

# Energy Security in a Changing World

With special reference to European gas

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Bergen Energi -- 18 May 2011

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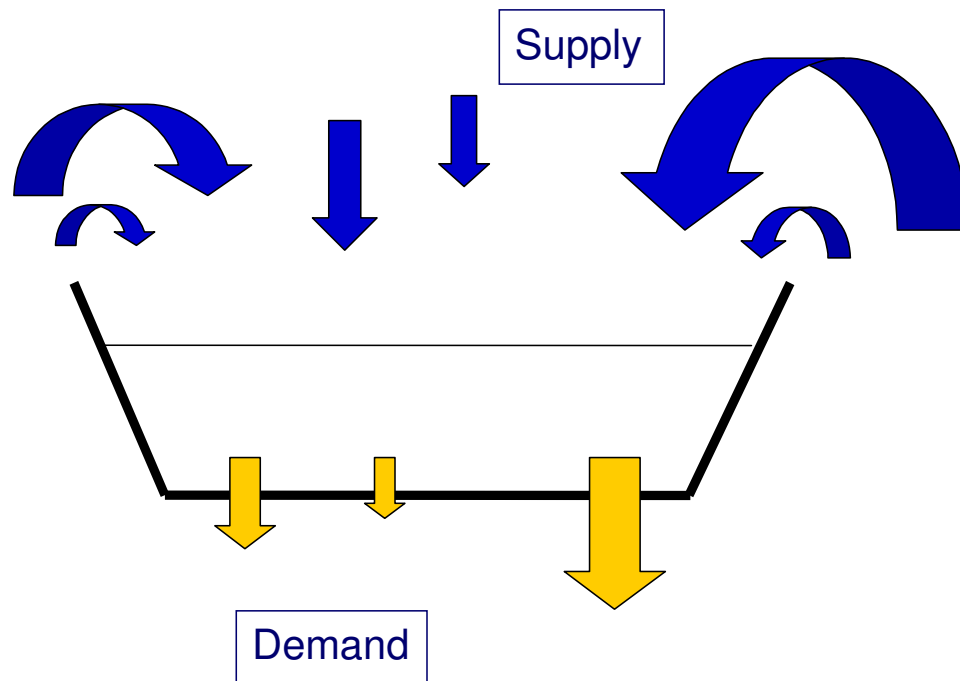
- I. Global oil supply security and the Middle East
- II. European gas supply security and Russia
- III. Security of supply and the EU internal market

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-I-

# Oil Supply Security and the Middle East

# Global oil market – highly integrated

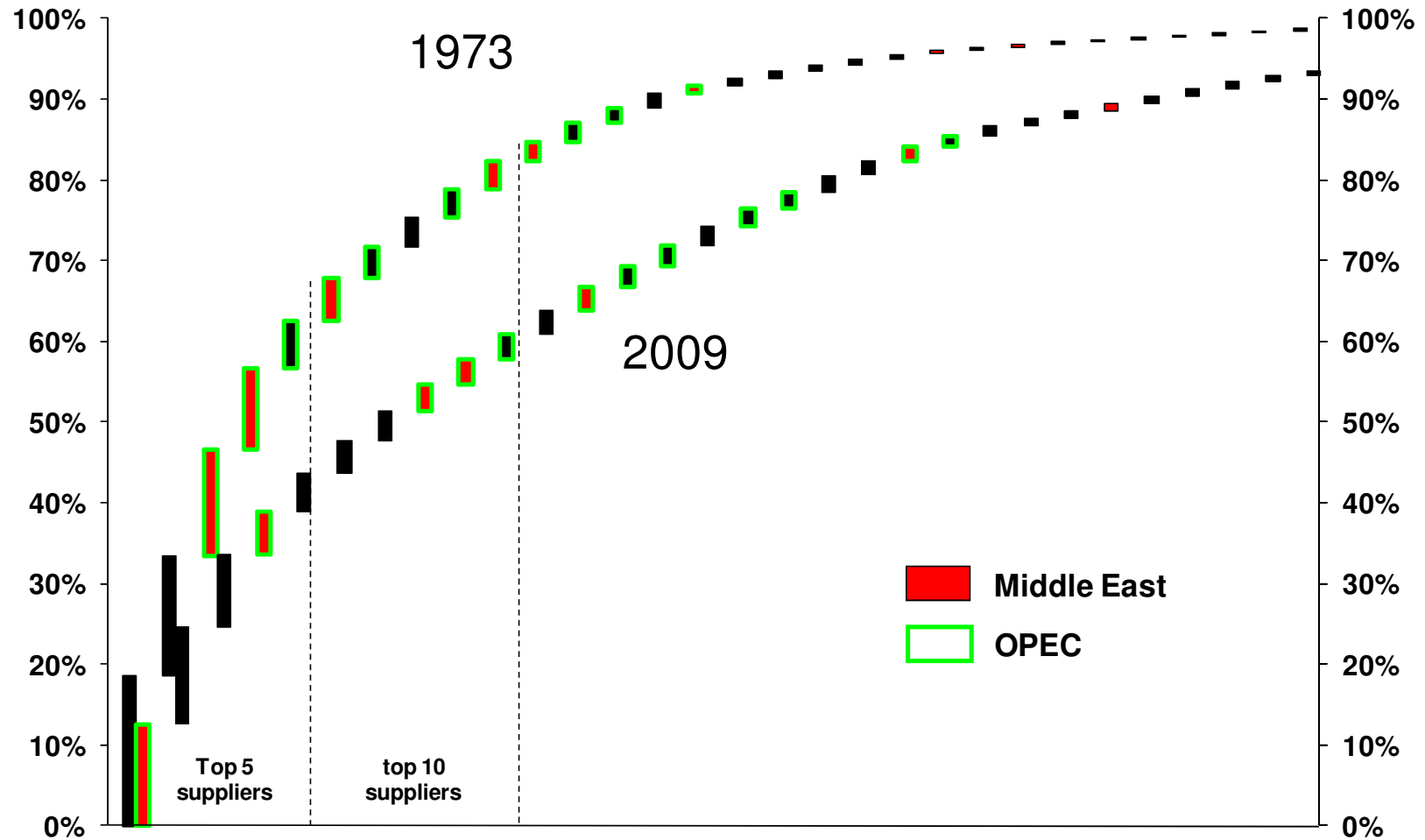


## Key implications

1. No need to secure 'access' to resources
2. US does not depend on the Middle East
3. China's upstream investment do not reduce our access to the oil market
4. Embargoes are never credible
5. Supply disruptions are felt by all consumers

