast Guard**

1. Gulf of Mexico: 1.0 Bcfd (Main Pass McMoran Exp.)
2. Offshore Florida: 1.2 Bcfd (Hoegh LNG - Port Dolphin Energy)
3. Gulf of Mexico: 1.4 Bcfd (TORP Technology-Bienville LNG)

### Export Terminal

#### **APPROVED - UNDER CONSTRUCTION**

##### **U.S. - FERC**

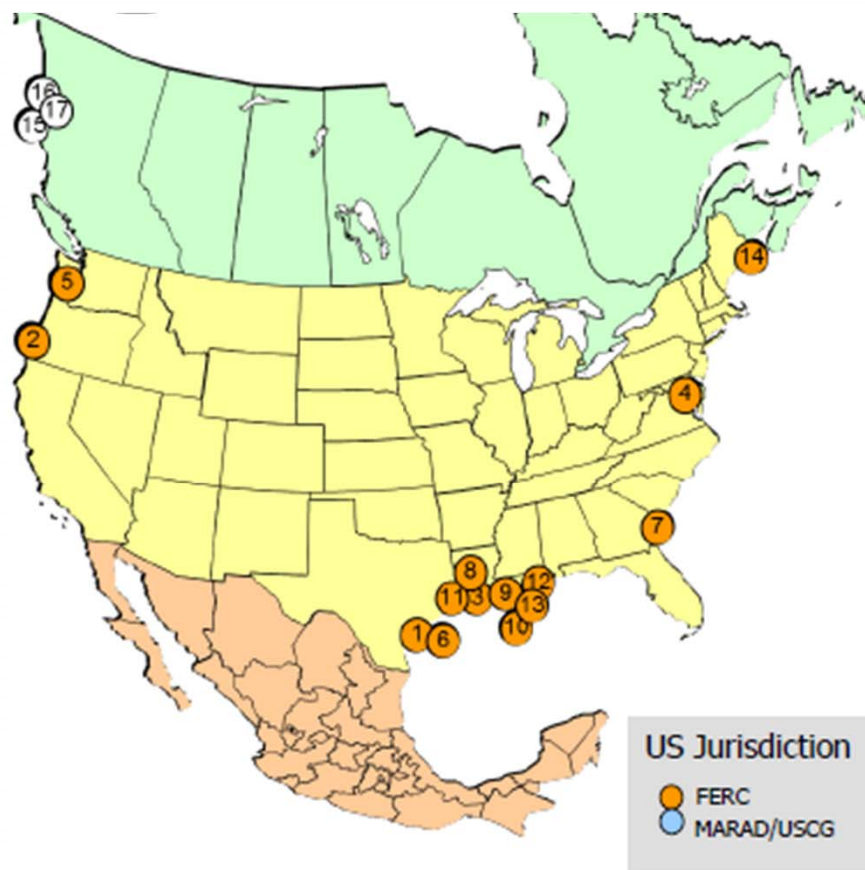
4. Sabine, LA: 2.76 Bcfd (Cheniere/Sabine Pass LNG)  
(CP11-72 & CP14-12)

#### **APPROVED - NOT UNDER CONSTRUCTION**

##### **U.S. - FERC**

5. Hackberry, LA: 1.7 Bcfd (Sempra - Cameron LNG)  
(CP13-25)
6. Freeport, TX: 1.8 Bcfd (Freeport LNG Dev/Freeport LNG  
Expansion/FLNG Liquefaction) (CP12-509)

# ➤ North American Proposed LNG Export Terminals



## Export Terminal PROPOSED TO FERC

1. Corpus Christi, TX: 2.1 Bcfd (Cheniere – Corpus Christi LNG) (CP12-507)
2. Coos Bay, OR: 0.9 Bcfd (Jordan Cove Energy Project) (CP13-483)
3. Lake Charles, LA: 2.2 Bcfd (Southern Union - Trunkline LNG) (CP14-120)
4. Cove Point, MD: 0.82 Bcfd (Dominion – Cove Point LNG) (CP13-113)
5. Astoria, OR: 1.25 Bcfd (Oregon LNG) (CP09-6)
6. Lavaca Bay, TX: 1.38 Bcfd (Excelerate Liquefaction) (CP14-71 & 72)
7. Elba Island, GA: 0.35 Bcfd (Southern LNG Company) (CP14-103)
8. Sabine Pass, LA: 1.40 Bcfd (Sabine Pass Liquefaction) (CP13-552)
9. Lake Charles, LA: 1.07 Bcfd (Magnolia LNG) (CP14-347)
10. Plaquemines Parish, LA: 1.07 Bcfd (CE FLNG) (PF13-11)
11. Sabine Pass, TX: 2.1 Bcfd (ExxonMobil – Golden Pass) (CP14-517)
12. Pascagoula, MS: 1.5 Bcfd (Gulf LNG Liquefaction) (PF13-4)
13. Plaquemines Parish, LA: 0.30 Bcfd (Louisiana LNG) (PF14-17)
14. Robbinston, ME: 0.45 Bcfd (Kestrel Energy - Downeast LNG) (PF14-19)

