Upheaval in Global Natural Gas Markets

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Three Fundamental Developments in Natural Gas Markets

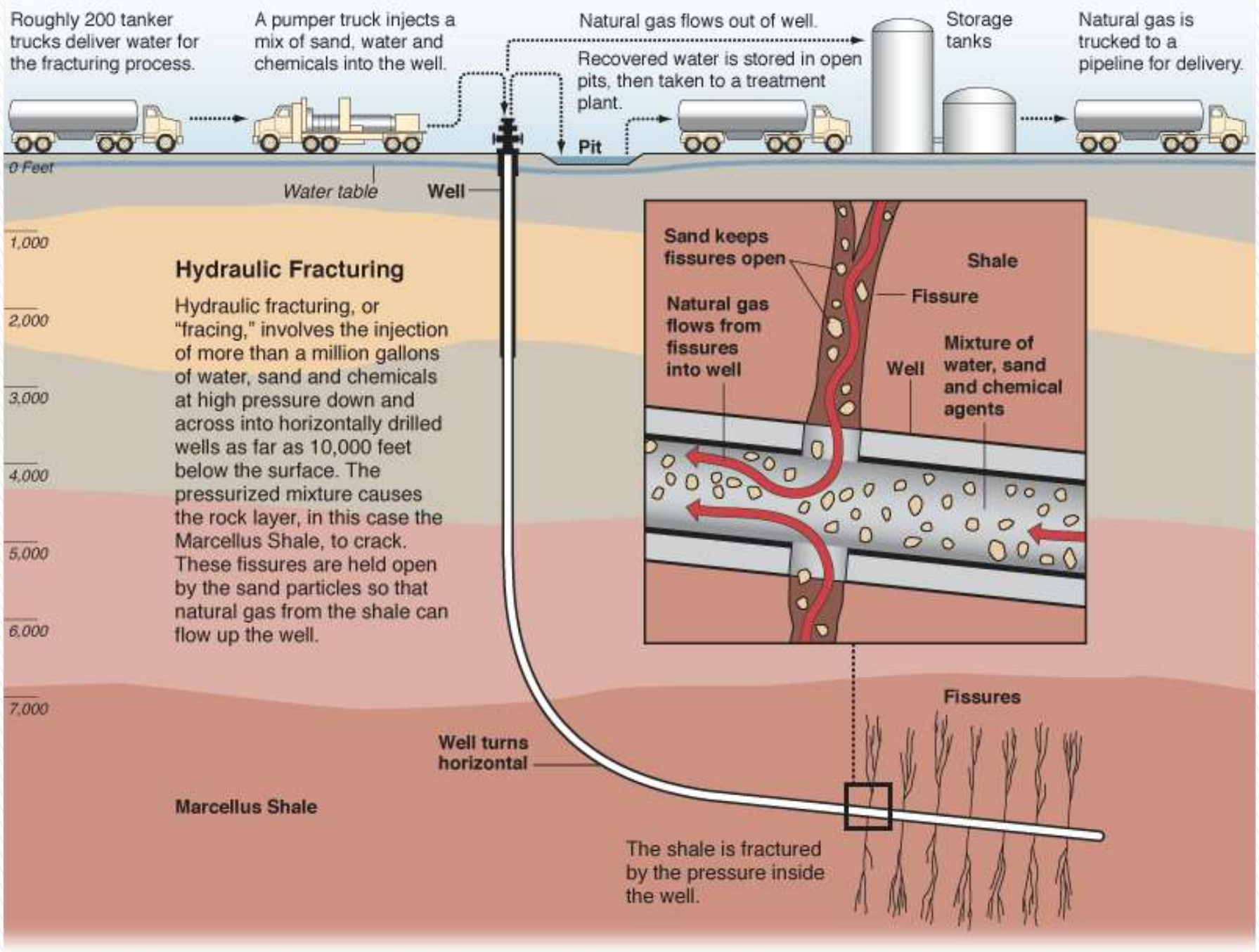
- I. New technologies (fracking) are allowing previously uneconomic natural gas resources to be exploited threatening a glut in supply.
- II. Massive ongoing investments in liquefied natural gas (LNG) by Qatar and others are increasing price transmission across markets.
- III. As a result, natural gas prices are becoming delinked from oil prices in some markets.

Fluid Developments

- U.S. natural gas imports have plummeted with prices at 10 year lows; major LNG investments targeted at U.S. markets must look elsewhere for customers.
- Warren Buffett has warned his shareholders that the largest private equity investment in history, in a Texas utility, may be worthless.
- Exxon is betting much of its future growth on fracking by buying XTO Energy for US$35 bn.

