



How to Make LNG Accessible to All of Europe?

Jeff D. Makholm, Ph.D.

CEER Workshop, Athens

September 12, 2016

Insight in Economics™

Agenda



NERA
ECONOMIC CONSULTING

- **What's going on with LNG in the world?**
- **What is the real cost of LNG?**
- **How can inner-European countries benefit from LNG given the borders they have to cross?**
- **Is there anything that the regulators can do to improve the European gas market?**

Will LNG Rescue the World's Gas Market?



- **What's going on with LNG in the world?**
 - **Gas accounted for 25% of worldwide energy use in 2014.**
 - **In the nine years leading up to 2014, ocean shipments of LNG grew at twice the rate of new pipeline capacity.**
 - **Floating re-gasification terminal capacity tripled from 2011 to 2016.**

- **LNG would seem to have the potential to link all the world's gas markets together.**

BUT: There are Barriers in the Worldwide LNG Market



NERA
ECONOMIC CONSULTING

- **Cost:** The cost of LNG is the *wrong kind of cost*—mostly fixed.
- **Access to the Ocean:** Gas pipelines in the world (outside of North America) don't provide competitive access.
- **Politics:** Where it is heavily regulated, gas is subject to political winds:
 - *Bridge fuel? Renewables? Security of Supply?*
 - *Shale gas? Sustainability? Competition?*

Will LNG Rescue the World's Gas Market?



