

The (Uncertain) Future of European Gas Markets

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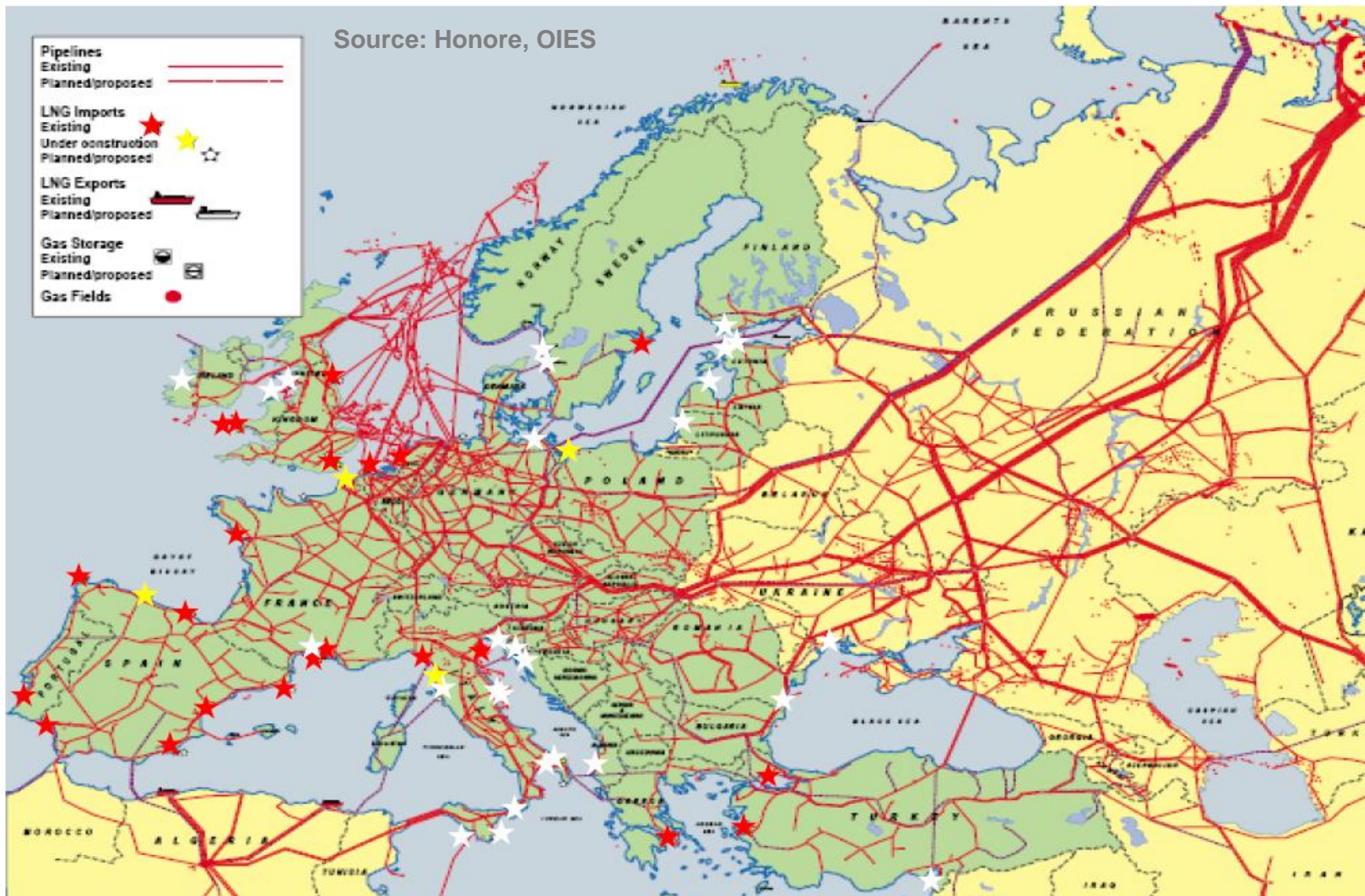
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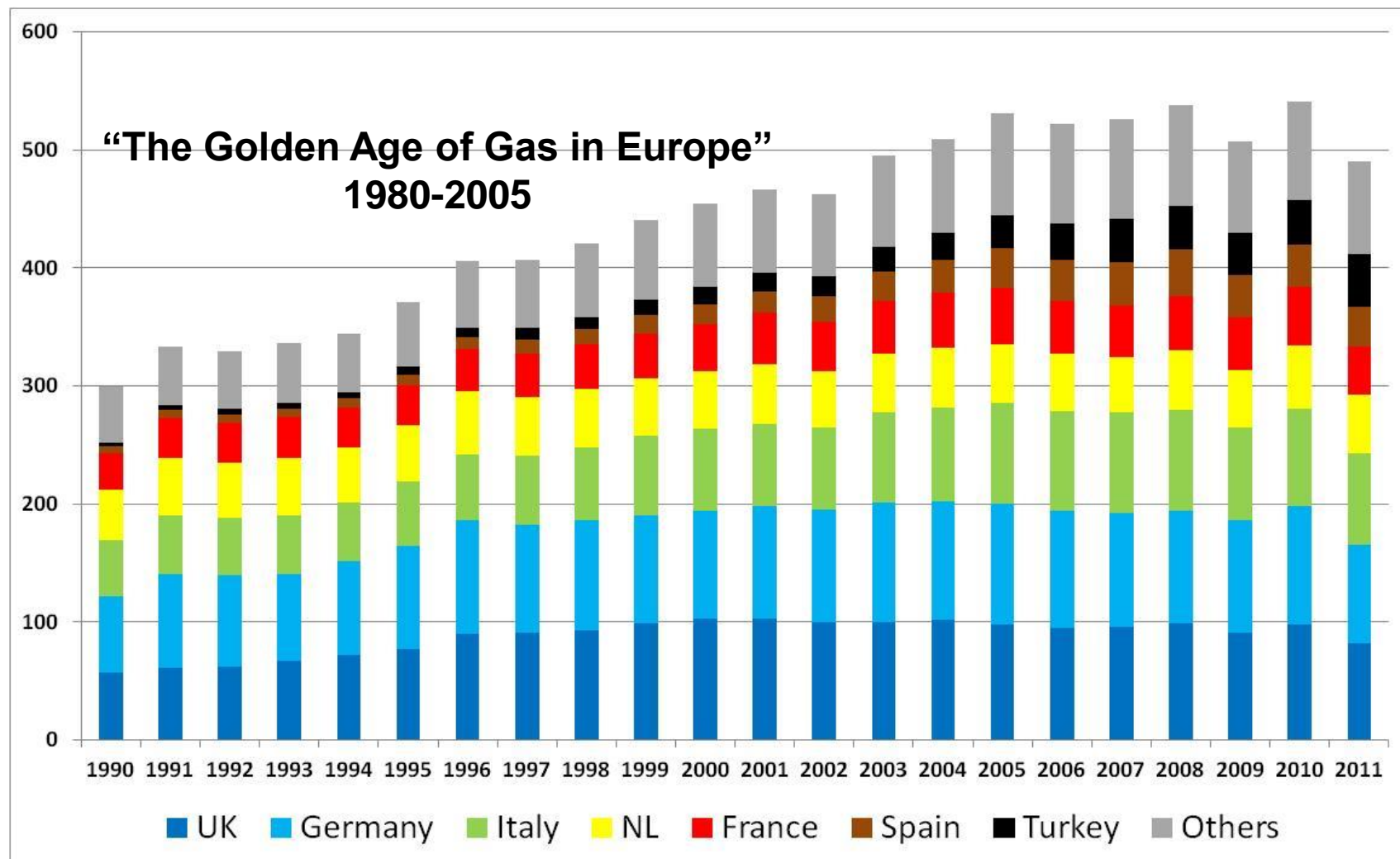
OECD Europe (incl. Turkey & Norway)

In 2011, demand = 511 bcm, 53% from production, 30% from pipeline, and 17% from LNG

Source: Honore, OIES



European Gas Demand 1990-2011 (bcm)



Source: OECD Europe, IEA

- **2011: 7 markets = 80% of total demand**
- **Major markets: UK, Germany, Italy, Netherlands, Turkey, France and Spain**