**Oil security is a global public good**

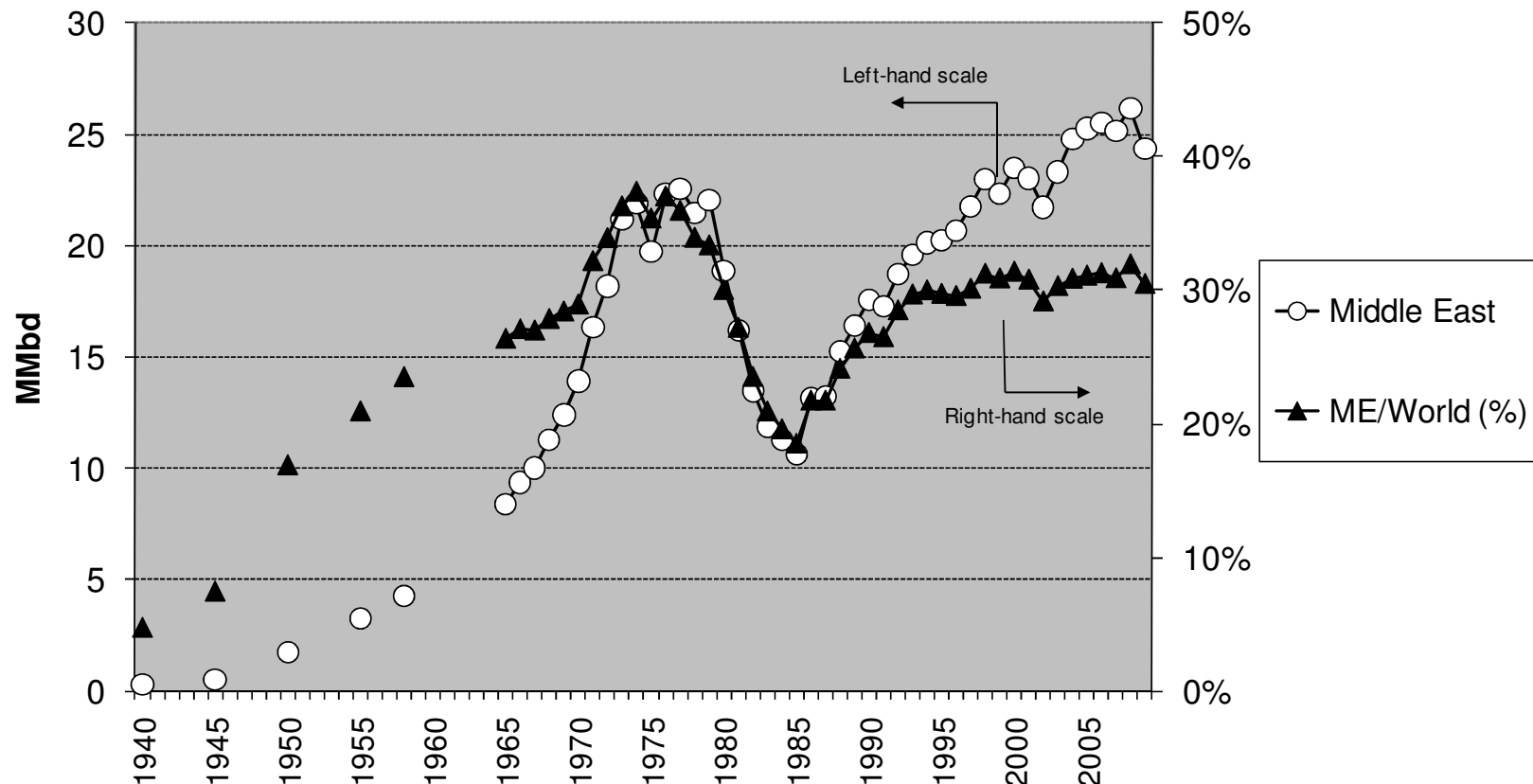
# Oil supply has never been so diversified



Data source: BP Statistical Review 2010

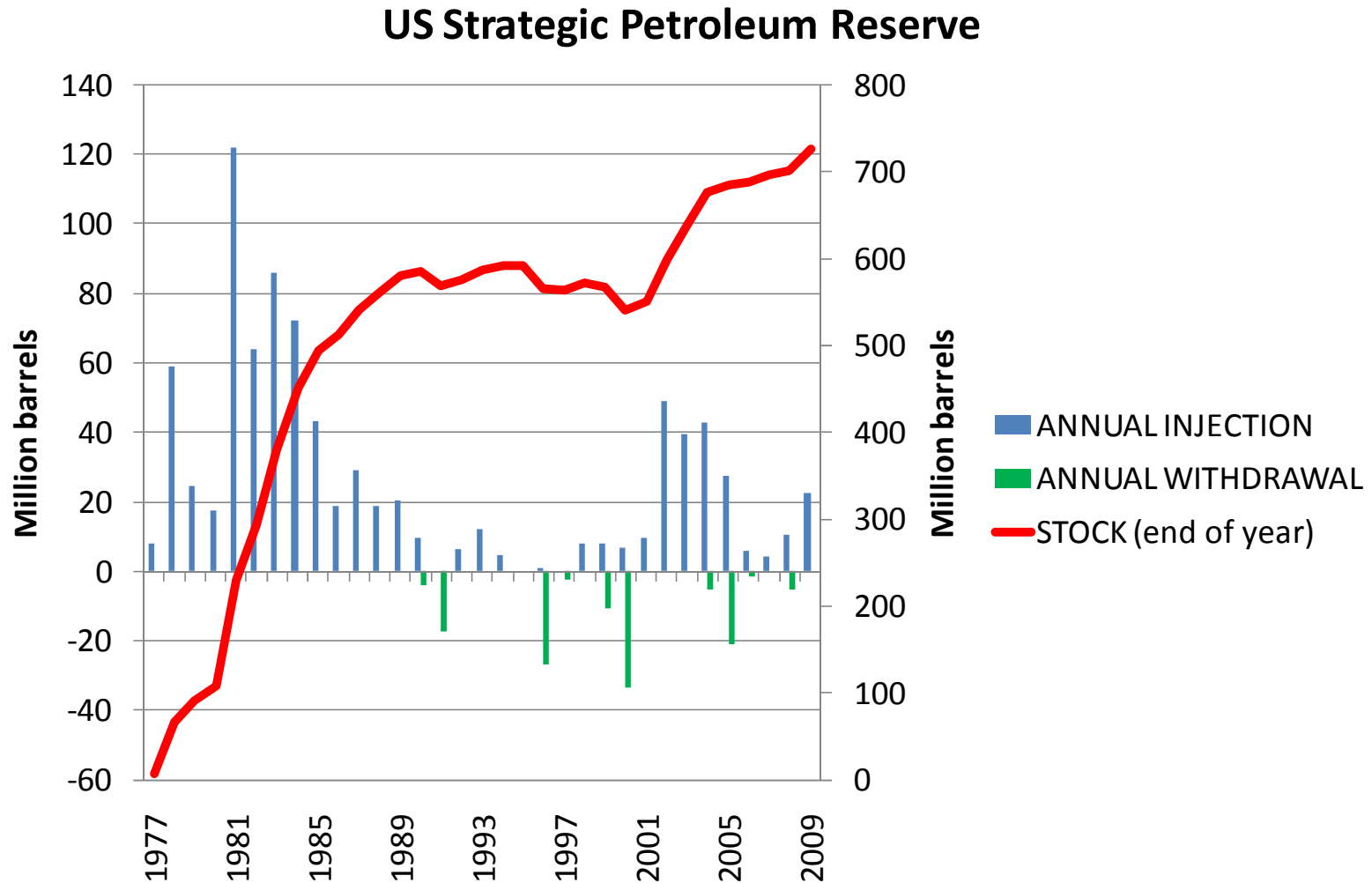
# Middle East = 30% of world oil

Middle East Oil Production, 1940-2009



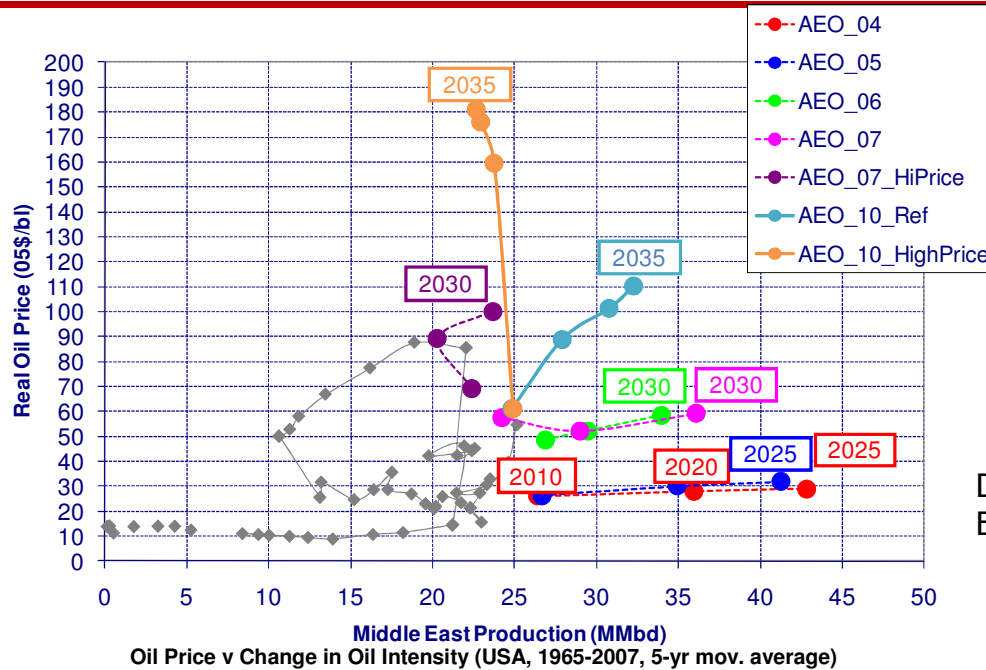
Sources: American Petroleum Institute, "Petroleum Facts & Figures", 1958 ; BP Statistical Review of World Energy, 2010