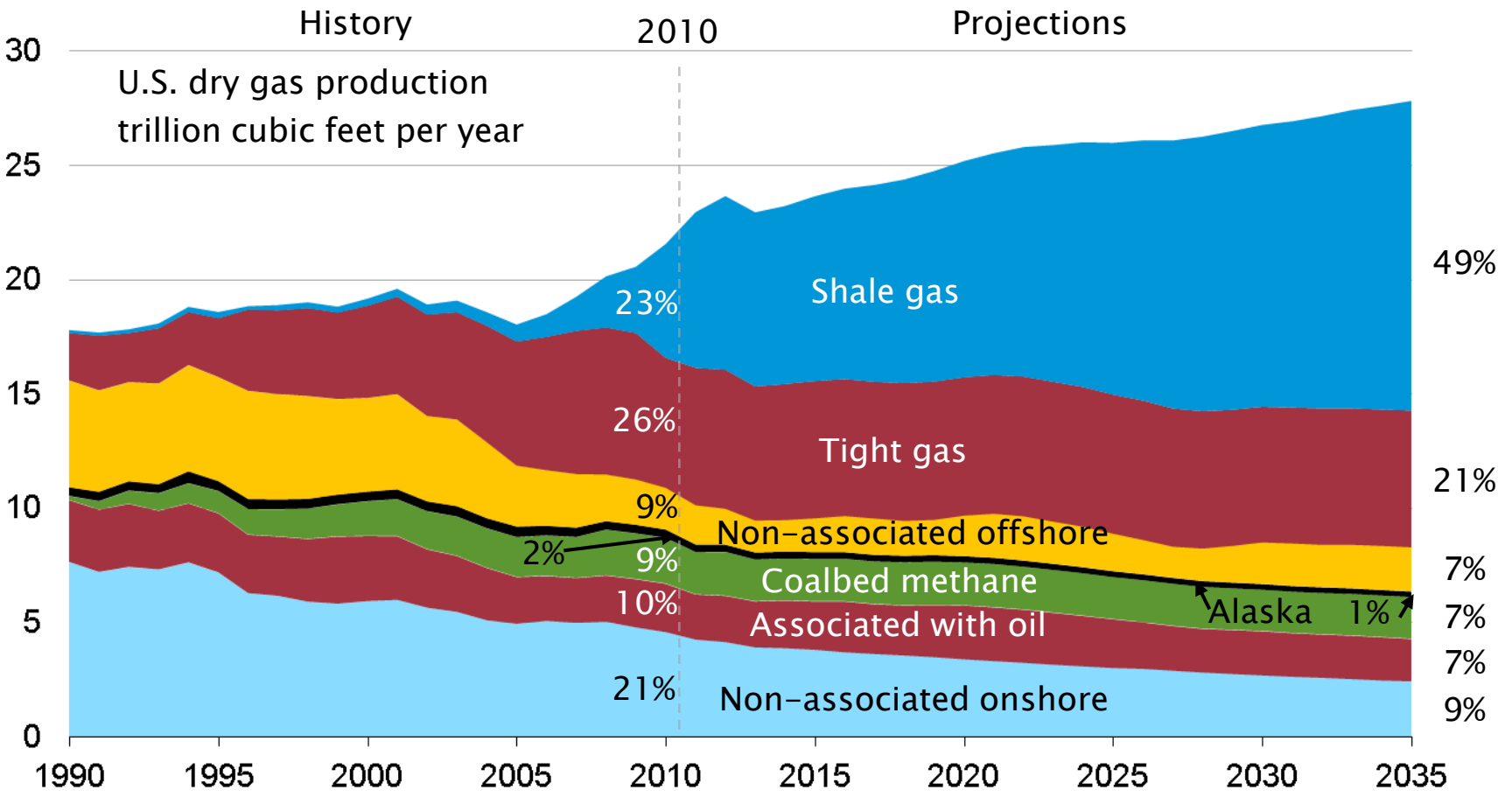
I. Hydraulic Fracturing (Fracking)

- Large quantities of water, chemicals, and sand (or proppants) are injected at high pressure into a well drilled down and then horizontally.
- The pressure fractures the rock (shale) and releases natural gas.