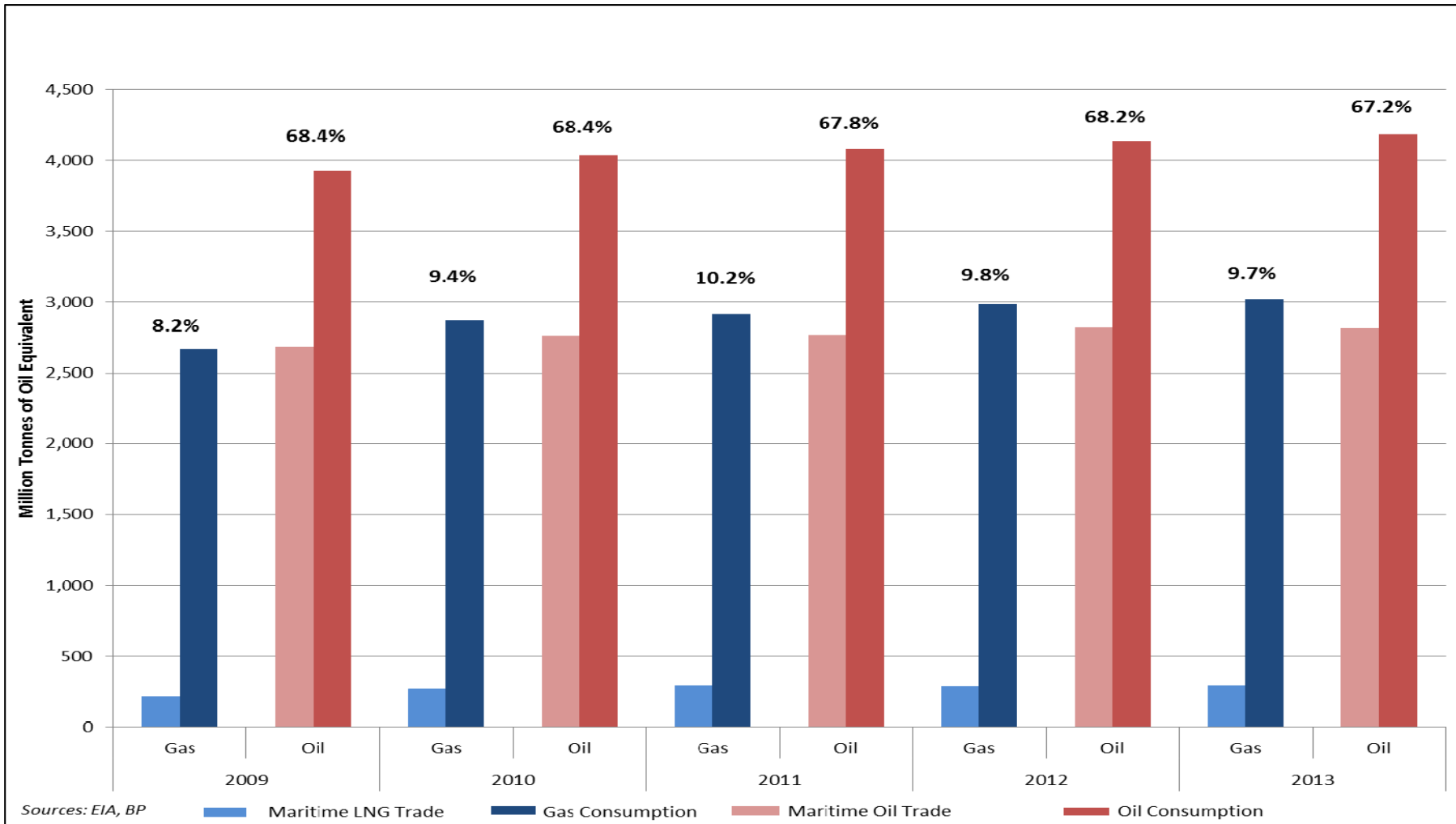
NERA
ECONOMIC CONSULTING

- **LNG would seem to have the potential to link all of the world's gas markets together.**
 - Brent and WTI (West Texas Intermediate) are worldwide oil prices.
 - Can worldwide LNG prices equilibrate prices between the United States and the European Union?
 - Can LNG be spot traded as oil is around the world?