# Massive strategic oil stocks



Data source: US DOE/EIA

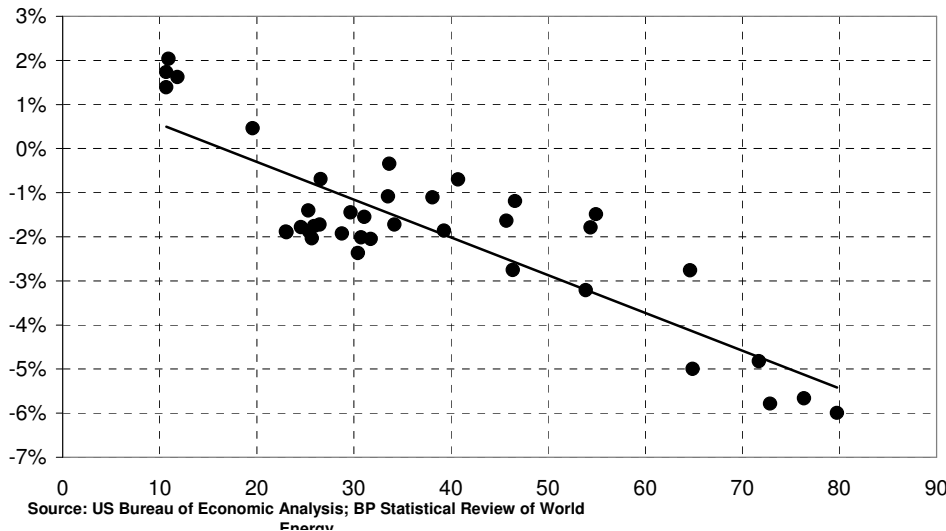
# High prices limit our dependence...



on the Middle East

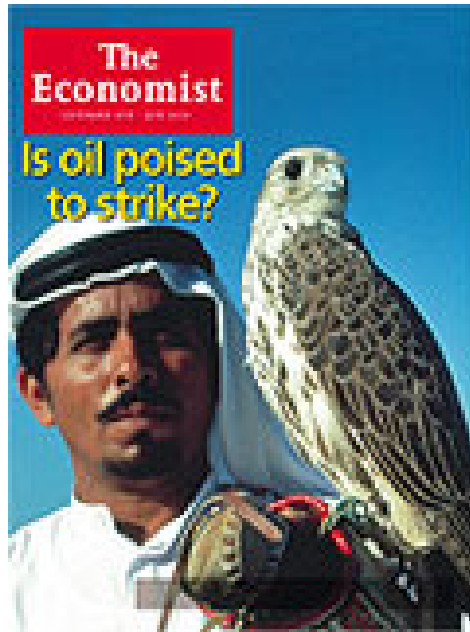
Data sources: DOE/EIA, Annual Energy Outlook, various years

on oil itself





# Conclusions on oil security



**Geopolitical risk is high but we have bought insurance**



**Biggest risk may be the macroeconomic impact of oil prices**



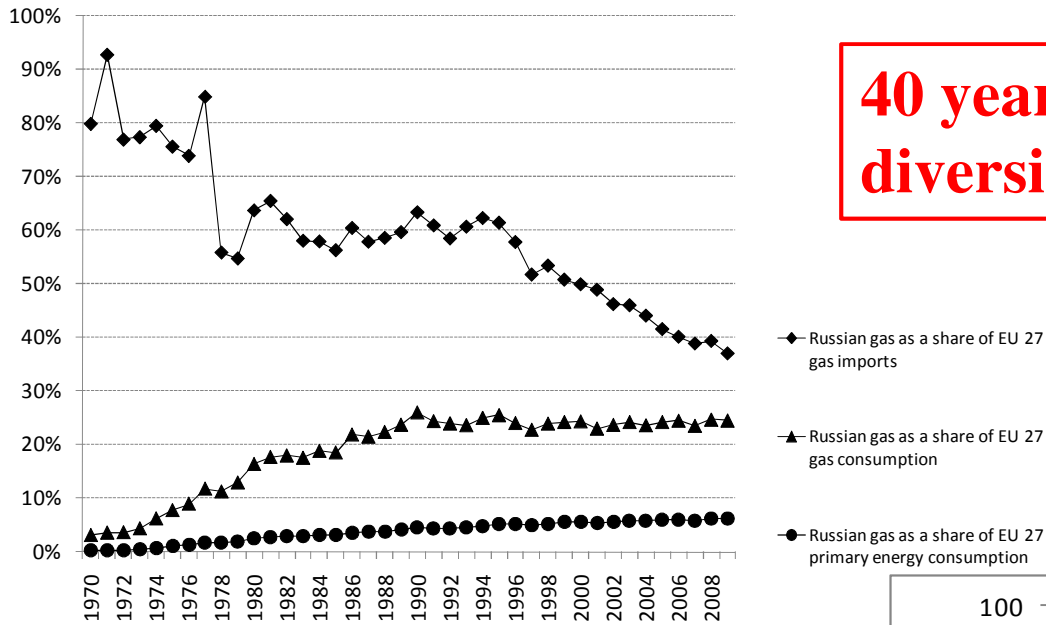
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# European Gas Supply Security and Russia