## PROPOSED CANADIAN SITES IDENTIFIED BY PROJECT SPONSORS

15. Kitimat, BC: 1.28 Bcfd (Apache Canada Ltd.)
16. Douglas Island, BC: 0.23 Bcfd (BC LNG Export Cooperative)
17. Kitimat, BC: 3.23 Bcfd (LNG Canada)

As of August 15, 2014





# Outline

- 🔵 **U.S. Energy Industry Changes and Trends**
- 🔵 **U.S. LNG Export Outlook and Policy Issues**
- 🔵 **China Natural Gas Market and Facilities**
- 🔵 **Comments & Suggestions**

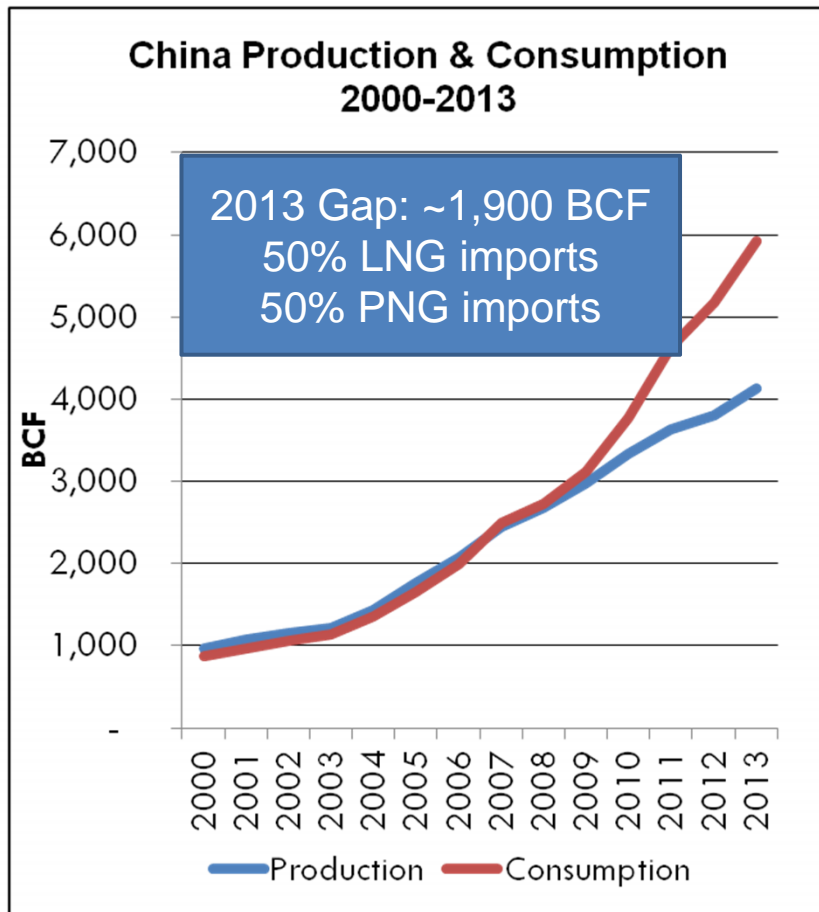


## ➤ China Domestic Natural Gas Demand



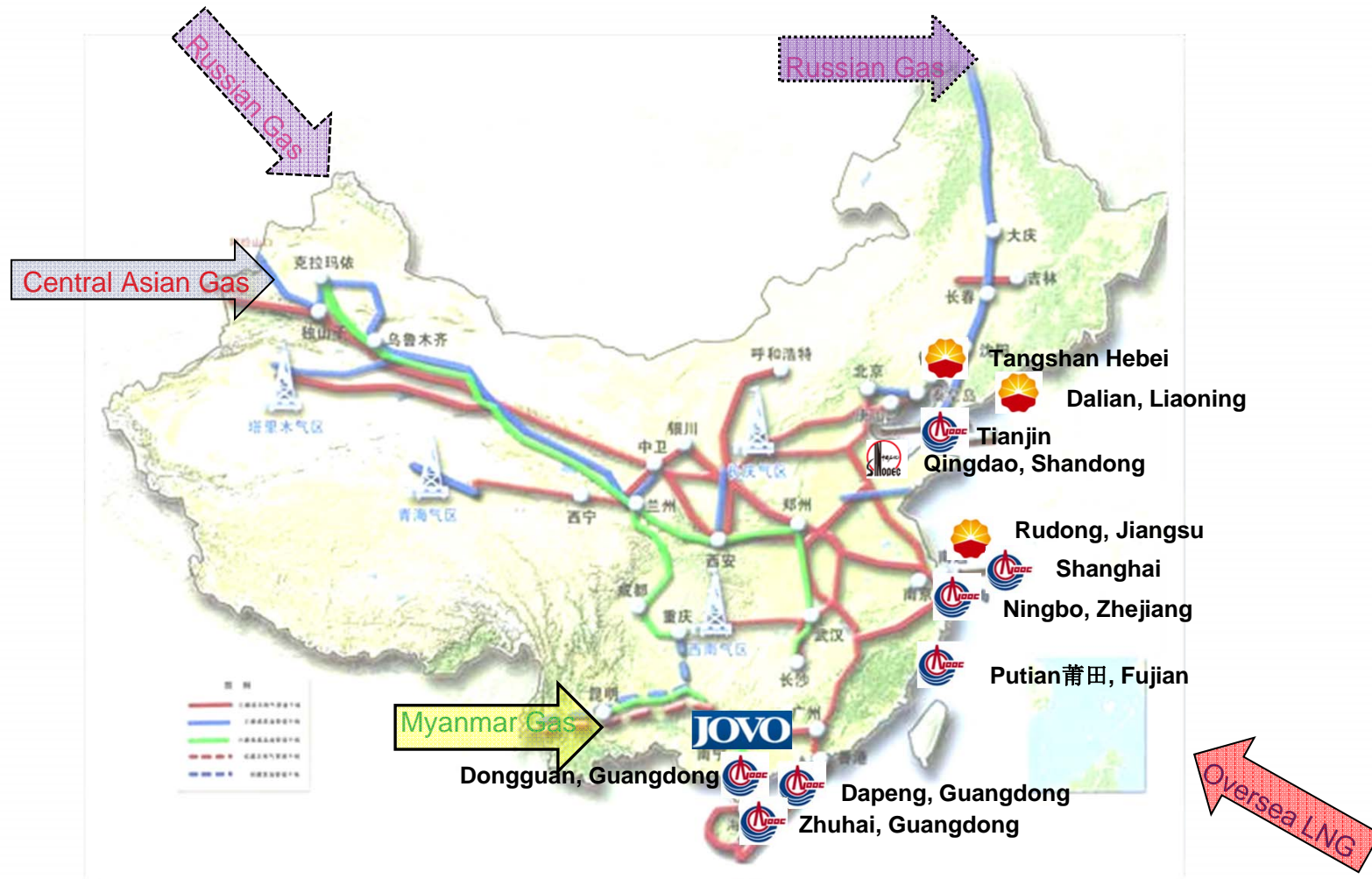
- China's natural gas production in 2012 reached 107.6 billion cubic meters (3.5 trillion cubic feet). The production is growing at a healthy speed.
- During 2003 to 2013, China's consumption growth rate is 17%. The total consumption in 2013 was 1.6 trillion cubic meters (5.7 trillion cubic feet).
- By 2013, the number grew to 32%, with total import at 51 billion cubic meters (1.8 trillion cubic feet).
- China costal cities are quickly developing LNG receiving capacity. Currently there are 11 main LNG gasification projects with a total production capacity of 48.1 billion cubic meters (1.7 trillion cubic feet , 33 million tons).
- In 2013, China became the third largest LNG import country.
- It is projected that by 2015, China's natural gas production will reach 185 billion cubic meters (6.5 trillion cubic feet), demand reaches 260 billion cubic meters (9.2 trillion cubic feet), the supply-demand gas is about 75 billion cubic meters (2.6 trillion cubic feet).

- Natural gas plays an important role in China's clean energy agenda and its infrastructure is rapidly expanding to support growth



- Since 2000, China's natural gas demand has doubled every 5 years
- China has quadrupled LNG import terminal capacity (4 Bcf/d) in the past five years with an additional 2 Bcf/d expected to come online by 2016
- In 2013, China more than doubled its underground storage capacity and is doubling its small-scale LNG storage in 2014