LNG's Position vs. Oil



Annual Worldwide Consumption and Ocean Transport of Oil and Gas, 2009-2013

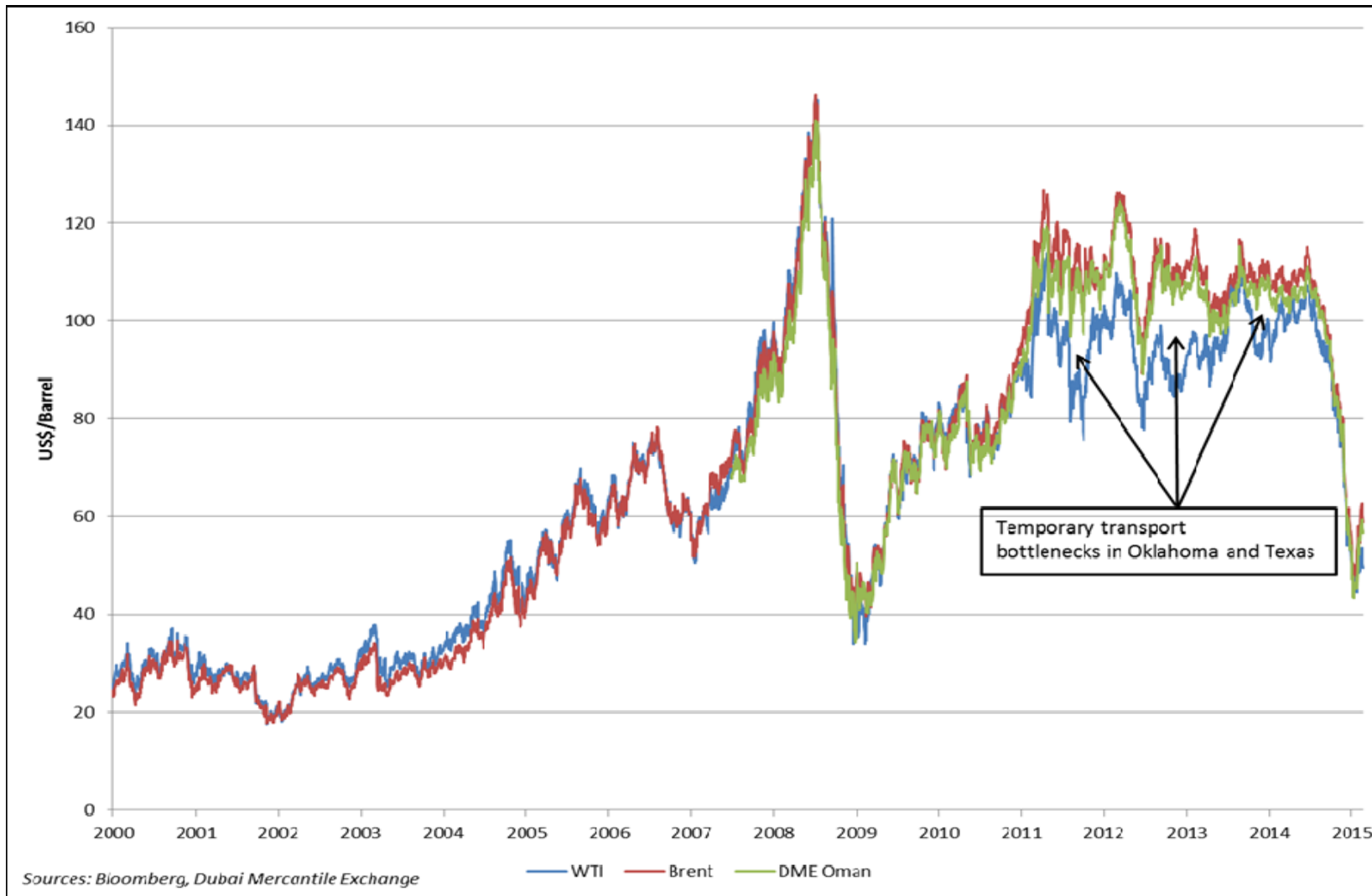


The Worldwide Price of Oil



NERA
ECONOMIC CONSULTING

World Oil Benchmark Prices, 2000-2015