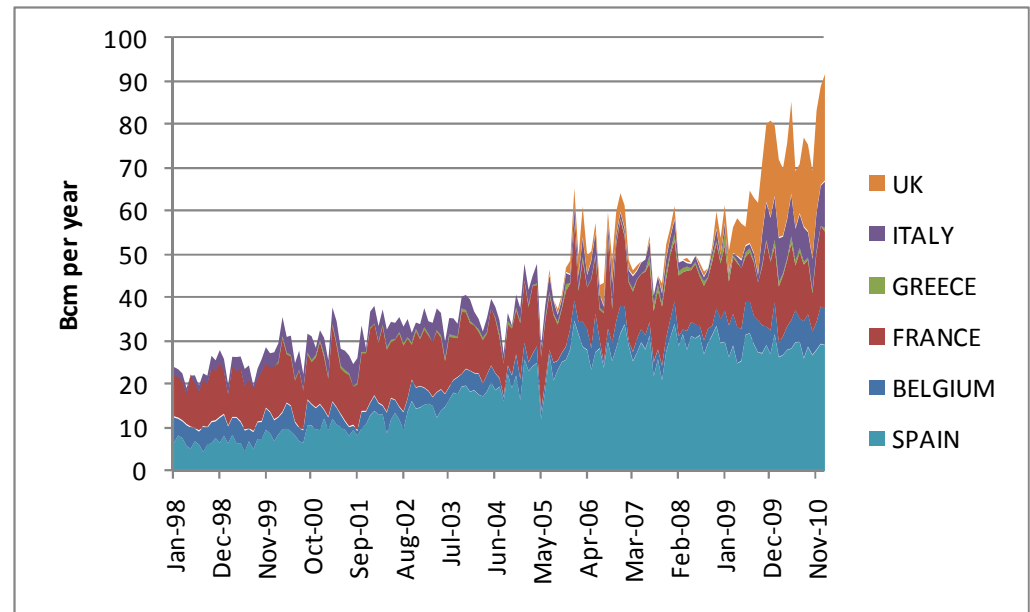
# Russian gas: important, not dominant



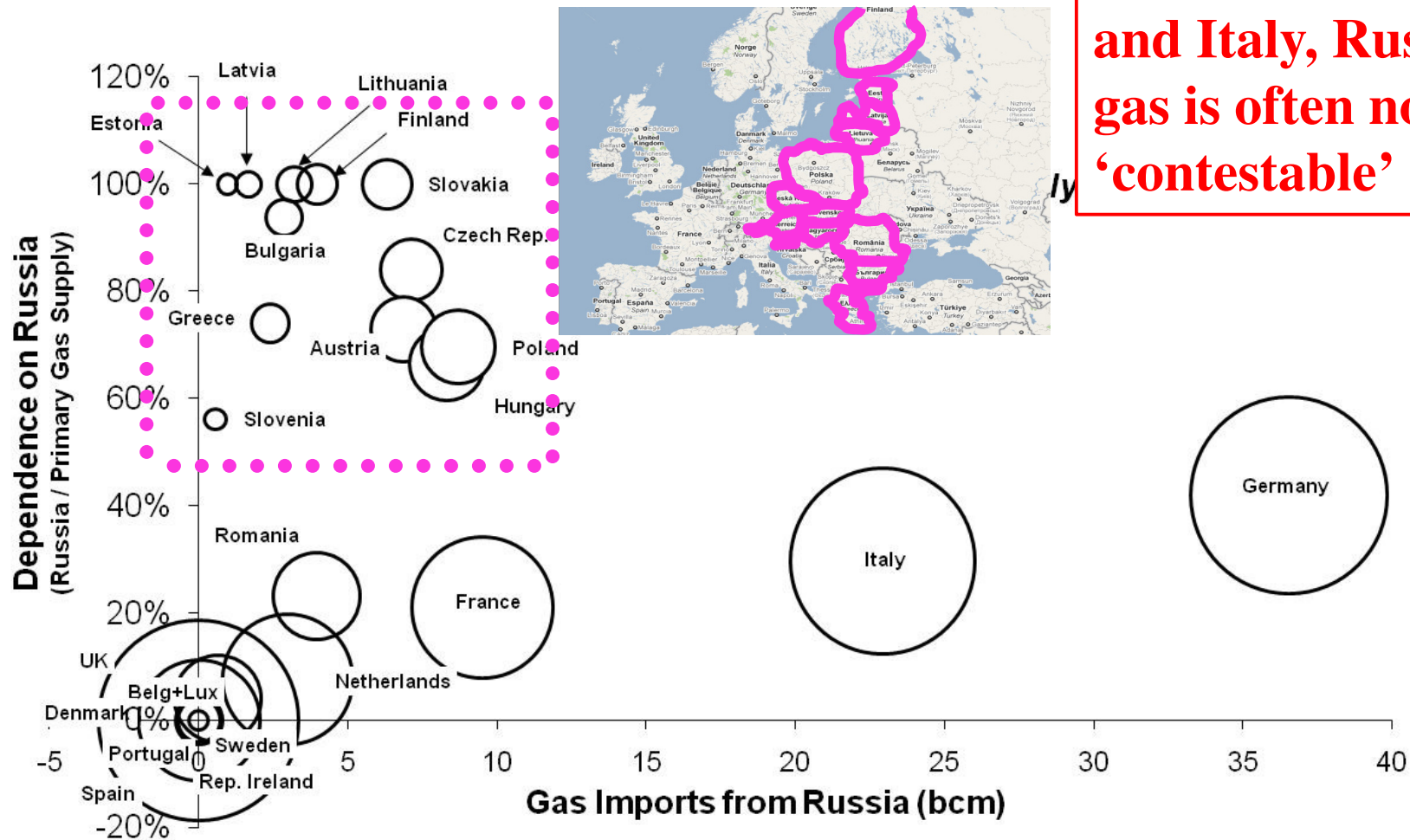
**40 years of diversification...**

Source: BP Statistical Review of World Energy; International Energy Agency; Eurostat