## ➤ China Natural Gas Import Facilities





# Outline

- **U.S. Energy Industry Changes and Trends**
- **U.S. LNG Export Outlook and Policy Issues**
- **China Natural Gas Market and Facilities**
- **Comments & Suggestions**

## ➤ Comments & Suggestions (1)



- U.S. shale gas revolution has rapidly increased production.
- Slated to become a major natural gas exporter in the future.
- U.S. LNG export is ramping up, targeting consumers in emerging markets.
- Natural gas will play a larger role in China's energy consumption year by year, China will remain a long term natural gas importer in Asia.
- China is already sourcing natural gas and LNG from Central Asia, Russia, Middle East, Australia and other regions and countries . Securing LNG resources from the U.S. has strategic implications.
- China and U.S. energy companies should build deep cooperation on long-term, stable, economical LNG trades.
- Chinese companies should more actively participate U.S. Greenfield LNG export terminal projects, as well as securing long-term export volumes to non-FTA countries.
- To support continued development of natural gas infrastructure.

## ➤ Comments & Suggestions (2)



- The future for LNG trading between China and U.S. have very broad prospects , some specific suggestions are:
  - Chinese participation in investment of U.S. natural gas production, to develop an integrated business supply chain.
  - Continued mutual cooperation between experienced U.S. and Chinese project operator and developers on new LNG projects.
  - Mutually beneficial for Chinese and U.S. Energy trading companies to work together to increase LNG trading.
  - Expand the LNG export market, and consideration the feasibility to modify the plan for the U.S. - China bilateral FTA system. May start from adding LNG to the free trade commodity.
  - The key factor of the LNG trade for U.S.-China is the competitiveness of the LNG Price. Therefore, the two sides need to establish a natural gas pricing system specially for U.S.-China natural gas trade.





# Thank you!