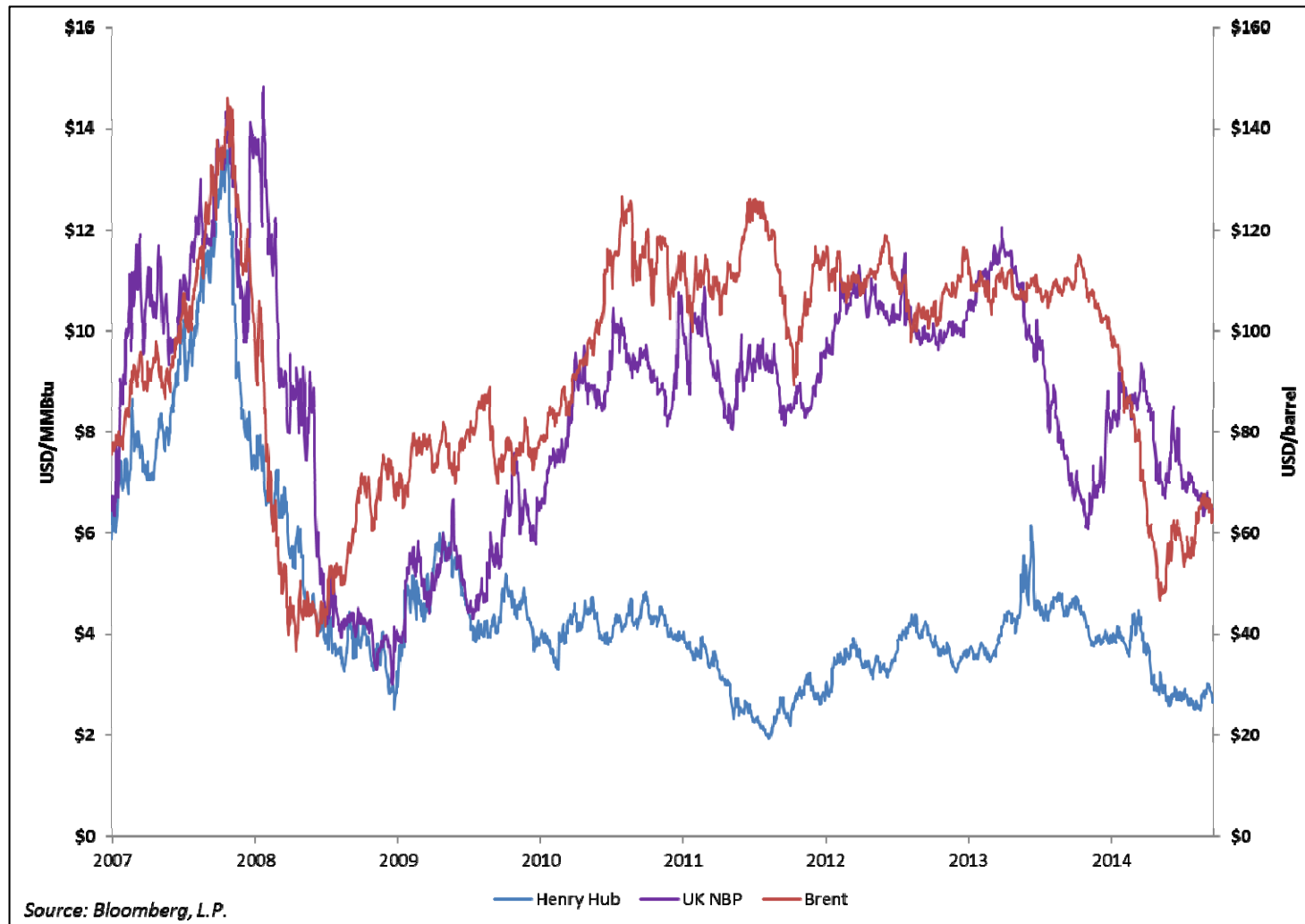


No Worldwide Price of Gas



NERA
ECONOMIC CONSULTING

Henry Hub, UK National Balancing Point, and Brent Prices, 2007-2015

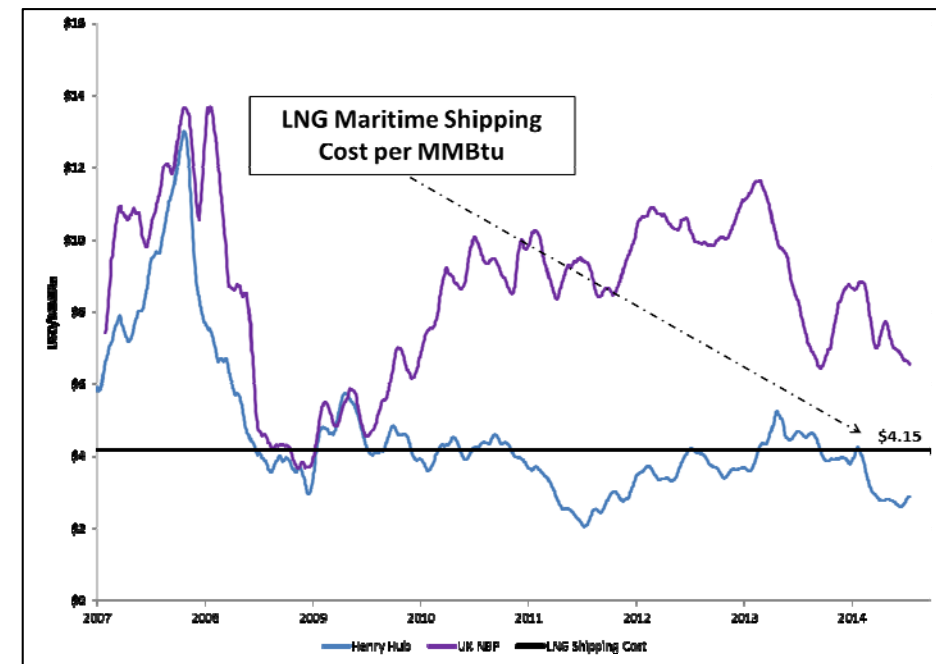
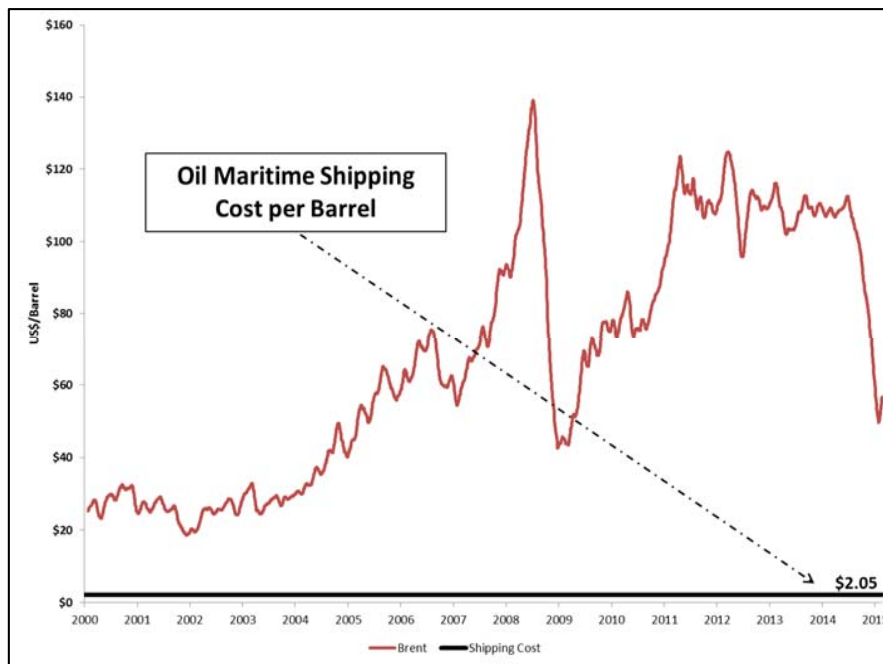