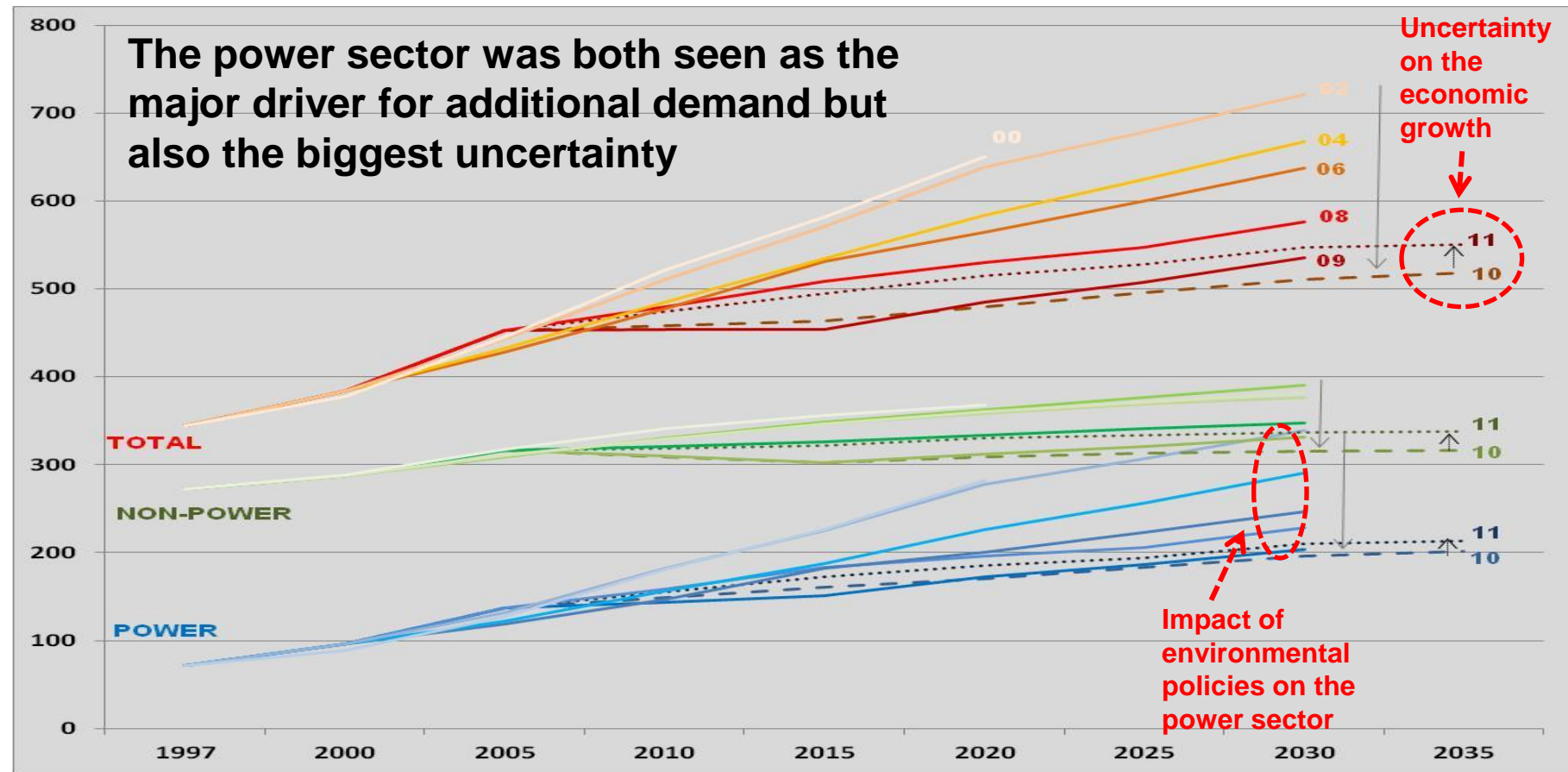


AGENDA: WHAT ARE THE ISSUES

- **DEMAND** – different outlooks in different countries – especially for power generation
- **SUPPLY/IMPORT DEPENDENCE/SECURITY/Russia and its new infrastructure**
- **PRICING AND THE EVOLUTION OF A GLOBAL MARKET**

Revisions of IEA natural gas demand scenarios in Europe 2000-11

Mtoe

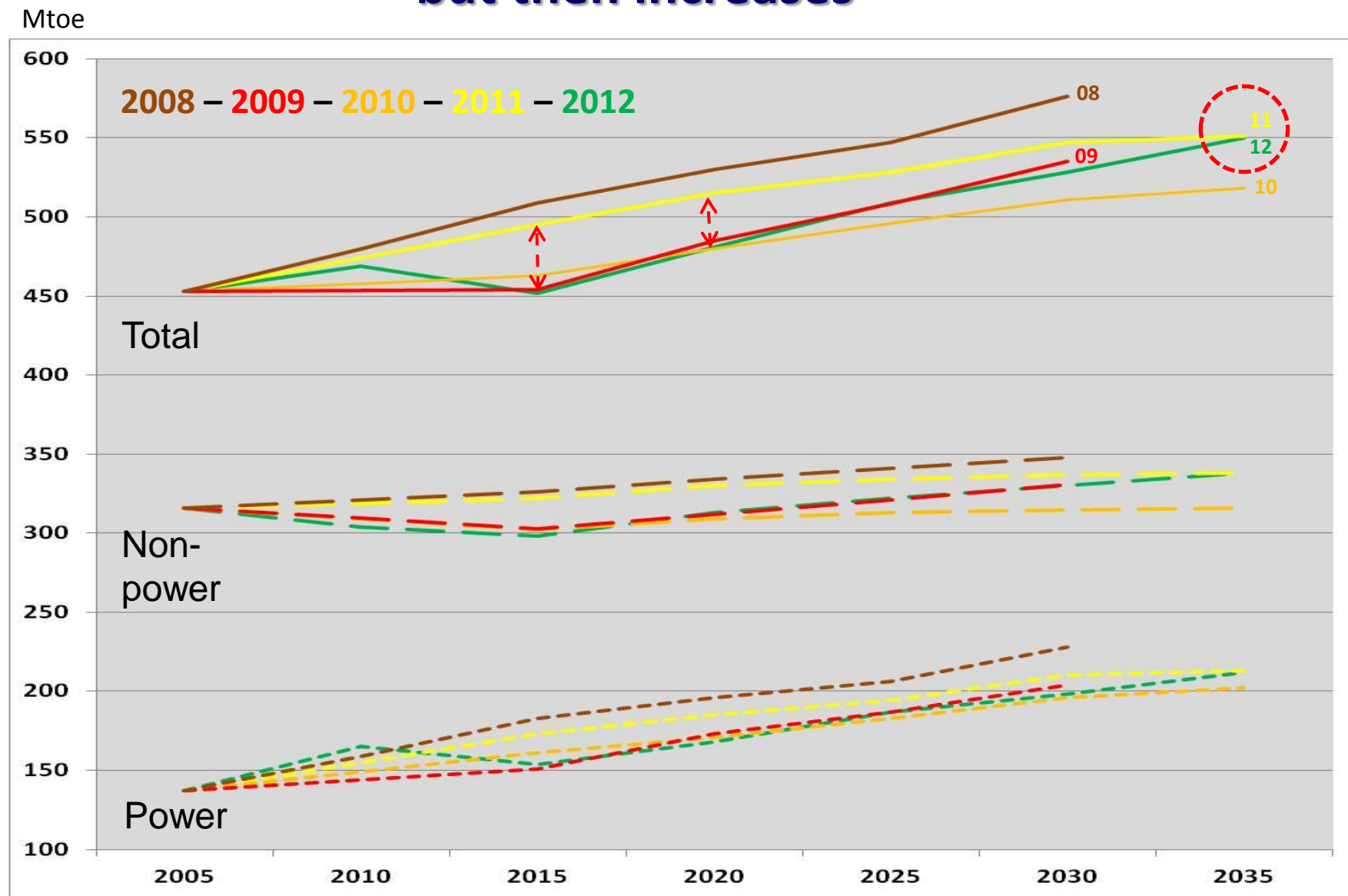


Sources: Updated from Honore (2010), author's calculations from IEA, OECD Europe, reference scenario in WEO 2002, WEO 2004, WEO 2006, WEO 2008, WEO 2009, and new policies scenario in WEO 2010 and WEO 2011

Progressive reduction of demand expectations but some increase in 2011

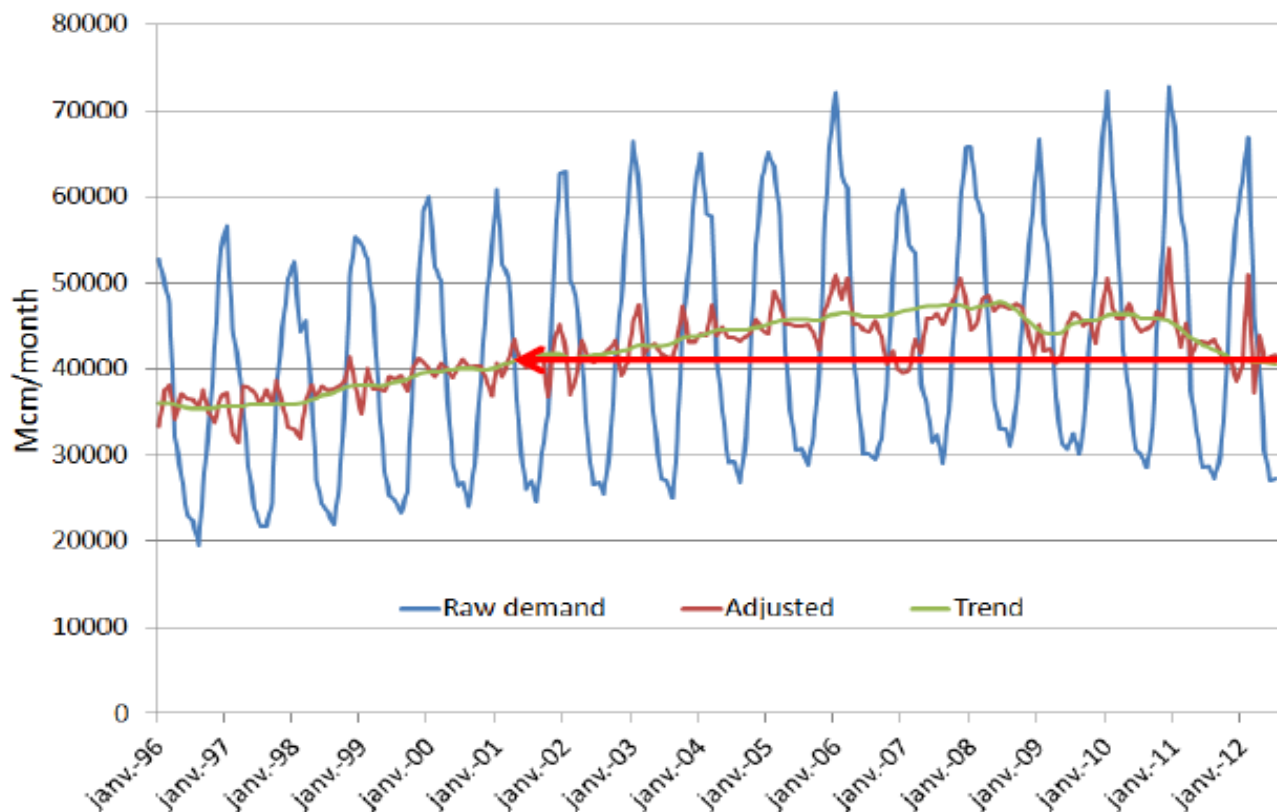


2012 IEA projection is that demand falls up to 2020 but then increases



Sources: Honore (forthcoming 2013), author's calculations from IEA, OECD Europe, reference scenario in WEO 2008, WEO 2009, and new policies scenario in WEO 2010, WEO 2011 and WEO 2012