**...accelerated by the LNG boom**



# Supply diversity is in Western Europe

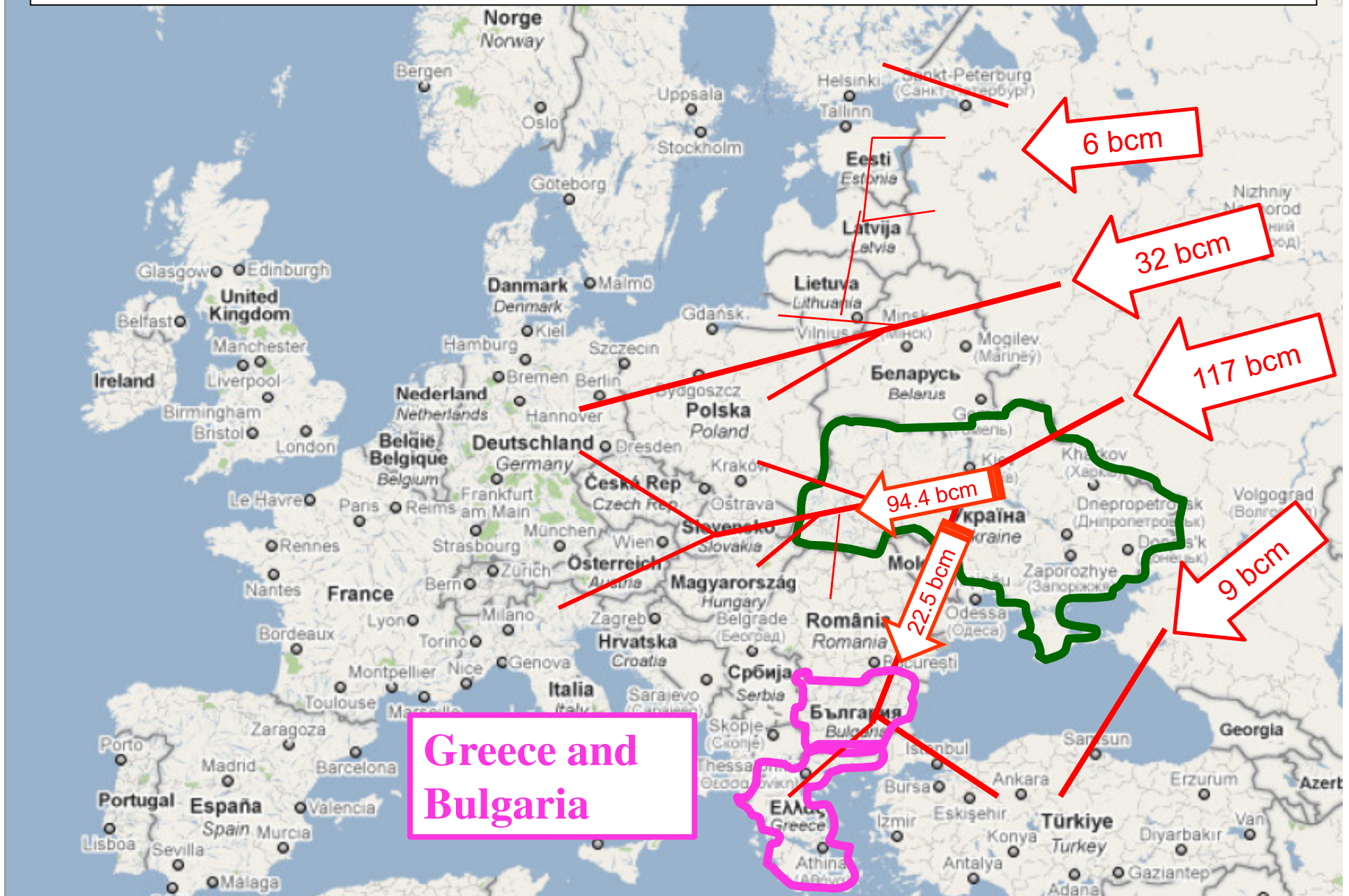


**East of Germany and Italy, Russian gas is often not 'contestable'**

Data source: BP Statistical Review; Eurostat; National Statistics -- 2008 data

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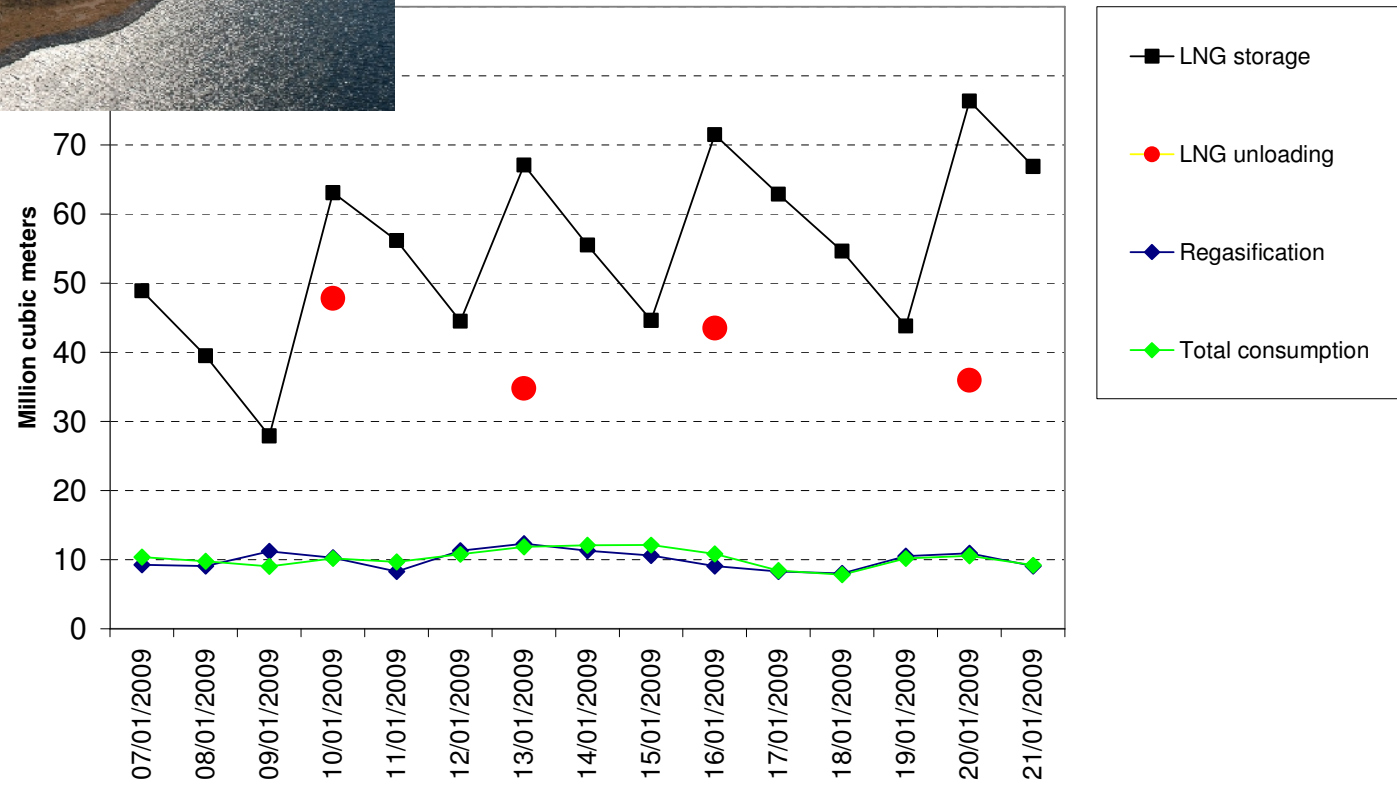
# Coping with supply disruptions: 01/09



# January 2009 -- Greece



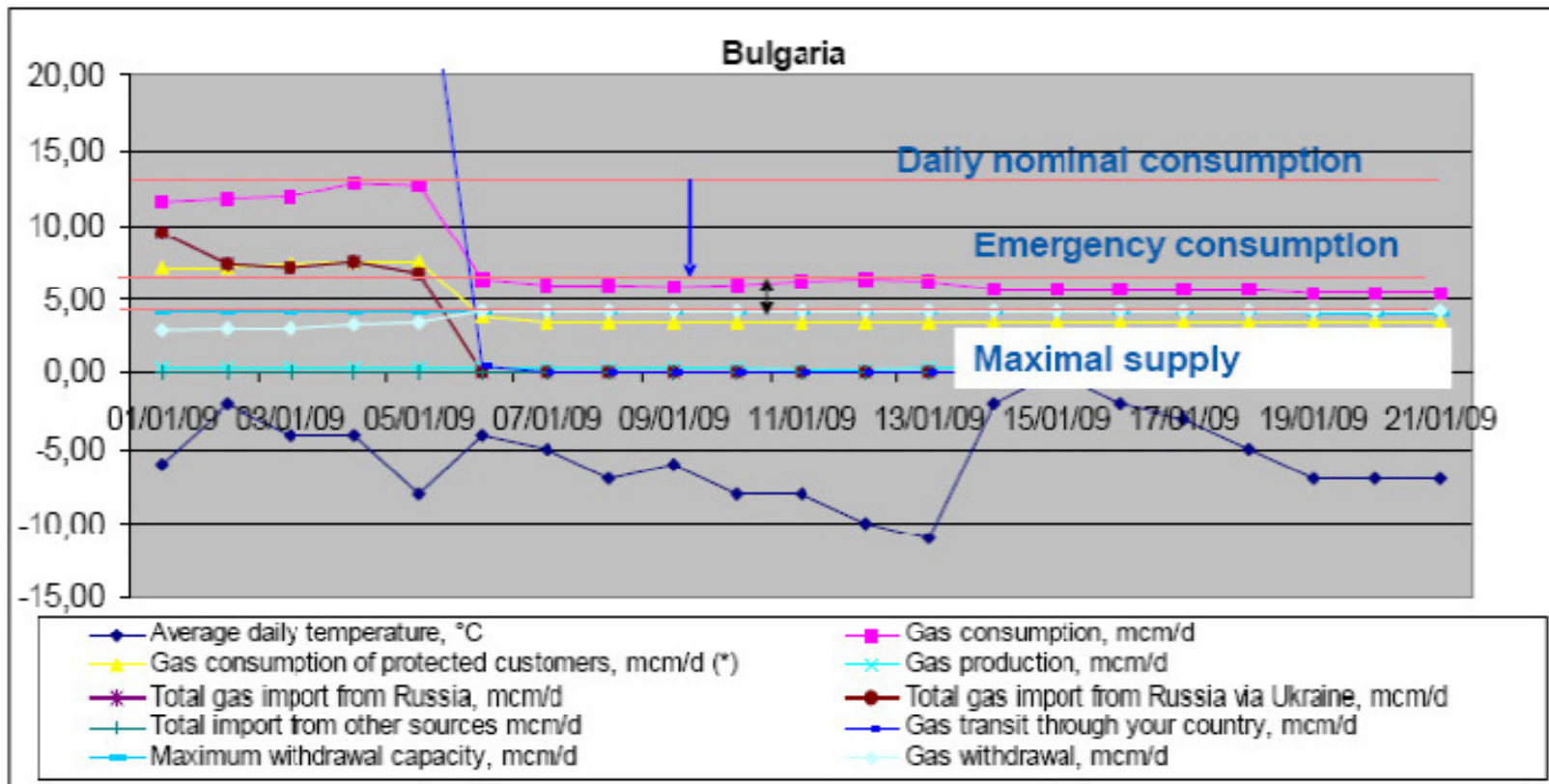
Revithoussa LNG



Data source: DESFA (Greek gas TSO) reporting to RAE (Greek energy regulator)

Demand fully met by LNG – including  
spot cargoes

# January 2009 -- Bulgaria

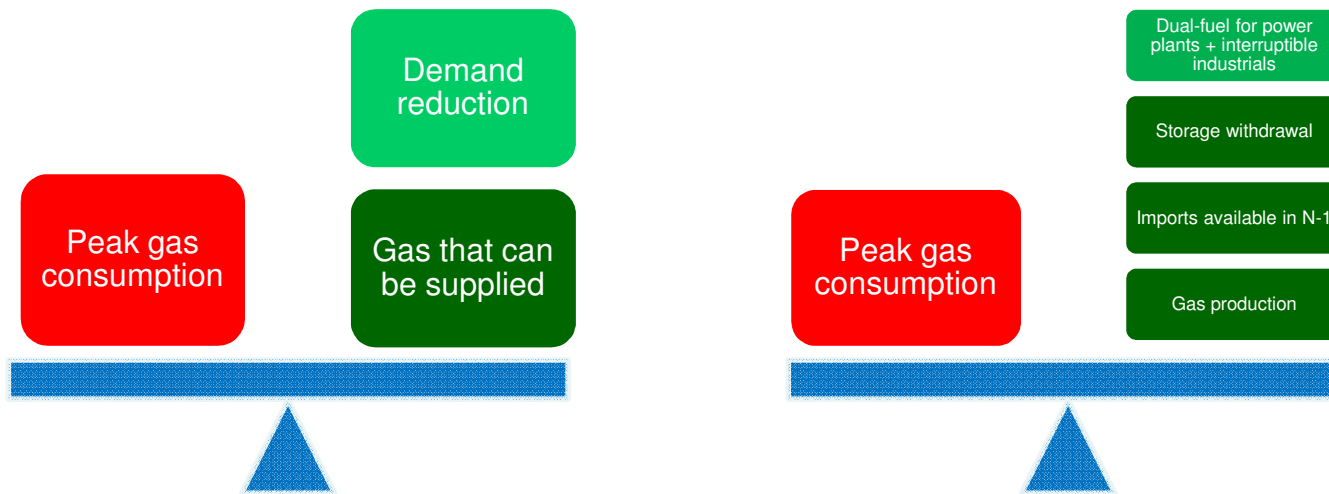


Source: Kardejak (2009)