The High Relative Cost of LNG



NERA
ECONOMIC CONSULTING

Relative Cost of Maritime Shipping for Oil and Gas



	US\$/MMBtu
Liquefaction (average of five projects)	\$2.66
Shipping (4,500 Mile Trip)	\$0.59
Regasification (average of three projects)	\$0.89
Total	\$4.15

- The US is a virtually “controlled experiment:”
 - High domestic prices (2004): **21 different enterprises** in competition (either individually or in JVs) to import LNG.
 - Low domestic prices (2016) **20 different enterprises** (again, either individually or in joint ventures), competed to export US LNG.
 - This is the feature of a **deregulated market** with the freedom of oil and gas companies to enter.
 - Entry into new pipeline capacity, to or from the sea, generally regulates itself.
 - The business generally lies outside of regulators or special interests.

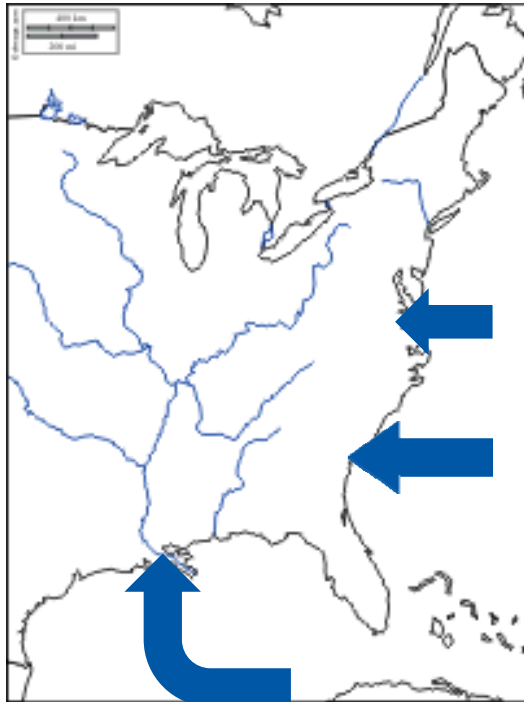
Competitive Access to the Sea



NERA
ECONOMIC CONSULTING

2004: **Import** Projects:

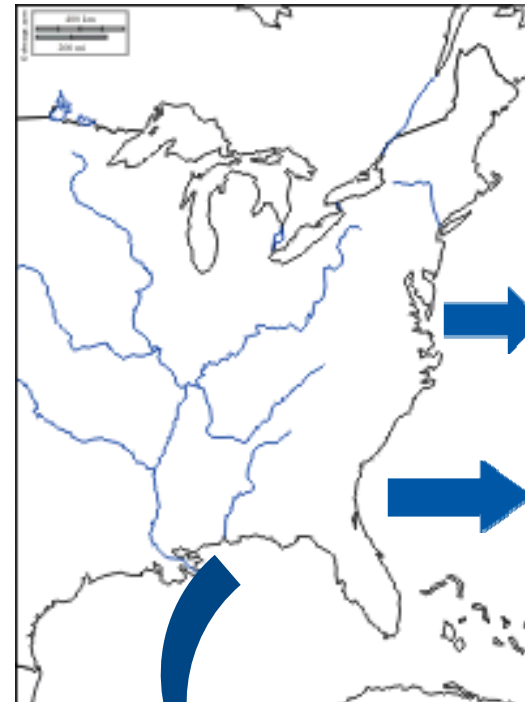
** Constructed and authorized for re-export of delivered LNG as of June 2, 2016; ** Constructed as of June 2, 2016*



- GDF Suez
- Dominion
- Southern Union
- El Paso
- Sempra Energy*
- Cheniere*
- Cheniere*
- Cheniere
- ExxonMobil
- Hess
- ExxonMobil**
- Occidental Energy Ventures
- BP
- Sempra Energy
- Cheniere
- El Paso/Crest/Sonango**
- ChevronTexaco
- Mitsubishi/ConocoPhillips
- TransCanada/Shell
- Northern Star Natural Gas LLC
- Quoddy Bay, LLC
- Gulf Coast LNG Partners
- Kestrel Energy
- AES Corp.
- Veresen
- Leucadia National Corporation

2016: **Export** Projects:

** Approved and under construction as of June 2, 2016; **Approved but not under construction as of June 2, 2016; *** Projects in pre-filing*



- ConocoPhillips
- Cheniere
- Cheniere*
- Cheniere*
- Sempra Energy*
- Cheniere*
- Dominion*
- Energy Transfer**
- Magnolia LNG**
- Kinder Morgan**
- ExxonMobil
- Kinder Morgan
- Venture Global, LLC
- Texas LNG Brownsville LLC
- NextDecade
- Cambridge Energy***
- Parallax Enterprises LLC***
- Kestrel Energy***
- Eagle LNG Partners***
- Exelon***
- Sempra Energy***
- BP, TransCanada***
- Venture Global LNG***
- G2 LNG***