European gas demand lost ... 10 years



- Although European gas demand recovered from the economic crisis starting end-2009 (mostly due to lower gas prices), this did not last
- Seasonally-adjusted gas demand has been declining since mid-2010, in response to increasing gas prices and weak economy

Source: Anne-Sophie Corbeau IEA

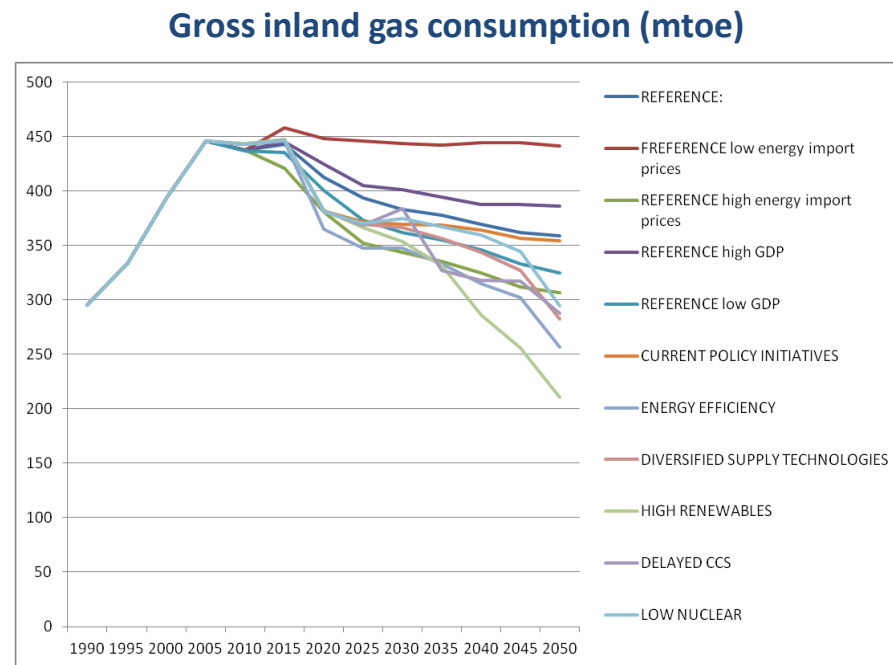
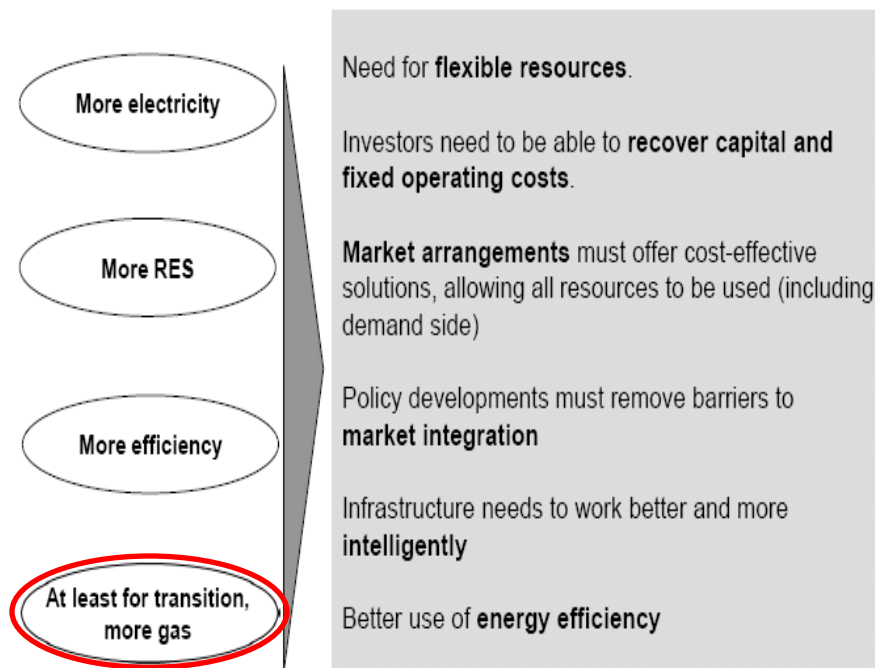


The EU and National Gas Demand Outlook: “one-size fits nobody”

- **Gas in national policies**
 - ❖ Gas as green fuel vs fossil fuel (UK)
 - ❖ Access to diversified supply (Turkey, Eastern Europe)
- **Meeting environmental targets: EU ETS, 20/20/20, LCPD, IED:**
 - ❖ Not the same impact on each market, potentially major crisis in some countries (UK vs Germany)
 - ❖ NL (renewables) vs Germany / UK
- **Gas Market Maturity versus Expansion**
 - ❖ NWE vs Turkey
- **Existing and new electricity generation capacity**
 - ❖ France: nuclear down to 50% of elec mix by 2025? => 2/3 scenarios
 - ❖ Germany: replacing nuclear by renewables => 2 scenarios
 - ❖ UK: EMR/nuclear/renewables => 2 scenarios
 - ❖ Germany vs Spain to deal with renewable intermittency

Energy Roadmap 2050:

limited role for gas in decarbonisation scenarios



Source: J. Stern (OIES) from EC Energy Roadmap 2050

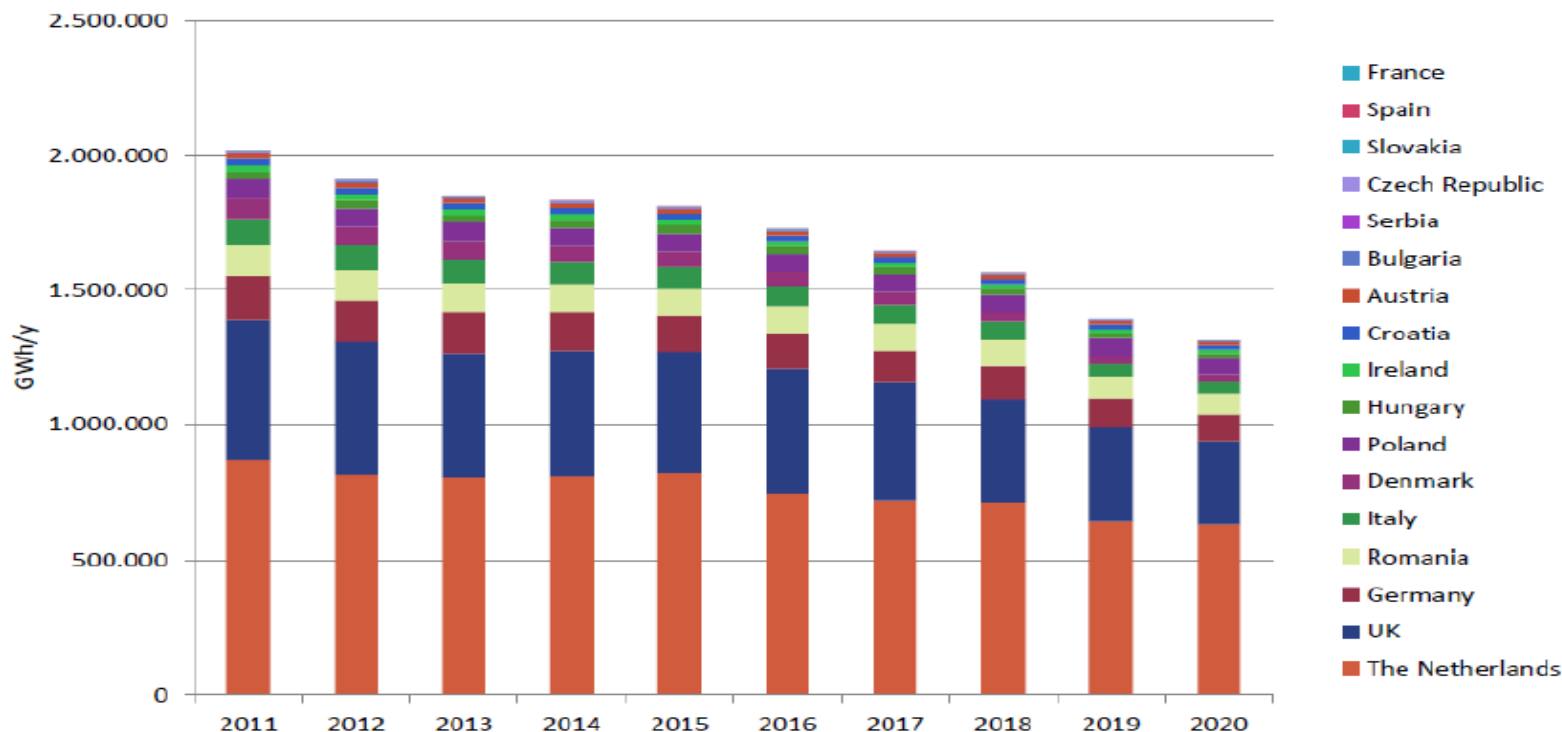
- Gas consumption falls substantially in all scenarios aside from reference low energy import prices
- Falls are greatest in decarbonisation scenarios after 2030, especially high renewables,

Current short and long term prospects for gas demand in Europe are very pessimistic

- European gas demand will grow only in the power sector, BUT only with lower gas prices in order to compete with other fuels
- European gas demand will not return to 2010 levels till 2020; complete change from pre-crisis when we were expecting high demand growth
- Could we see new end-uses for gas demand eg transport sector (ships, trucks, buses)?

The only countries where gas-fired power demand could increase significantly are Turkey, UK and Poland

Supply: increasing import dependence = insecurity?