Graphic by Al Granberg

U.S. Shale Gas Production: Five- fold Growth in Five Years

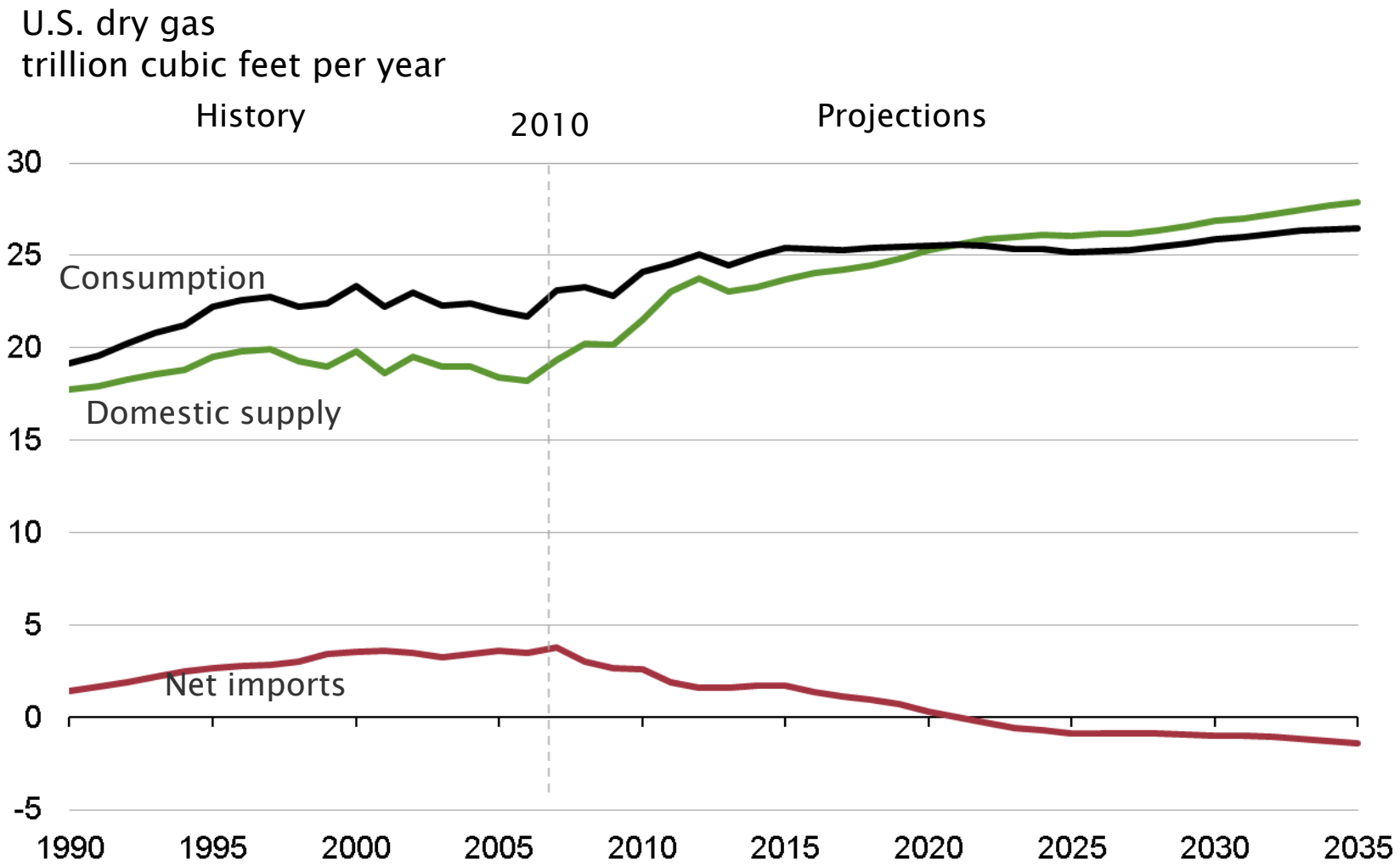


Source: EIA, Annual Energy Outlook 2012 Early Release

US to Become a Net Exporter

- The United States is projected to become a net exporter of LNG in 2016, according to the U.S. Energy Information Administration.
- It is projected to become a net pipeline exporter in 2025, and an overall net exporter of natural gas in 2021.

US as a Net Exporter



- Source: EIA, Annual Energy Outlook 2012 Early Release

Global Shale Gas Potential

Technically Recoverable Shale Gas Resources by Country

(In trillions of Cubic Feet)

Country	Resources	Country	Resources	Country	Resources
Algeria	231	Germany	8	South Africa	485
Argentina	774	India	63	Sweden	41
Australia	396	Libya	290	Tunisia	18
Bolivia	48	Lithuania	4	Turkey	15
Brazil	226	Mexico	681	United Kingdom	20
Canada	388	Morocco	11	Ukraine	42
Chile	64	Netherlands	17	United States	862
China	1,275	Norway	83	Uruguay	21
Colombia	19	Pakistan	51	Venezuela	11
Denmark	23	Paraguay	62	Western Sahara	7
France	180	Poland	187	Total	6603

Source: The U.S. Energy Information Administration.

- Proven natural gas reserves are around 6,647 trillion cubic feet. Technically recoverable resources (largely excluding shale) are around 16,000 trillion cubic feet.