**50% of demand left unserved.**

# Measuring short-term gas supply security

- Gas Supply Balance **when Russian Gas not Available**

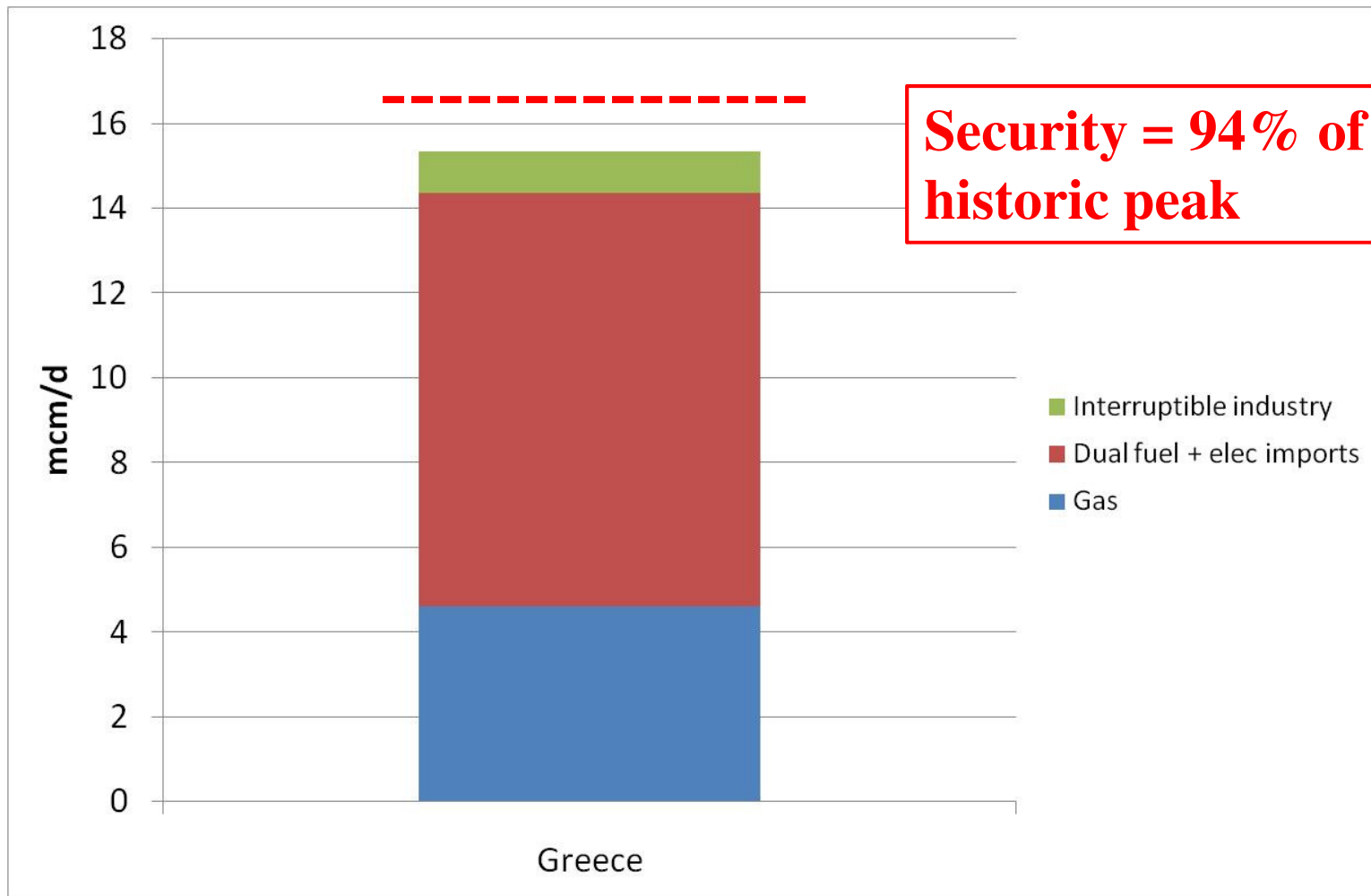


- Gas Supply Security Indicator – **1<sup>st</sup> Day of Total Disruption**

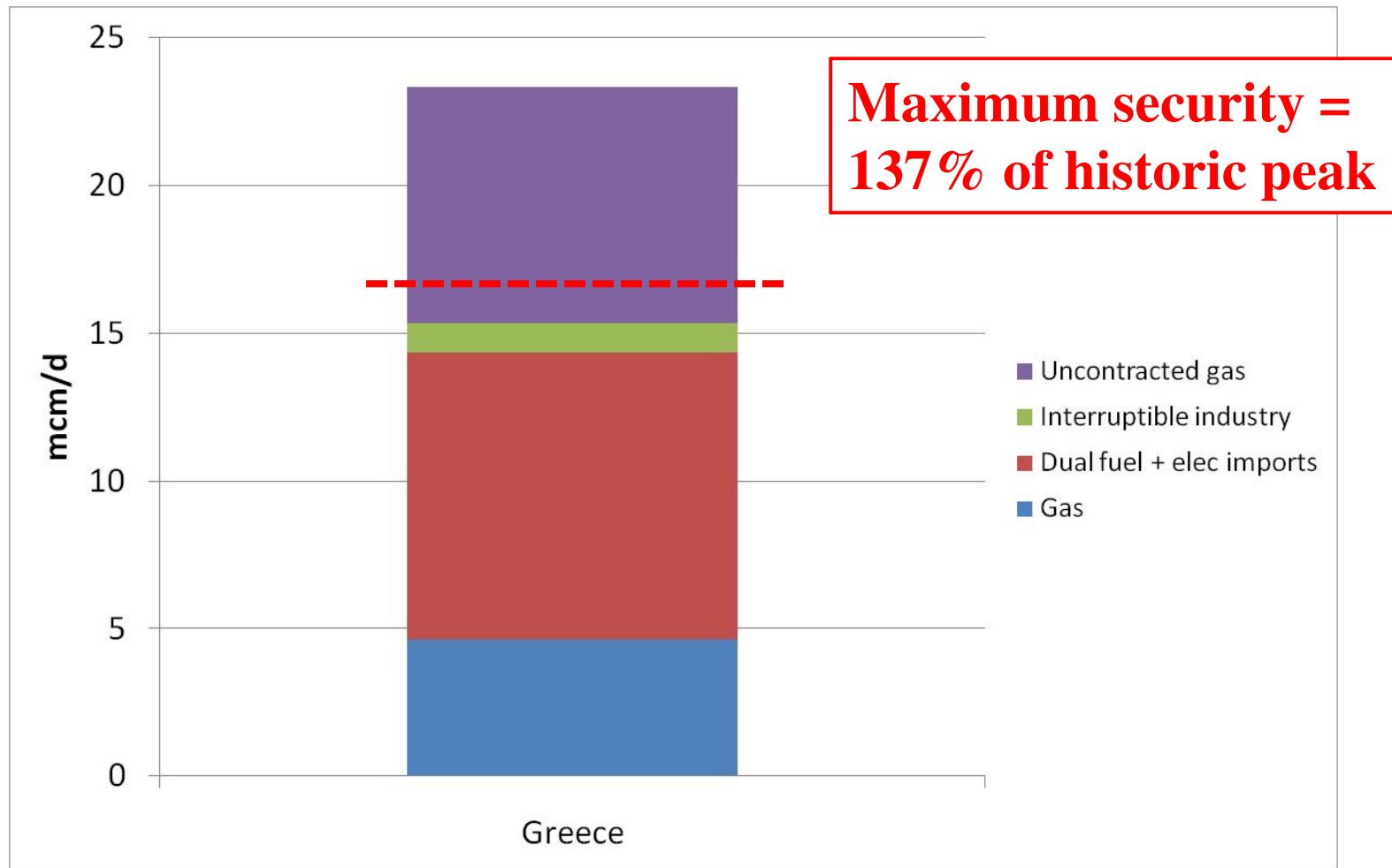
$$\text{GSS} = \text{[Green Box]} + \text{[Light Green Box]} \text{ as \% of } \text{[Red Box]}$$