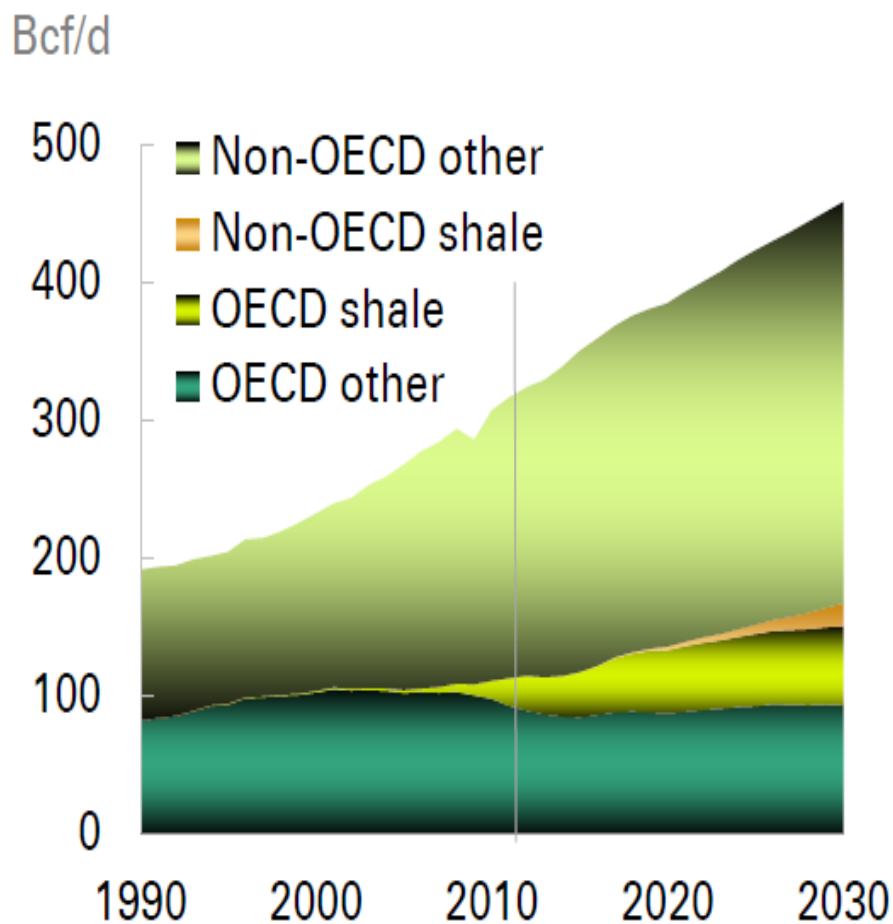
Source: ENTSOG 10 Year Network Development Plan

- Production has started to decrease everywhere, apart from Norway
- Prospects for a substantial increase in output are limited
- Production falls by 50-70 bcm by 2020 – does this need to be replaced by new gas imports through new infrastructure?
- => depends the level of gas demand in Europe!

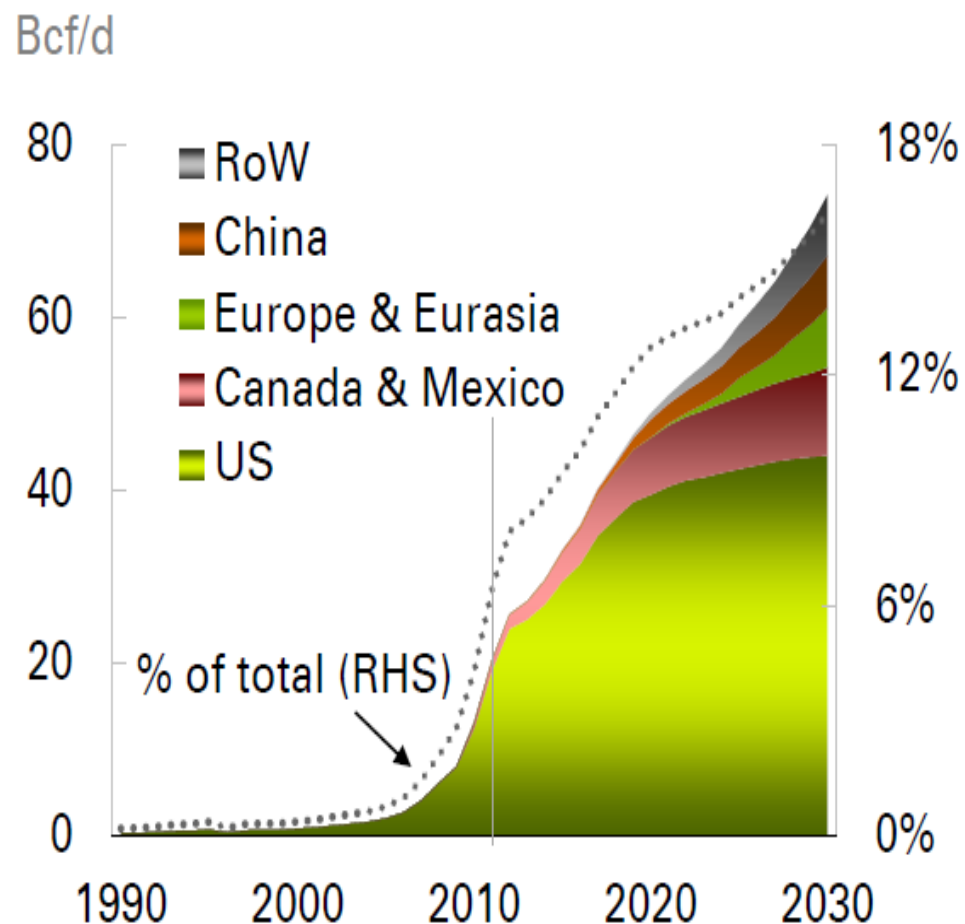
Source: A. Honore (OIES, forthcoming 2013)

Shale gas and global supply growth

Gas production by type and region



Shale gas production



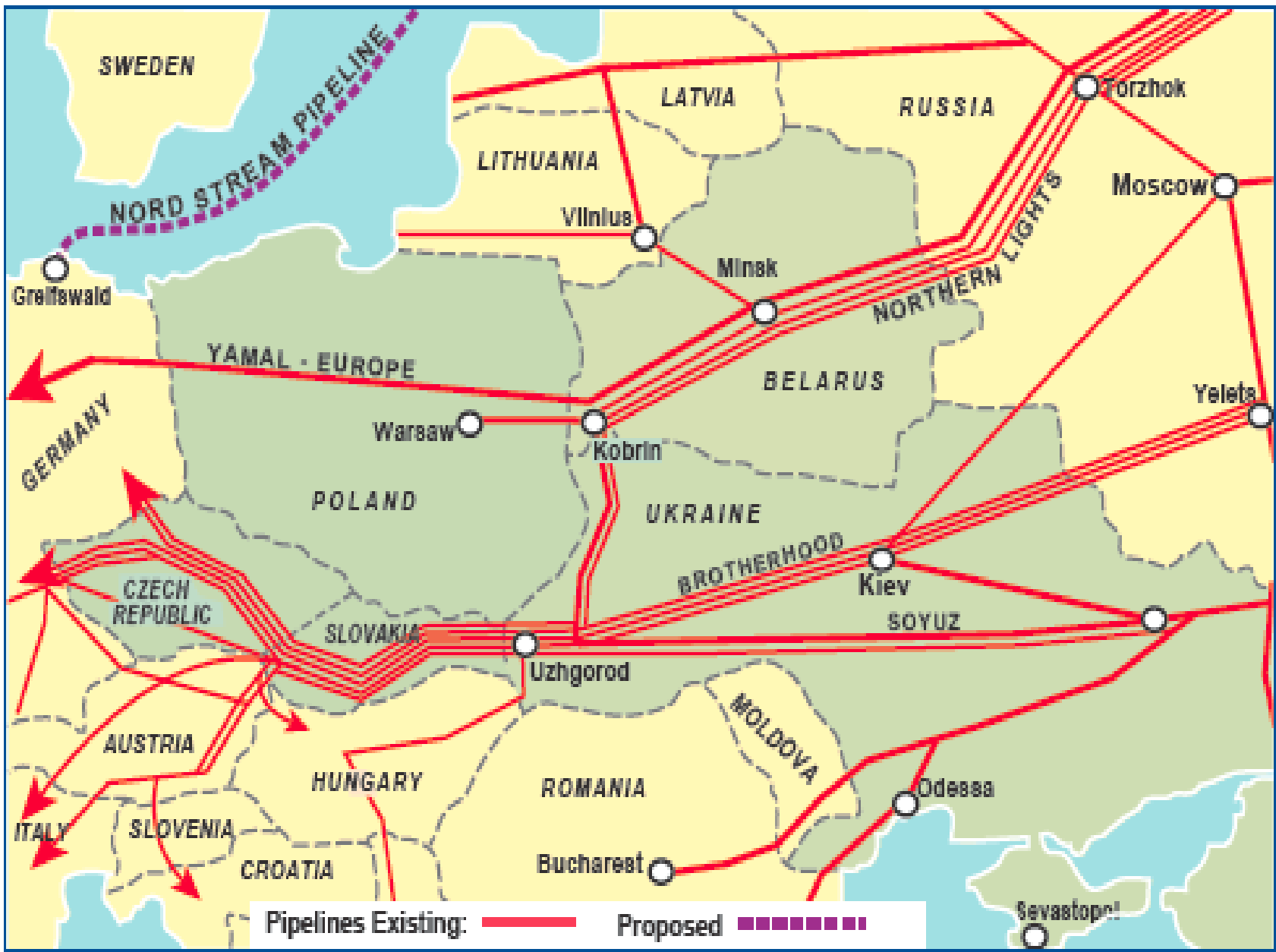


Import Dependence = insecurity?