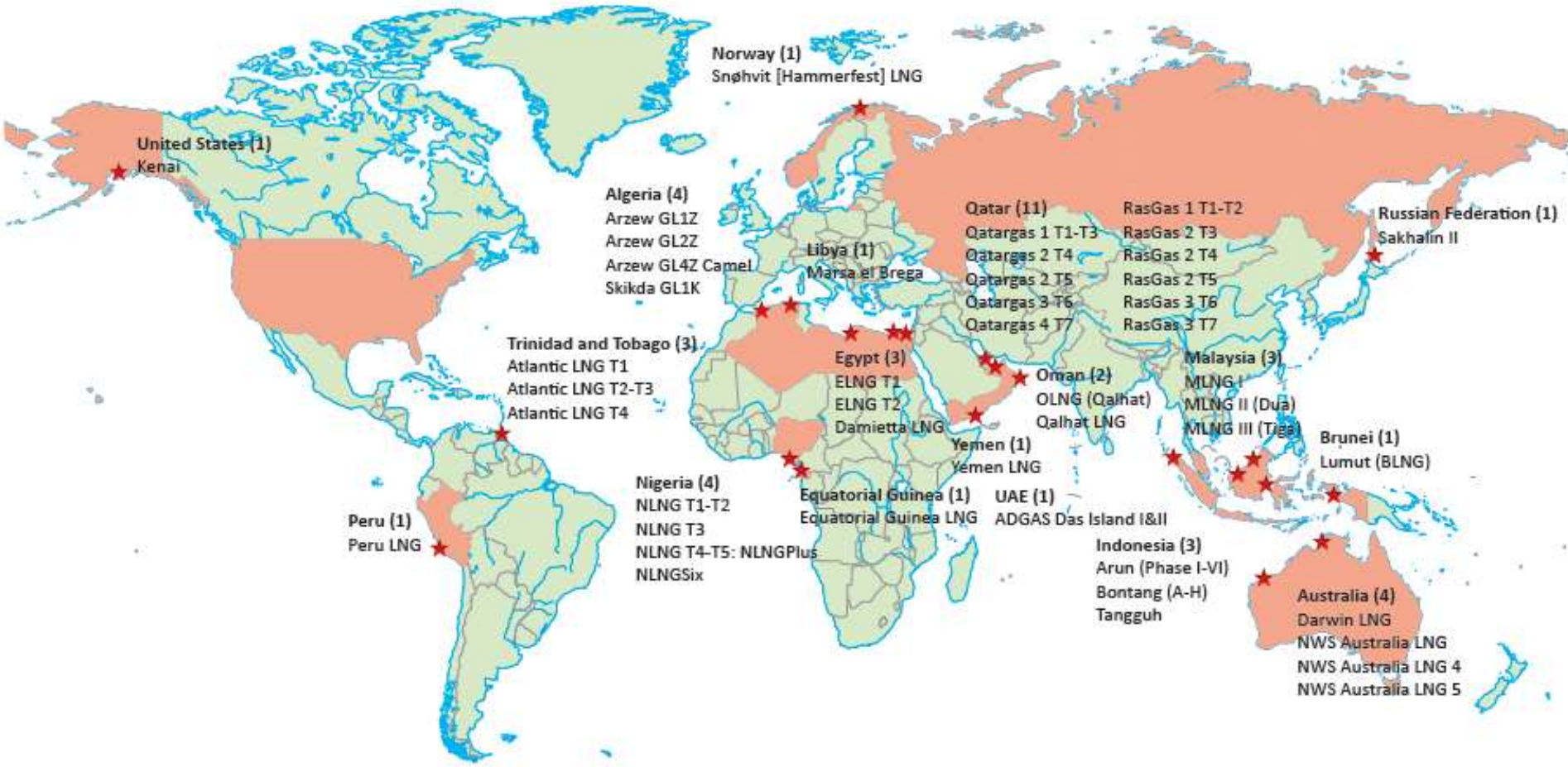
Fracking and the Environment

- Natural gas is the cleanest fossil fuel.
- However, there are potentially large risks to the environment from fracking:
  - Obtaining millions of gallons of water
  - Injecting the water with undisclosed chemicals into the ground, with potential contamination of aquifers
  - Managing large quantities of the injected water and chemicals recovered at the surface, which could be subject to spills

II. Is There a Global Natural Gas Market?

- There is a large and growing geographical mismatch between sources (e.g. Qatar, Iran, Russia) and markets, esp with rebalancing.
- About 30 percent of natural gas is traded across borders and about three quarters of that is by pipeline, with geographic and other constraints.
- The share of trade accounted for by LNG is rapidly growing. LNG demand is particularly strong for fast-growing emerging markets not served by pipelines.

World LNG Exporters



Legend
- Existing LNG export plant
- Under construction LNG export plant
- Under construction LNG export plant offshore
- Planned and proposed LNG export plant
- Planned and proposed LNG export plant offshore
- Speculative LNG export plant
- Speculative LNG export plant offshore

Existing LNG Export Plants

Exclusive to LNG INSIGHT

World 46 plants existing
Capacity 284.14m t/y as at April 2012

Cartography: Petroleum Economist Cartographic Service
Source: Compiled by Petroleum Economist from primary source

LNG INSIGHT

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Plants Under Construction

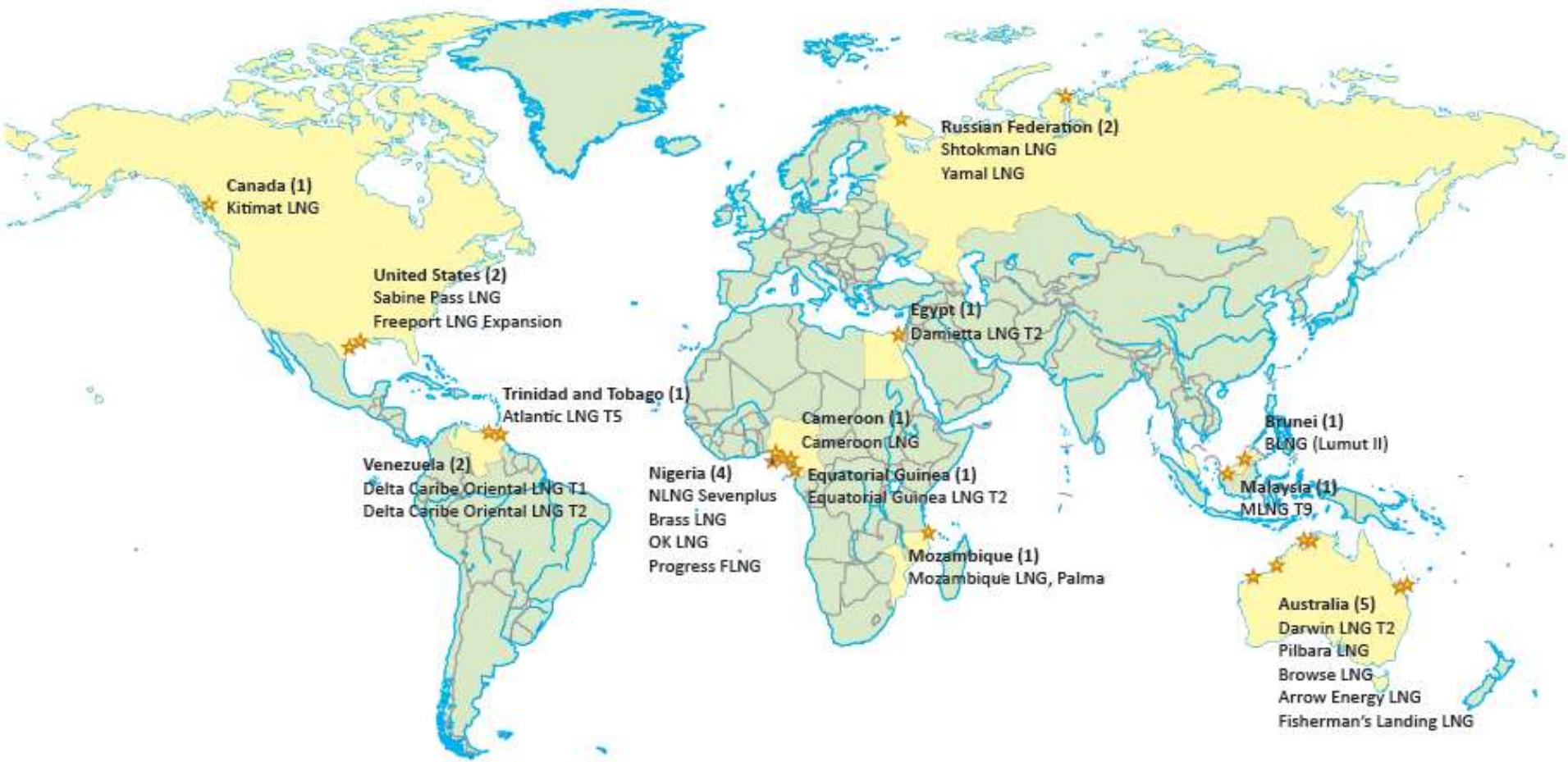
Exclusive to LNG INSIGHT

World 13 plants under construction
Capacity 88.50m t/y as at April 2012

Cartography: Petroleum Economist Cartographic Services
Source: Compiled by Petroleum Economist from primary sources