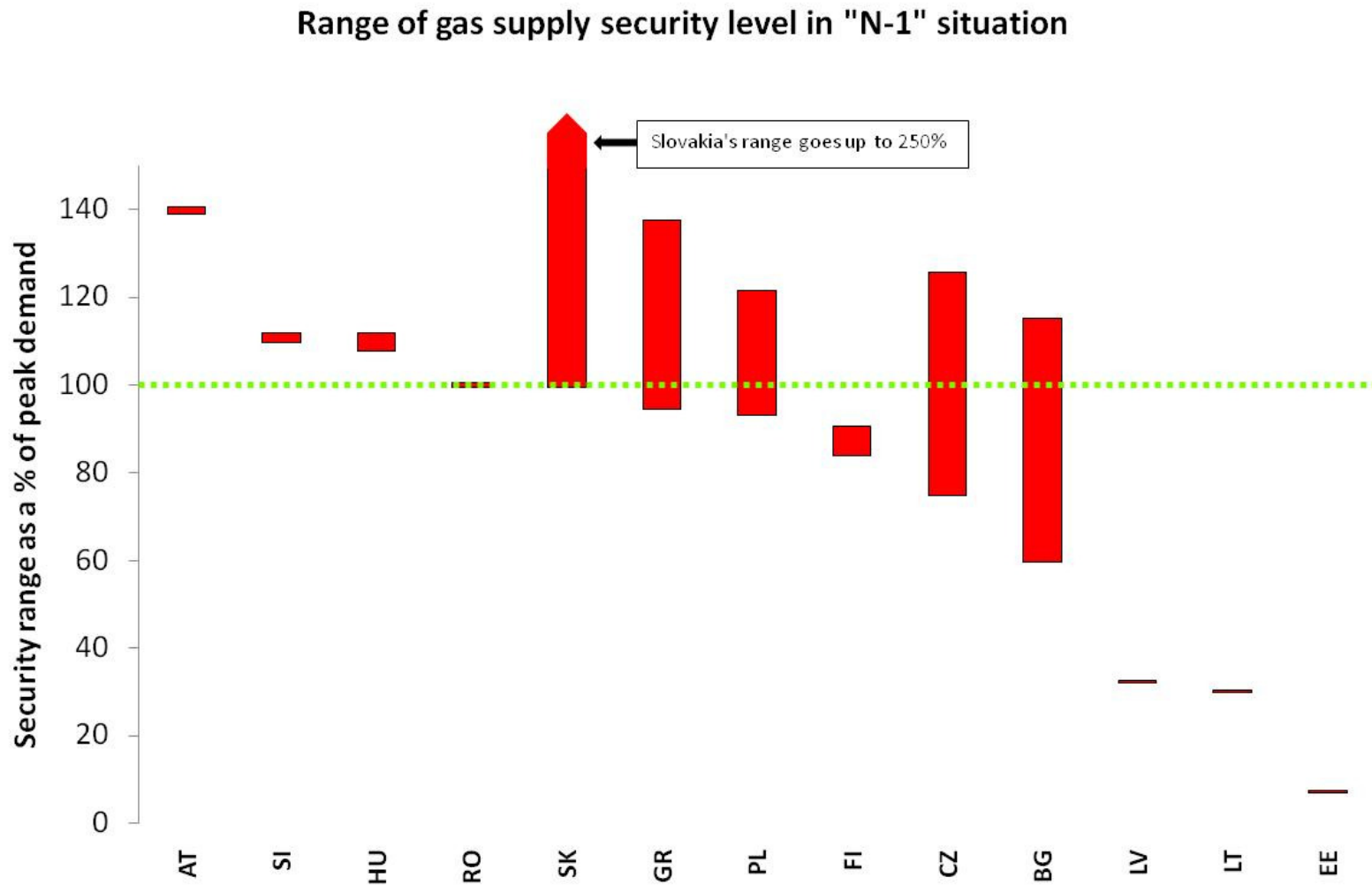
# Ex.: Greece in 'N-1' – minimum security