Europe's LNG Import Terminals

Owners

Fluxys

Engie

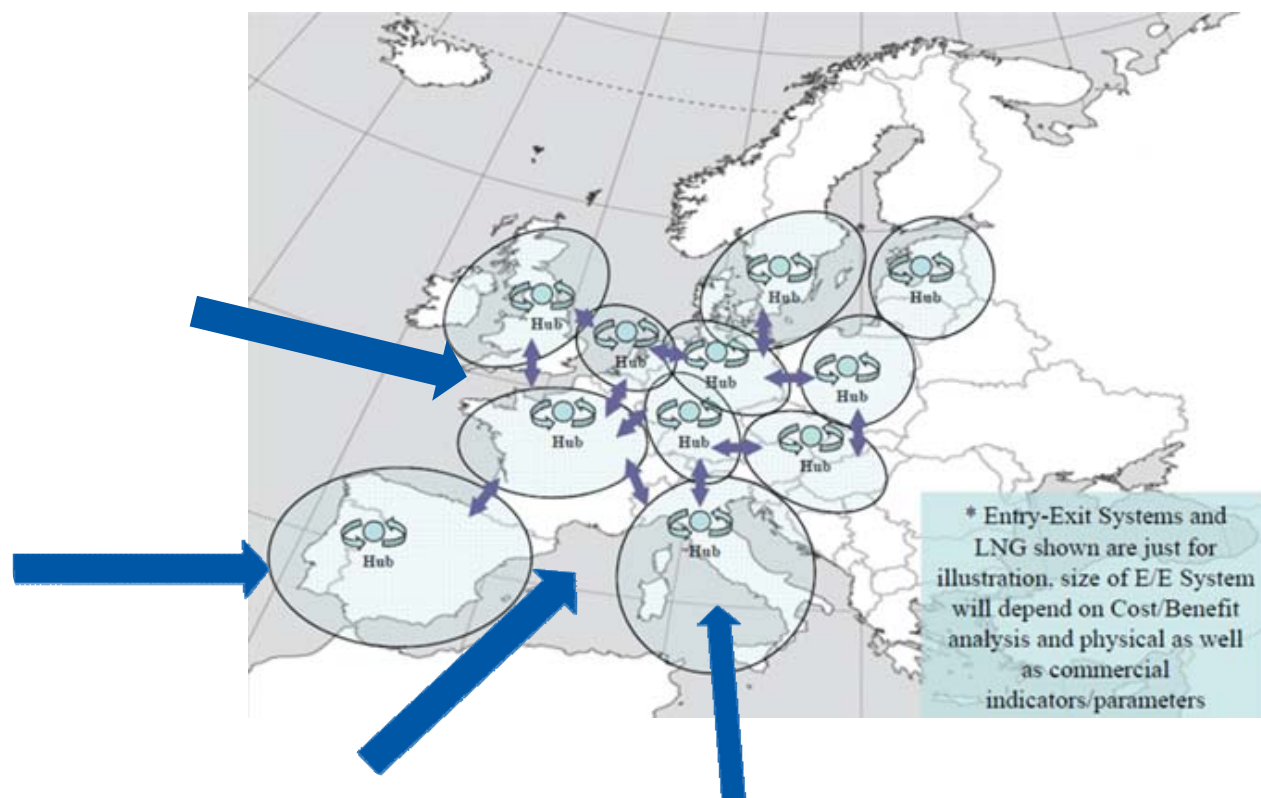
Snam

Gasunie

Enagás

Reganosa

National Grid



Local Monopoly Access to the Sea



NERA
ECONOMIC CONSULTING

17 European LNG Import Terminals

LNG Terminal Name	Location	Operator	Facility Owner(s)	Pipeline Connections	Pipeline System Owner(s)
Zeebrugge LNG Terminal	Belgium	Fluxys LNG	Fluxys Belgium	Fluxys Belgium Transmission Grid	Fluxys Belgium
Fos-Tonkin LNG Terminal	France	Elengy	Elengy	GRTgaz Transmission Network	Engie
Montoir-de-Bretagne LNG Terminal	France	Elengy	Elengy	GRTgaz Transmission Network	Engie
Fos Cavaou LNG Terminal	France	Elengy	Fosmax LNG	GRTgaz Transmission Network	Engie
Panigaglia LNG terminal	Italy	GNL Italia	Snam Rete Gas	Snam Rete Gas National Network	Snam
Gate Terminal, Rotterdam	Netherlands	Gate Terminal	Gasunie and Vopak	National Transmission Network	Gasunie Transport Services B.V.
Barcelona LNG Terminal	Spain	Enagás	Enagás	Spanish Gas System	Enagás
Huelva LNG Terminal	Spain	Enagás	Enagás	Spanish Gas System	Enagás
Cartagena LNG Terminal	Spain	Enagás	Enagás	Spanish Gas System	Enagás
Bilbao LNG Terminal	Spain	BBG	Enagás and EVE	Spanish Gas System	Enagás
Sagunto LNG Terminal	Spain	Saggas	Infraestructuras de Gas and Iniciativas de Gas	Spanish Gas System	Enagás
Mugaros LNG Terminal	Spain	Reganosa	Reganosa	Northwest Spain Transmission Network	Reganosa
Gijón (Musel) LNG Terminal	Spain	Enagás	Enagás	Spanish Gas System	Enagás
Isle of Grain LNG Terminal	United Kingdom	National Grid Grain LNG	National Grid	National Transmission System; Scotia Gas Network	National Grid; SGN
Teesside GasPort (FSRU)	United Kingdom	Excelerate Energy	Excelerate Energy	National Transmission System	National Grid
Dragon LNG Terminal	United Kingdom	Dragon LNG	Shell and Petronas	National Transmission System	National Grid
South Hook LNG Terminal	United Kingdom	South Hook LNG	Qatar Petroleum, ExxonMobil, and Total	National Transmission System	National Grid