LNG INSIGHT

World LNG Exporters



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Planned and Proposed

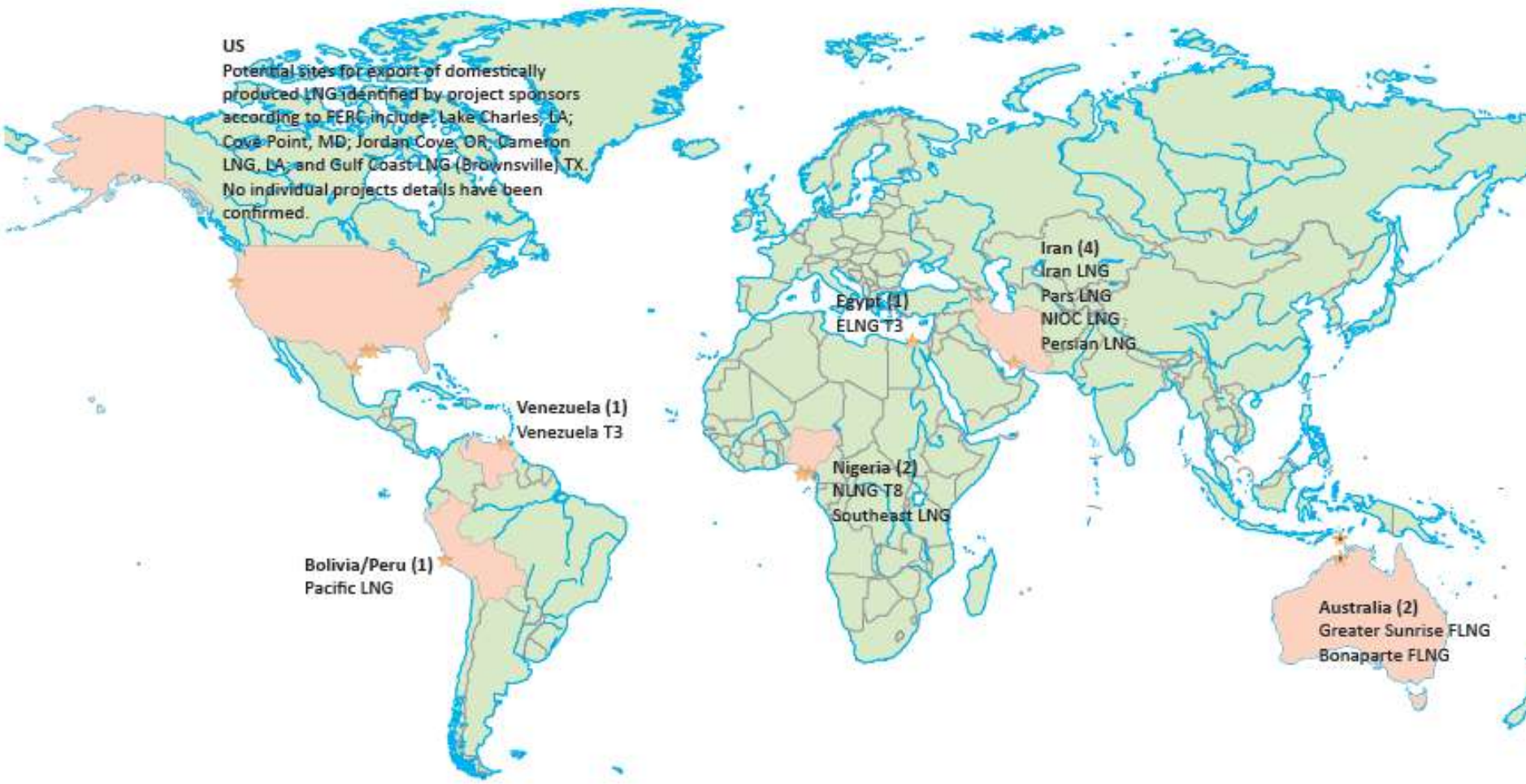
Exclusive to LNG INSIGHT

World 23 plants planned or proposed
Capacity 176.70m t/y as at April 2012

Cartography: Petroleum Economist Cartographic Services
Source: Compiled by Petroleum Economist from primary sources