- Indigenous production is in decline which will accelerate post-2015 therefore...
- Import dependence is increasing, although in many countries this is not a new story
- This dependence is causing disquiet about security of supply particularly in respect of Russia:
 - New EU member states have strong historical/political reasons to be concerned
 - Russia/Ukraine crises of 2006 and especially 2009 are fresh in the mind

This raises the importance of Russian exports and infrastructure

Russian Gas Transit Routes to Europe



Nord Stream Gas Pipelines



Aimed at delivering gas to Europe avoiding Ukraine

South Stream Pipelines



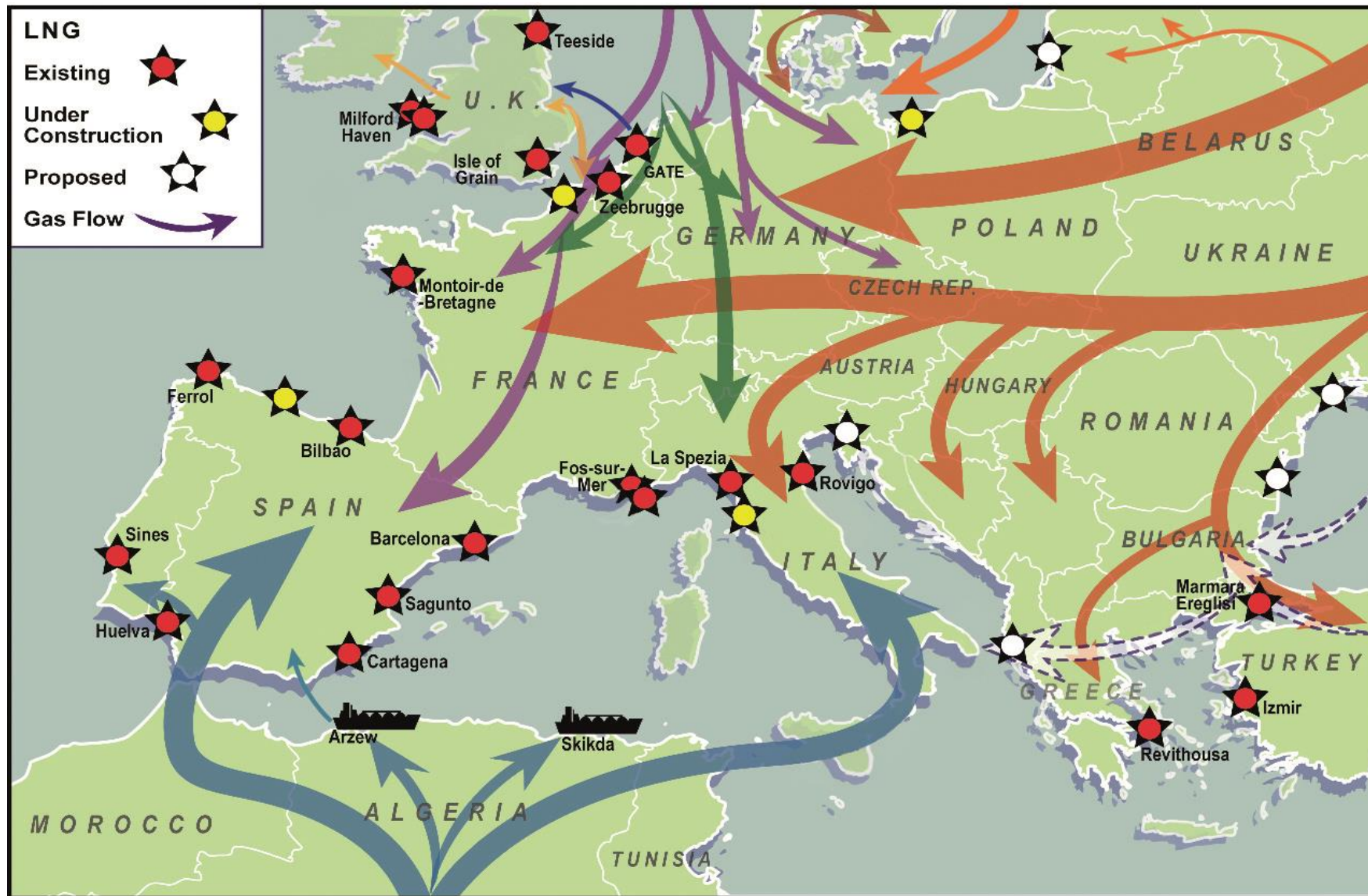
Same aim as Nord Stream; not completely certain to go ahead but well advanced

Southern Corridor Gas Pipelines to Europe



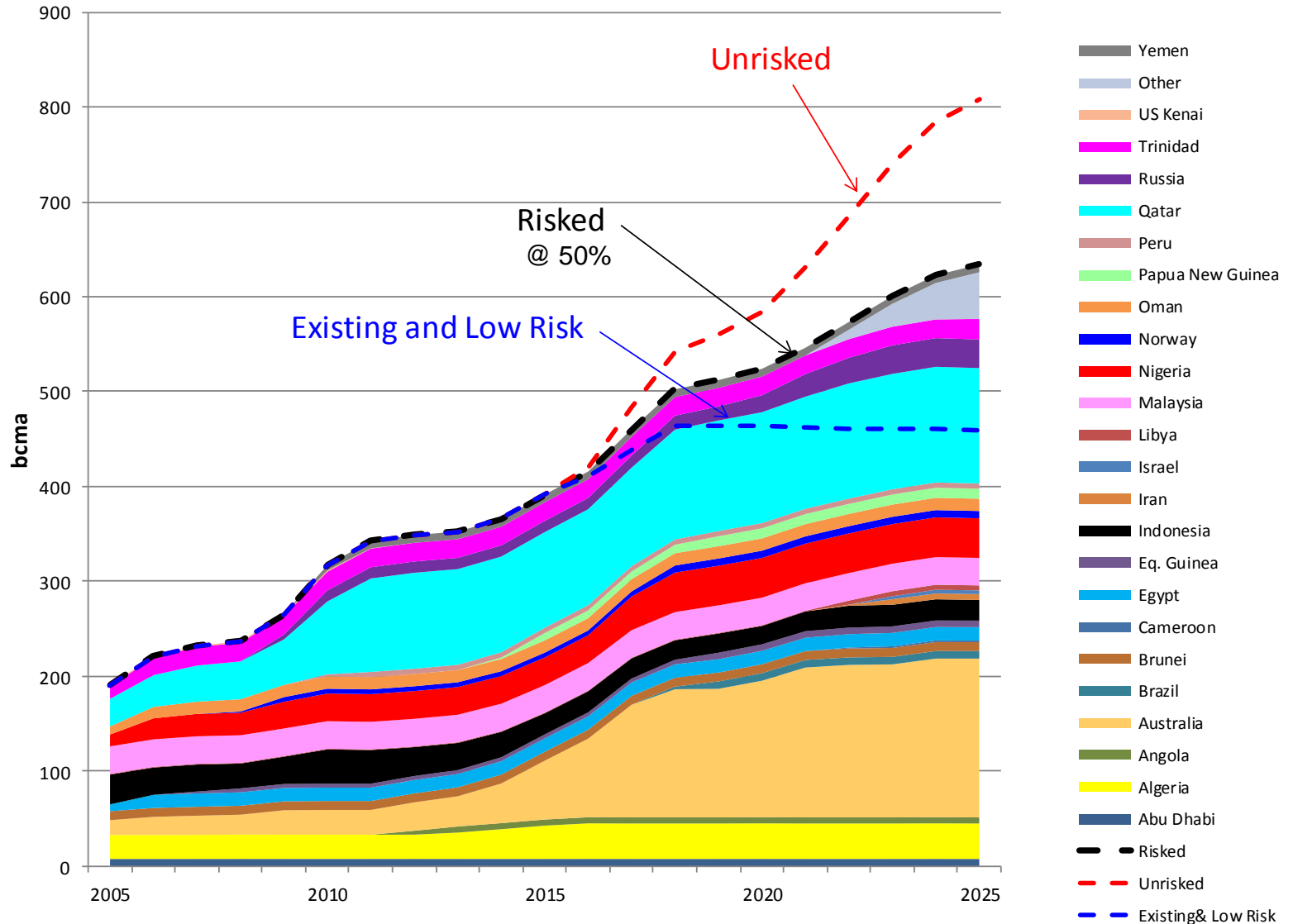
Some Azeri gas will reach Europe this decade but very slow progress on all pipelines

European LNG: import capacity has expanded hugely but competes with Asian countries



Global LNG Supply 2005 – 2025

(Excluding Possible US & Canadian Projects)



Source: Waterborne LNG, Ledesma/Rogers: OIES

Potential North American LNG Export Projects



Source: Henderson, OIES

	Location	Capacity			Potential Start-Up	Current Export Licence Status	Owners
United States		<i>Bcf/d</i>	<i>bcma</i>	<i>Mtpa</i>			
<i>Approved</i>							
Sabine Pass	Louisiana	2.1	21.6	16.0	2015	Unrestricted	Cheniere Energy, Sabine Pass LNG
<i>Proposed to FERC</i>							
Freeport	Texas	1.7	17.8	13.2	2017/18	FTA only	ConocoPhillips and multiple partners
Corpus Christi	Texas	1.8	18.2	13.5	2017	Filed with FERC	Cheniere Energy, Corpus Christi LNG
Coos Bay	Oregon	0.8	8.1	6.0	2017	FTA only	Jordan Cove Energy Project
Lake Charles	Louisiana	2.4	24.3	18.0	na	FTA only	Southern Union, Trunkline LNG (BGF)
Hackberry	Louisiana	1.6	16.2	12.0	2016/17	FTA only	Sempra, Cameron LNG
Cove Point	Maryland	0.8	8.1	6.0	2017	FTA only	Dominion
Astoria	Oregon	1.3	13.5	10.0	2017	Filed with FERC	Oregon LNG
<i>Approved & Proposed</i>		12.4	127.9	94.7			
<i>Other Potential Projects</i>							
Brownsville	Texas	2.8	29.0	21.4	na		Gulf Coast LNG Export
Pascaguola	Mississippi	1.5	15.5	11.5	na		Gulf LNG Liquefaction
Lavaca Bay	Texas	1.0	10.8	8.0	2017		Excelsior Liquefaction
Elba Island	Georgia	0.5	5.4	4.0			Southern LNG Company
Golden Pass	Texas	2.0	21.1	15.6	na		Exxon, Qatar Petroleum
<i>Potential</i>		7.9	81.8	60.5			
Total USA		20.3	209.7	155.2			
Canada							
<i>Proposed</i>							
Kitimat	British Colombia	0.7	6.8	5.0	2017	Secured NEB	Apache, EOG, Encana
Douglas Island	British Colombia	0.1	1.2	0.9	2014	Applied to NEB	BC LNG
Prince Rupert Island	British Colombia	1.6	16.2	12.0	2019	Applied to NEB	Shell Canada, KOGAS, Mitsubishi, PetroChina
<i>Sub-Total</i>		2.3	24.2	17.9			
Total Canada		2.3	24.2	17.9			
Total North America		22.6	233.9	173.1			