- In North America, the deregulated gas industry is mostly outside of politics.
 - US policy was to get out of the gas business
 - Pipelines restructured to be competitive in use and expansion

- In Europe, gas has become heavily regulated and highly politicized.
 - Sector regulation has grown quickly
 - Security of supply is a major issue
 - Sustainability has hurt the position of gas
 - “The creation of a ‘well-functioning’ gas market will always remain a highly politicized and never ending story”*

* Correljé, A. (2016). “The European natural gas market,”
Current Sustainable/Renewable Energy Reports 3(1), p. 33.

The International LNG Market



- Given the barriers of cost, access and politics, a “true commodity market” in LNG market (like that in crude oil, with futures markets) is not likely.
- Contracts will continue to exist to deal with risk.
 - Disputes between buyers and sellers
 - Disputes between government and project sponsors
 - Disputes between LNG project sponsor partners
- Inner European Countries need a **secure link to terminals**. How?

Tying “Inner European” Countries to LNG Import Terminals



- **Option 1: Wait for the “well-functioning” market**
 - Completion of Network Codes
 - Harmonization of Member State regulations
 - Reliable cross-border arrangements
 - “Congestion management” auctions
 - Predictable and durable ISO rules along the way
 - Link these to a multi-year LNG import contract

- **Option 2: Third Package: Article 36**
 - Carve out an “LNG Connector Exemption” from Entry/Exit and ISO jurisdiction, under Article 36
 - Link the exemption to a multi-year LNG import contract

Tying “Inner European” Countries to LNG Import Terminals



- Option 1 turns to *markets*:
 - The “markets” that investors seek do not contain the layers of overlapping and powerful regulation now evident in the EU.
 - A market solution is highly unlikely for Inner Europe—too many unknowns to support investments or contracts
- Option 2: Article 36 turns to *regulation*:
 - This is a regulatory solution—not a market solution—for the inland EU link to LNG.
 - With approval, it can carve out long-term access not subject to TPA, Entry/Exit, ISO decision making or unpredictable congestion management procedures

Improving European Gas Markets?



- This is too big a political subject for Athens.
 - The options chosen in the US are not available
 - **Farmers own the gas underground**
 - **Federal regulator of major pipelines, not the member states**
 - **Tightly define point-to-point pipeline capacity.**
 - **Tightly regulated accounting for cost-based, distance based tariffs.**
 - **Aggressive transparency everywhere.**
 - **No “TPA” without long-term contracts.**
 - **Tiny regulatory costs (174 people and \$60 million per year, all in).**
 - For the most part, Europe has made its bed regarding its gas market—and must sleep in it.

"Quo Vadis" EU Gas Market Regulatory Framework



- But the EU Commission is looking at things again:
 - Study on gas market design underway.
 - Many listed problems, among them:
 - Only very constrained competition on gas markets east of the Baumgarten hub
 - Gazprom and Statoil appear to be pursuing a market share maximization strategy—driving out entrants (including LNG).
 - Several EU Member States, especially in the east, are still heavily (sometimes exclusively) reliant on a single supply route and supplier for gas.
 - Perhaps there is an appetite for a critical re-examination of the EU's gas market. Perhaps not.



How to Make LNG Accessible to All of Europe?

Jeff D. Makholm, Ph.D.

Senior Vice President
NERA, Consulting Economics—Boston
+1 617 927 4540
jeff.makholm@nera.com