LNG INSIGHT

World LNG Exporters



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Speculative

World 11 plants speculative
Capacity unavailable

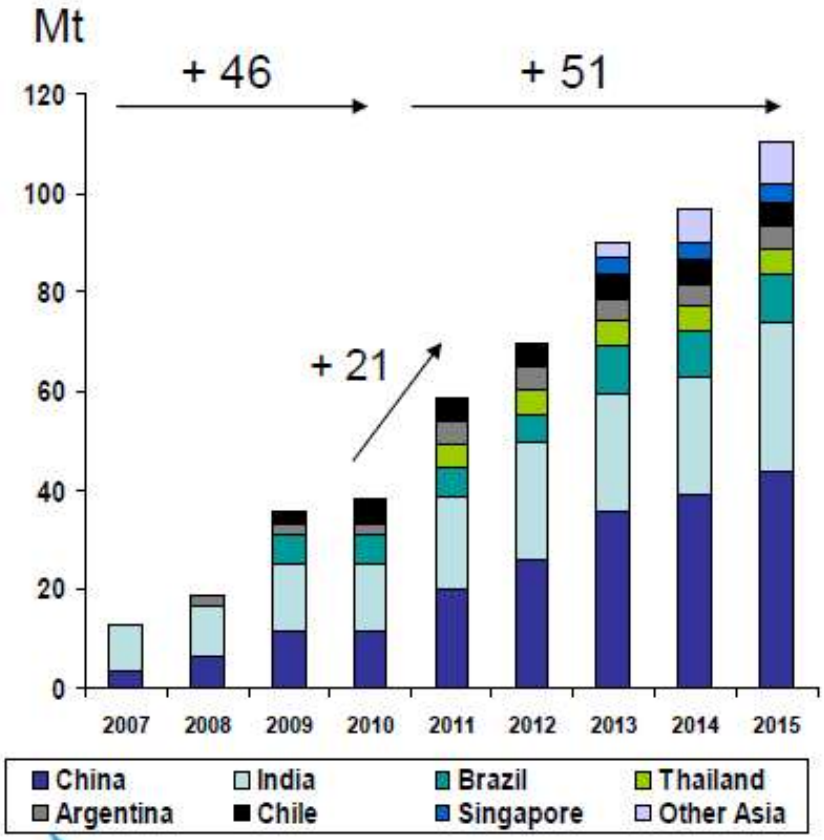
Exclusive
LNG INSI

Cartography: Petroleum Economist Cartographi
Source: Compiled by Petroleum Economist from prima

Construction of LNG Regasification Plants

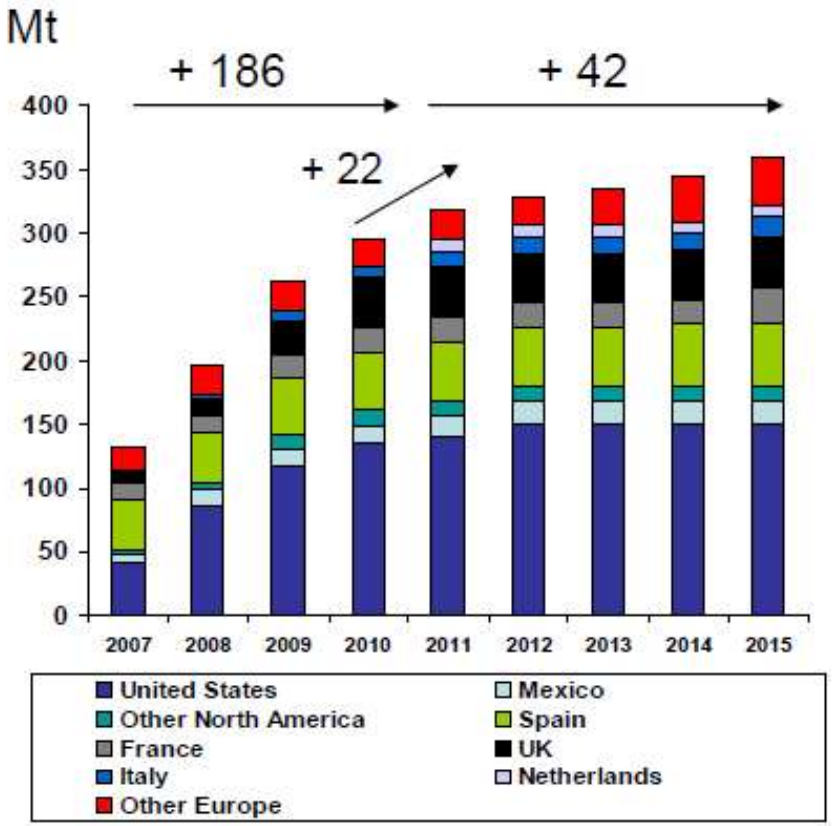
Projects under construction and probable: 2011-2015