Potential to add massively to global LNG supply

EUROPEAN AND INTERNATIONAL GAS PRICING: OIL-LINKAGE VERSUS HUBS, LONG TERM CONTRACTS AND NEW INFRASTRUCTURE



Original Long Term Contract Gas Price Logic: fundamentals and risk sharing

ECONOMIC FUNDAMENTALS:

- Cost of development and delivery
- Financing (loan) and cash flow requirements

MARKET FUNDAMENTALS (mainly oil products):

- Competing fuels in end use markets
- Ability of customers to switch to other fuels
- Degree of competition from other suppliers

Producer took the price risk (via the base price and indexation); buyer took the market risk (via the take or pay clause)



In many (most?) European countries international gas prices ceased to reflect market fundamentals some time in the 1990s

No major concern about this because:

- **what matters for the industry is price level (not price formation)**
- **Importers could pass through purchase costs to their (captive) customers**
- **All parties made lots of money – and end-users took (most of) the risk**

But post-2008...



Inability to adjust prices to fundamentals threatens long term import contracts

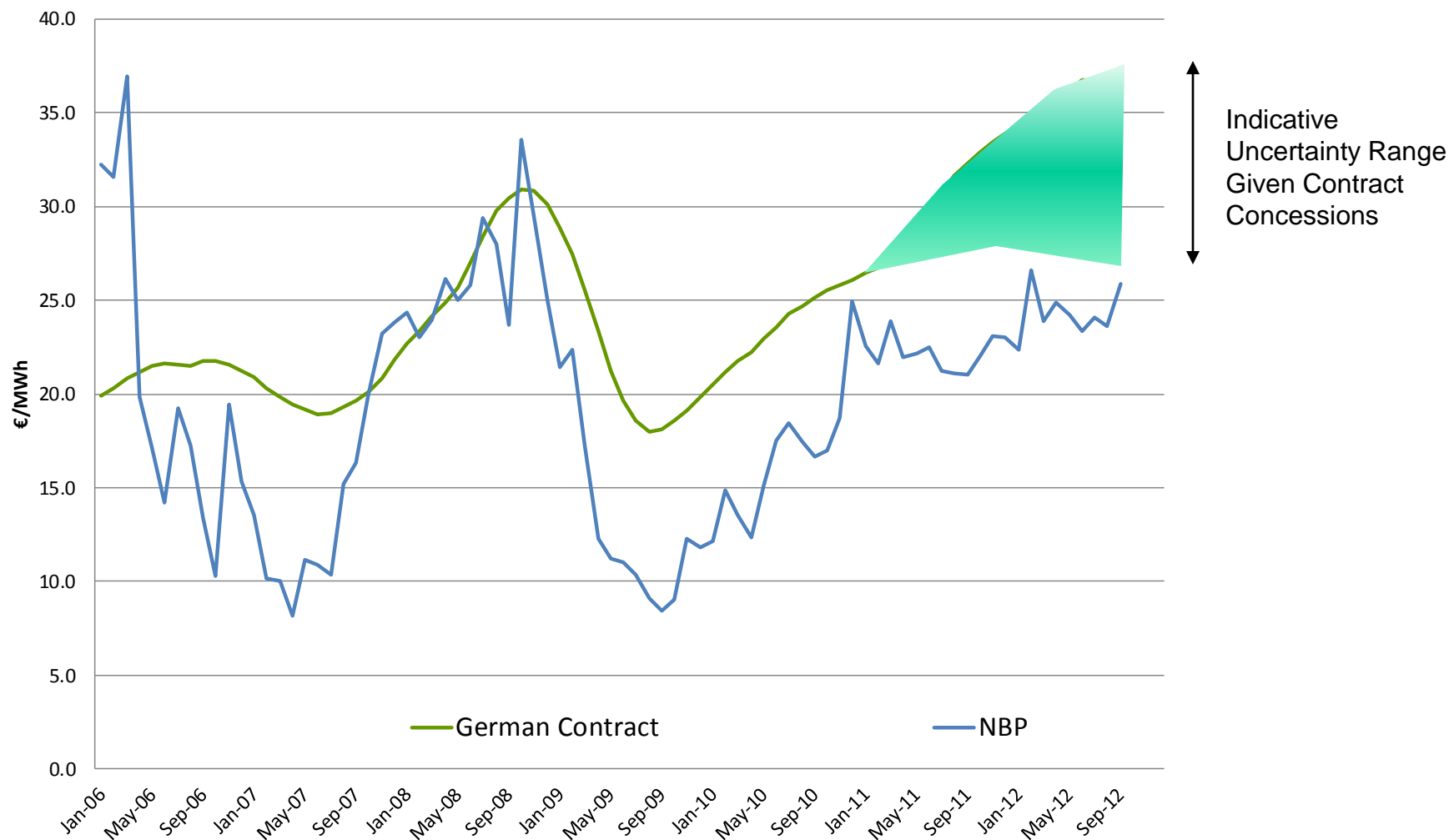
- As fundamentals changed, contracts did not (or could not) adapt
- For a long time this “did not matter” but in Europe the situation changed post 2008 because of recession, liberalisation and competition and hub pricing and the huge increase in oil prices..
- oil-linked long term contract prices became increasingly uncompetitive and..
- led to European utilities, exposed to competition, losing significant amounts of money for the first time

Systems change when Big Players lose Big Money !

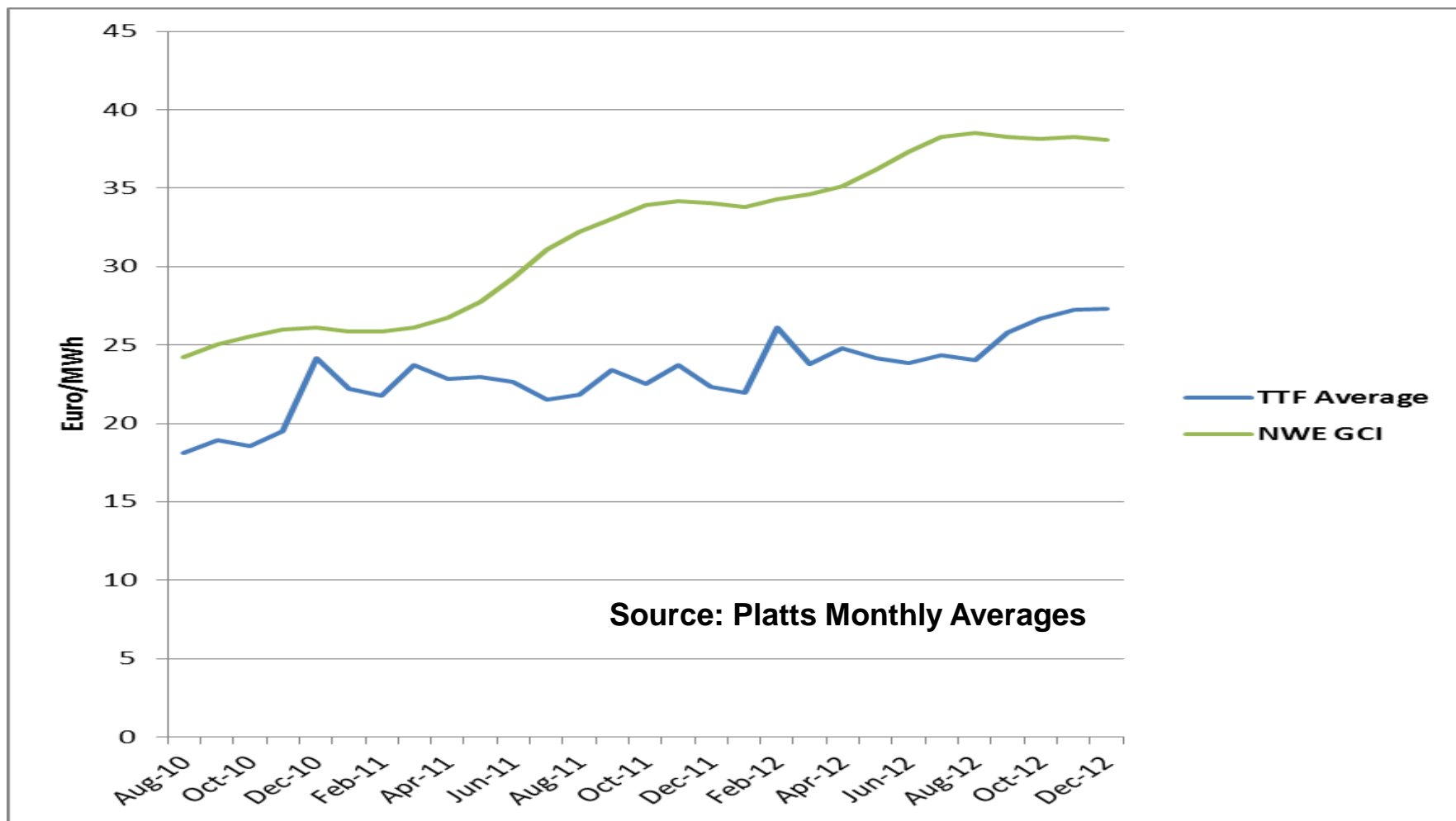
**THIS SITUATION HAS
CAUSED MAJOR PRICE
RENEGOTIATIONS AND A
HUGE INCREASE IN
ARBITRATION
PROCEEDINGS**