Emerging markets – *Latin America & Asia*



Industrialized markets

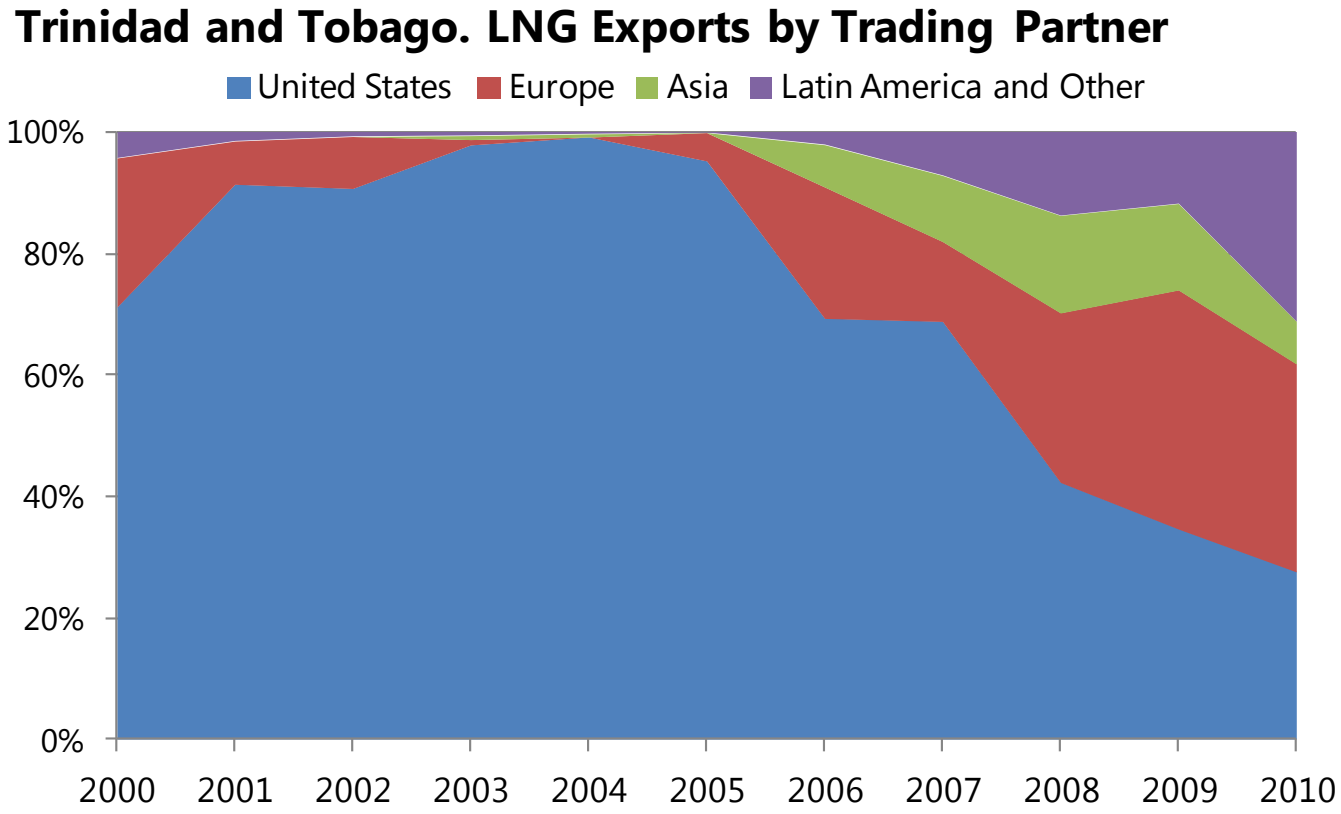
Atlantic Basin



Source: CEDIGAZ

Diversion of LNG Shipments

- TTO has diverted U.S. shipments to higher priced markets—but low prices and large uncertainty will affect investment.



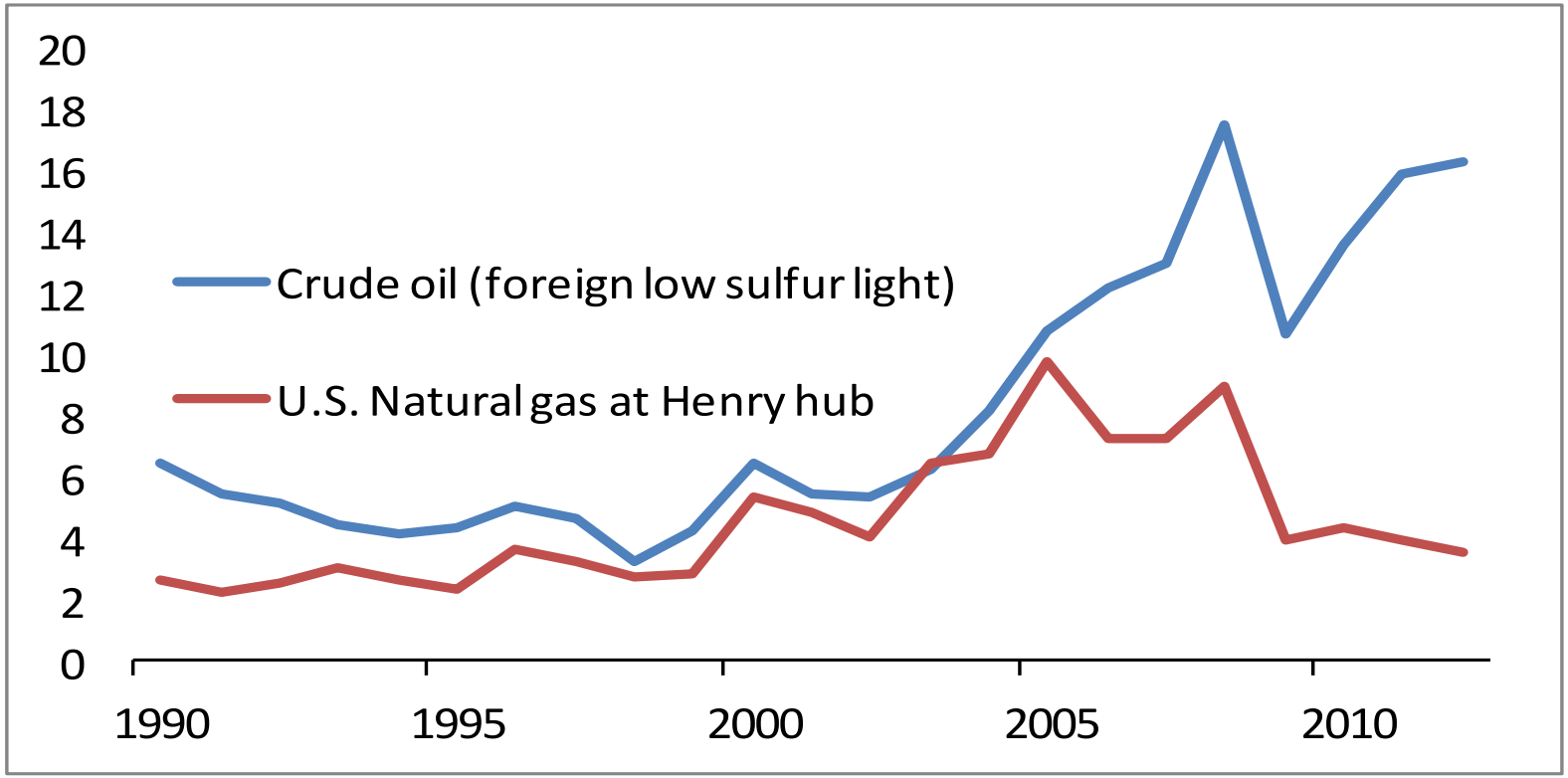
Source: World Integrated Trade Solution (UNCTAD and World Bank)

III. Delinkage of Gas Prices

- Delinkage of U.S. natural gas prices from oil prices reflects a competitive market with a well developed spot market and third-party access to pipelines.
- European prices are also under pressure. Russia has made price and volume concessions to some European buyers, with partial linkage to spot prices in Northern Europe. Russia is in arbitration with some other buyers.
- Japan, the world's largest LNG buyer, is facing its first nuclear-free summer, limiting downward pressure.