European Price Spread: German contract and NBP 2006-2012

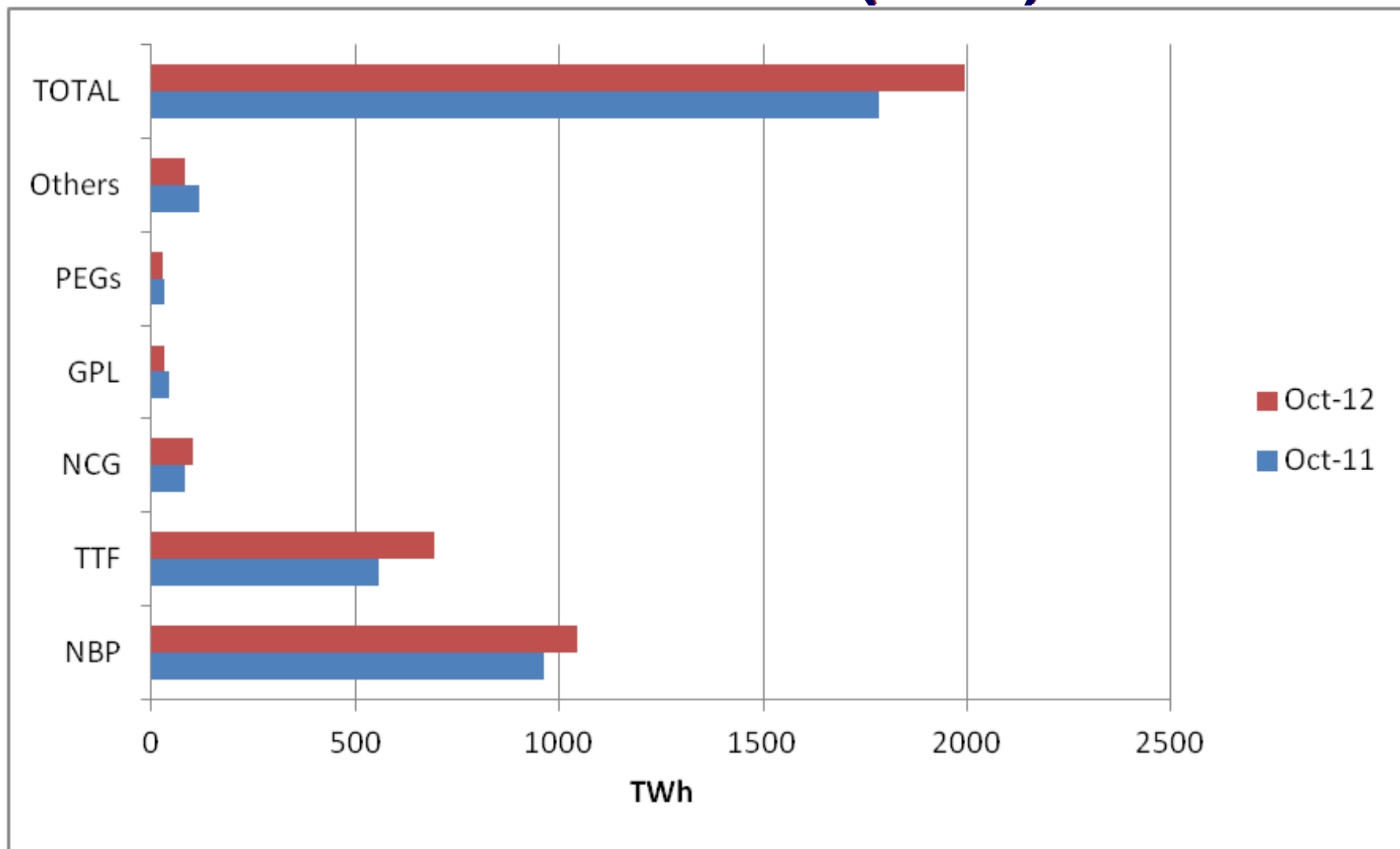


TTF (Hub) and Oil-Linked Contract Gas Prices, August 2010-December 2012 (Eur/MWh)



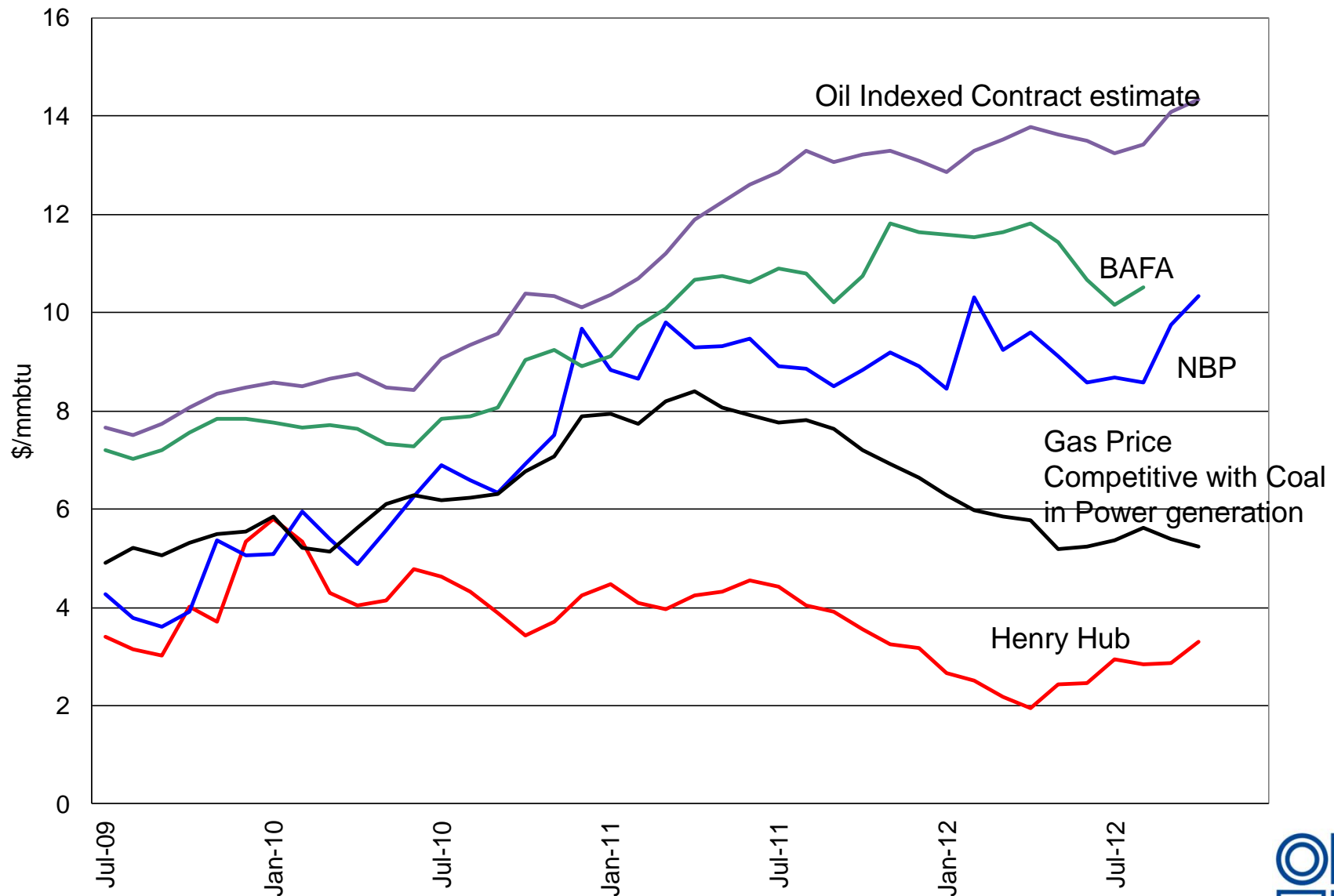
During 2012, hub prices averaged more than 30% below oil-linked contract prices

European Gas Hubs: OTC traded volumes October 2011-12 (TWh)

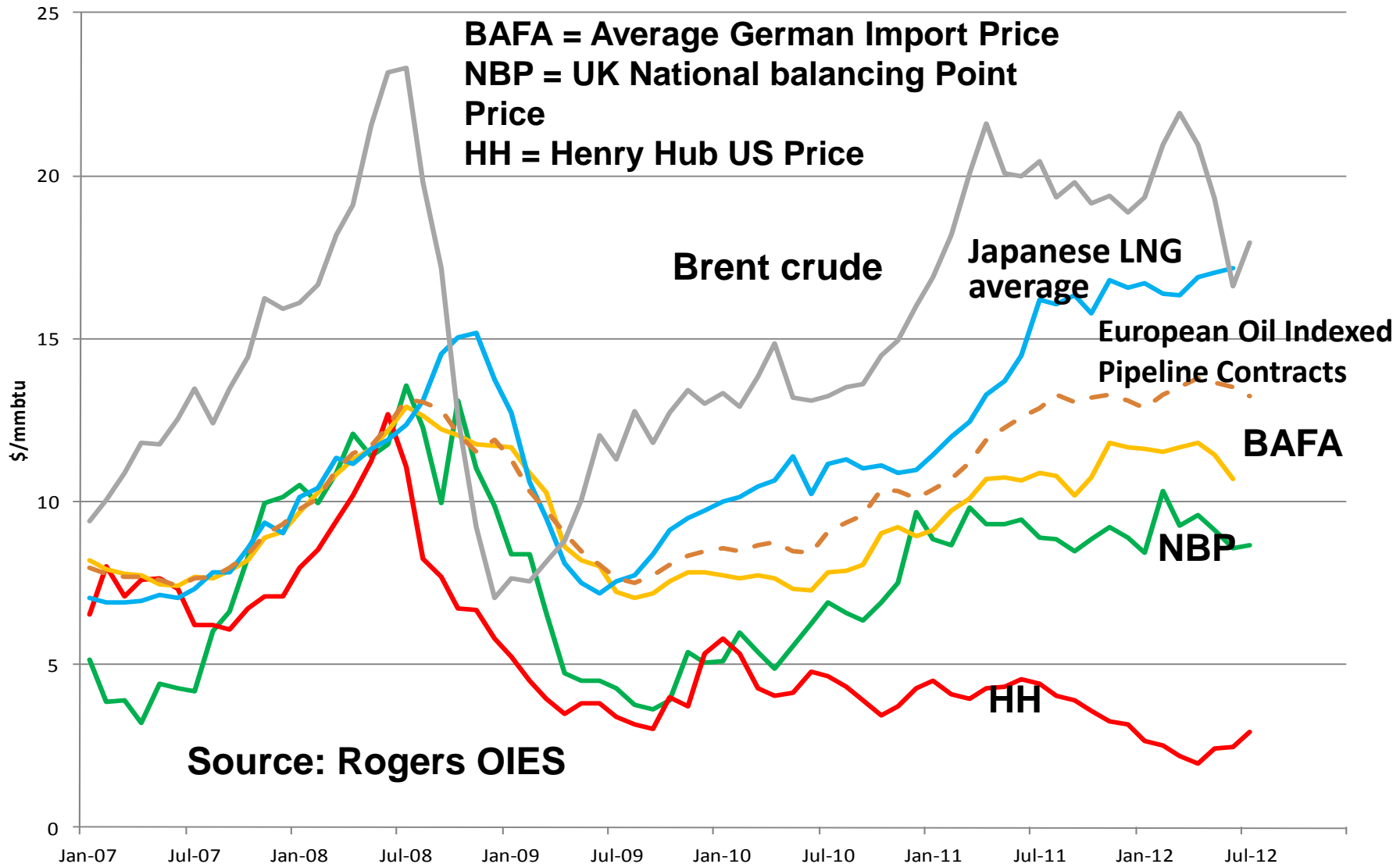


Source: LEBA, *Volumes in Gas, Power, Emissions and Coal, October 2011-12* 29

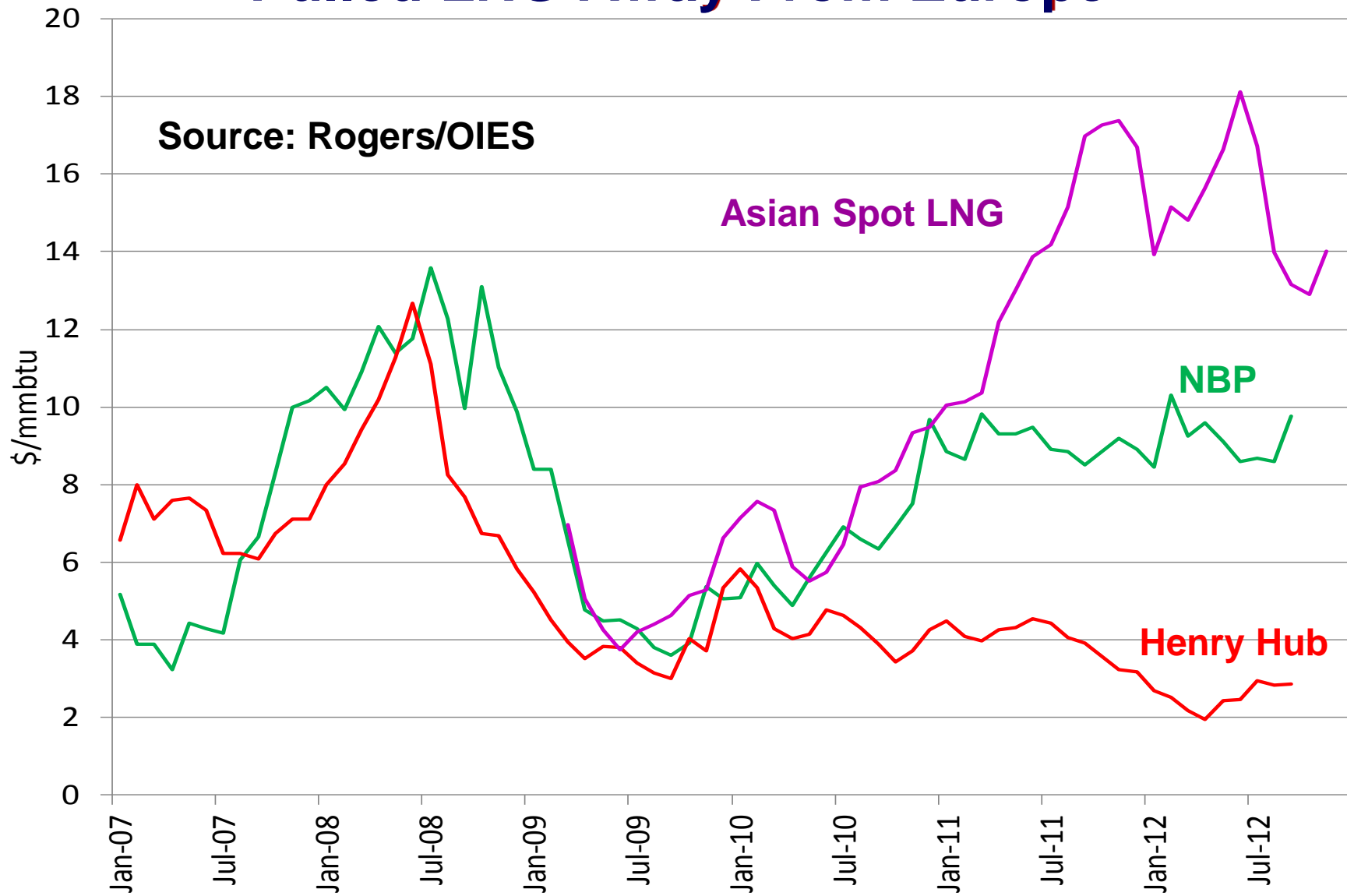
Hub Prices are not the only problem: European gas prices vs Coal, June 2009 – October 2012



Europe sits in the middle of a globalising market between North America and Asia



Since Fukushima, Asian Spot Prices Have Pulled LNG Away From Europe



Future Relationship of Gas Prices to Oil (and other energy) Prices

- A contractual link to oil prices is no longer logical BUT...
- this does not mean that oil prices are no longer relevant to gas price formation only that specific contractual linkage is no longer appropriate
- Hub-based pricing does not mean that gas prices will automatically and always be lower than oil-linked prices

The analytical challenge is to work out the components of, and influences on, European hub price formation: national/regional/global gas supply and demand; prices of other fuels – oil, coal, electricity, carbon

Future Relationship Between Long Term Contracts and Hub/Spot Prices

- Hub/spot prices do not necessarily mean spot/short term contracts
- Many existing (Dutch and Norwegian) long term contracts have moved to hub prices
- New long term contracts are being signed at hub prices (eg Statoil-Wintershall 10 year contract based on NCG/Gaspool)

BUT:

- New long term contracts are not so “long” (8-10 years not 25)
- have little or no flexibility – which requires an additional payment

Can major new infrastructure be built based on the basis of new long term contracts at spot prices?

The EU Third Package and Network Codes: a complex and evolving framework

- **Unbundling of transmission assets: OU, ISO, ITO options**
- **Certification of TSOs on meeting the unbundling requirement ('Gazprom clause')**
- **Entry-exit organisation of TSO network access**
- **Development of 12 binding pan-European network codes (NCs) for cross-border issues based on standardised capacity allocation contracts**
- **Creates uncertainty for all new infrastructure**

These measures are set to change the architecture of the EU gas market, both in terms of its structure and behaviour of stakeholders

Summary and Conclusions: European gas challenges and uncertainties

In the 2010s, European gas markets are having to cope with (at least) five different challenges:

- economic growth problems/problematic demand outlook**
- price formation changes (partly related to)**
- the “globalisation” of gas markets (and prices)**
- the low carbon “revolution” in power generation**
- major regulatory changes in transportation**

Any one of these would have been a problem, but to address all of them is a massive challenge and creates major uncertainties

Demand, Supply and Imports

- Overall picture for gas demand very pessimistic both short term and up to 2020
- Position is different in different countries but only a few (Turkey, UK, Poland) look like increasing their demand
- Aside from these countries prospects for gas-fired power generation are bleak
- But declining domestic production will mean increasing imports (even if demand declines)
- and therefore a need for some new pipeline and LNG infrastructure (but how much?)
- But 3rd Package is making new infrastructure much more complicated

European Gas Pricing: the search for new fundamentals

- **Only spot/hub-based pricing can react quickly enough to rapidly changing supply and demand fundamentals**
- **The transition is well under way (more than half of all gas sold in Europe in 2013 will be at hub-related prices)**
- **Conversion of long term contract pricing and disagreement with exporters – especially Gazprom and Sonatrach – will take time to resolve**

The next set of questions are about: which hub (NBP, TTF, other), which price (day-ahead, month-ahead), for what purpose (balancing, risk-management

Europe is part of an increasingly global gas market between North America and Asia

- North America – with Henry Hub prices – could become an exporter (or could revert to imports)
- Asian gas demand is increasing rapidly but if Chinese demand growth slows, and Japan reopens nuclear stations (both possible in 2013)
- Aside from its own internal dynamics, Europe will gain or lose LNG to Asia and North America, but timing of this is uncertain
- Much new LNG supply arrives at the end of the 2010s

The impact of these developments on European prices becomes crucial for supply and demand



THANK YOU

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