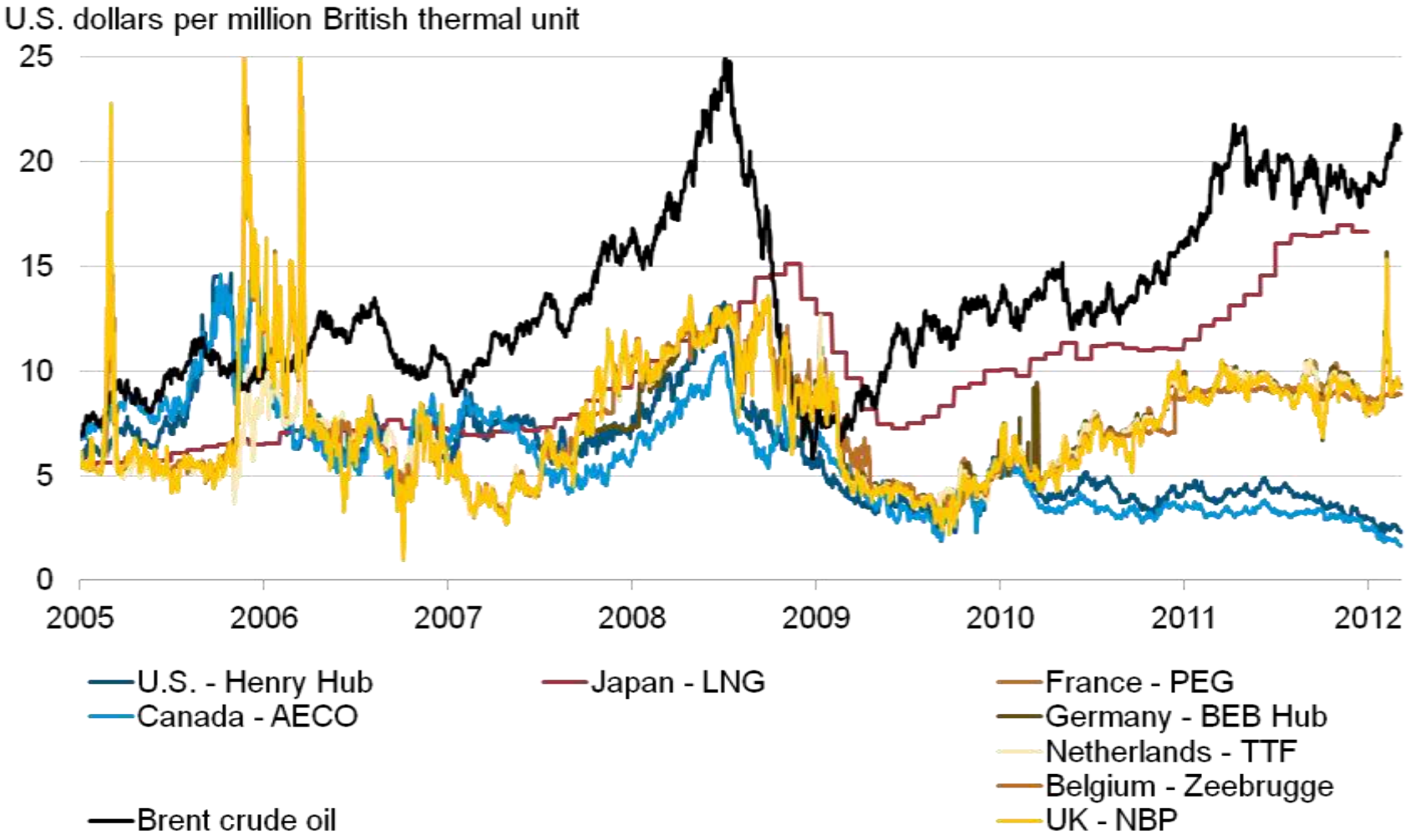
Delinkage of U.S. Natural Gas Prices

Oil and natural gas prices
2010 dollars per million Btu



Source: EIA, Annual Energy Outlook 2012 Reference Case

Global spot natural gas and crude oil prices with average monthly LNG prices in Japan



Source: EIA based on Bloomberg as of 3/5/2012

Gas Exporting Countries Forum (GECF)

- GECF is resisting downward pressure for delinkage.
- GECF includes 11 of the world's leading natural gas producers. Russia, Iran and Qatar alone hold nearly three-fifths of reserves.
- The first GECF summit in November 2011 acknowledged "the need to reach a fair price for natural gas based on gas to oil/oil products prices indexation with the objective of an oil and gas price convergence."

Conclusions

- Fracking, increased tradability of natural gas, and delinkage of natural gas prices with huge uncertainty are changing the playing field.
- Winners are consumers benefiting from lower prices and seeking low emission non-nuclear energy and countries benefitting from shale gas resources (if environmental damage is avoided).
- Losers are natural gas producers who may no longer benefit from oil-linked prices, especially as long-term contracts expire.

Thank You.