# Greece in 'N-1': maximum security



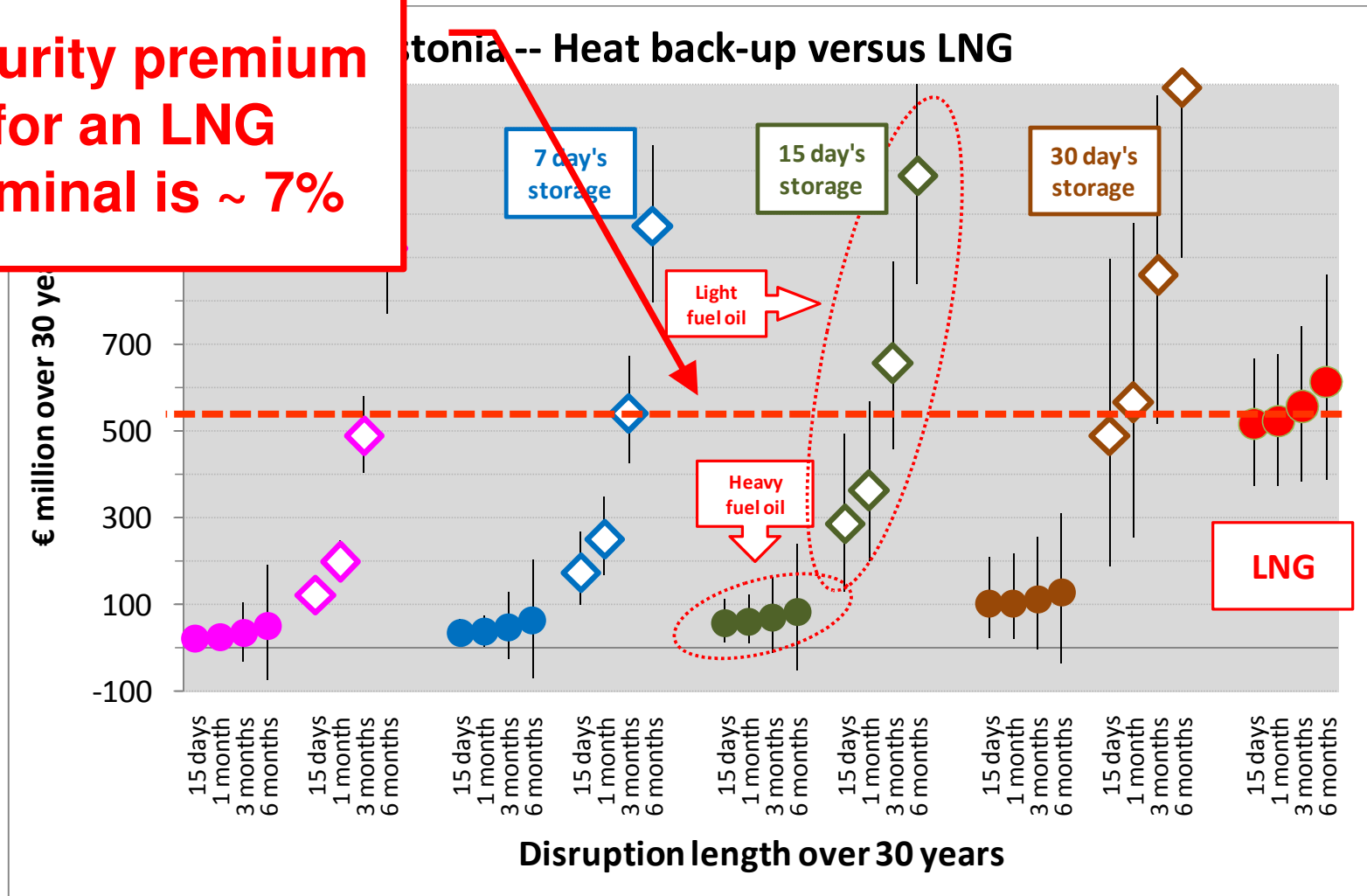
# Gas security in Russia-dependent EU



Source: Noel & Findlater, 2010

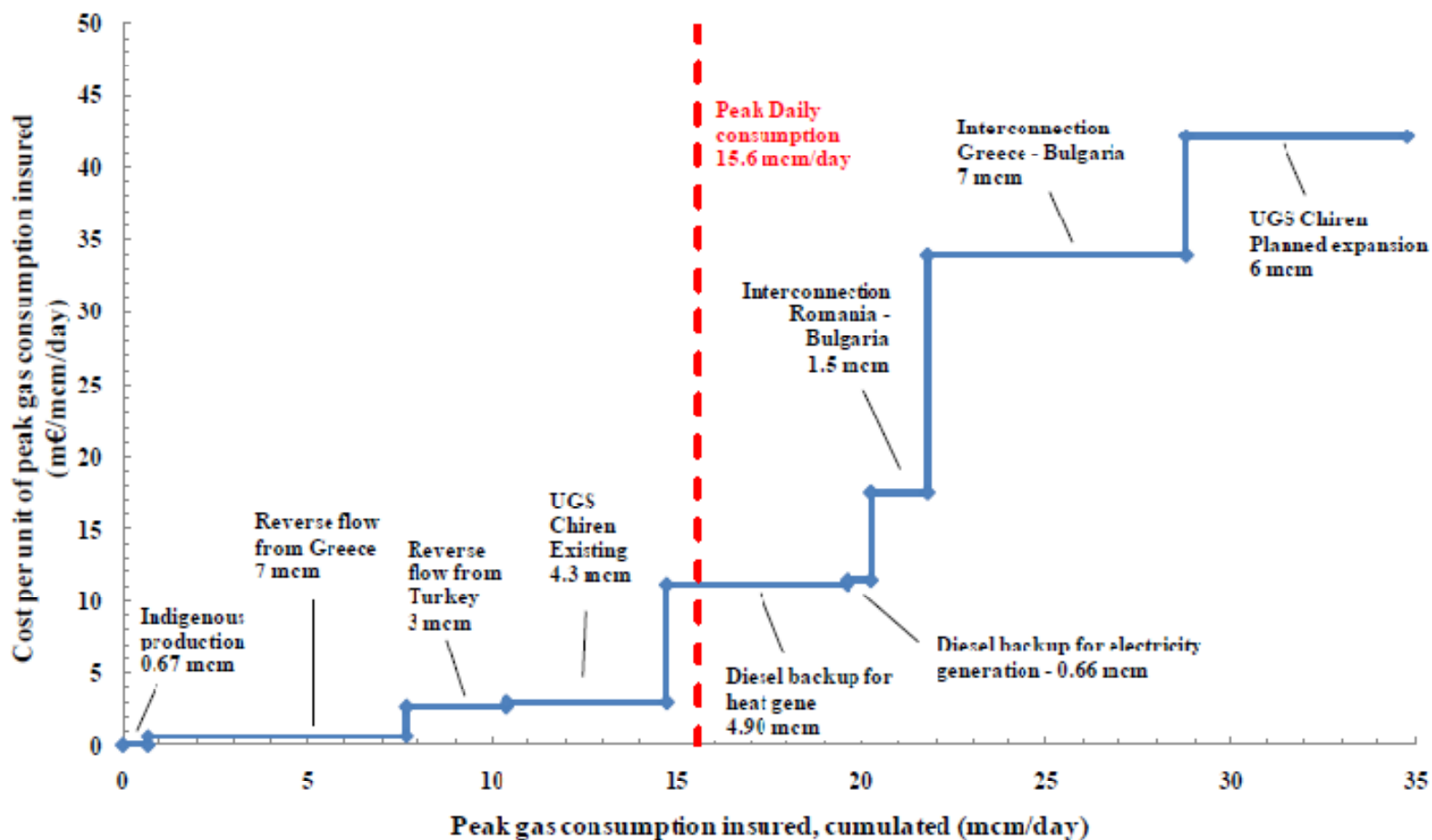
# Cost of improving security: Estonia

**Security premium for an LNG terminal is ~ 7%**



Source: Noel & Findlater, forthcoming

# Supply curve for gas security: Bulgaria



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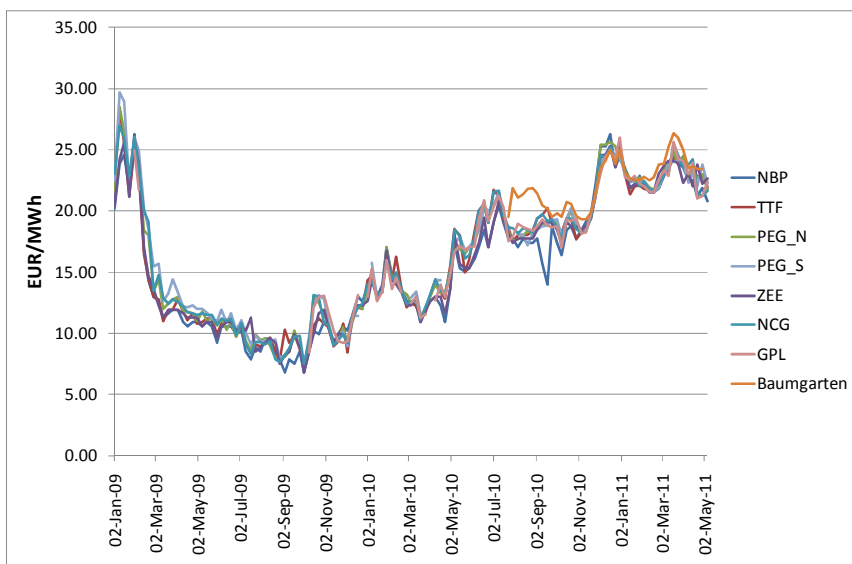
# Security of Supply and the EU “Internal Market”

# The market / security nexus

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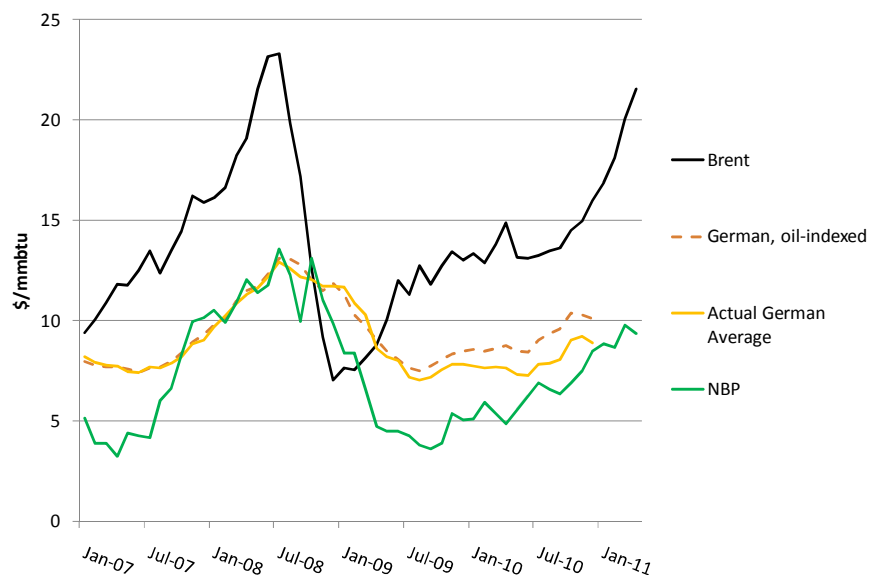
- Efficient markets increase welfare, including through enhanced security of supply
  - Alternative gas is available in times of crisis
  - Contestability breaks the link between contractual and political 'dependence'
- Two key questions for EU policy makers
  - Are price differences arbitrated?
  - Do people invest in trade-enabling infrastructure?

# NW Europe: the market seems to work



Data source: Bloomberg

- Hub price convergence – clear econometric evidence of market integration (Hansen & Jepma, 2011)
- Role of LNG in price convergence



- UK-Continent integration puts pressure on oil-indexation

Source: Spreadsheet sent to PN by Howard Rogers – updated with data from BAFA (German Federal Office for Economics) and Bloomberg



# Still no pan-European gas market

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- Huge spreads between West and East not arbitrated
  - No capacity trading in transit pipelines
- EU market design prevents efficient investment?
  - TSOs & National Regulators control large entry-exit zones
  - Impossible to sell LT capacity contracts along specific paths (through entry-exit zones)
  - ...although this is how UK-Continent has been done
- European temptation to subsidise (and politicise) pipeline investment
  - ERGEG study / TYNDP / EU infrastructure package
  - Pipeline investment decisions remain centralised in Europe (within zones, and between zones)

# Reforming the EU market model?

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- Remove long-distance transportation -- into zones and between zones -- from TSO control and E-E pricing
  - European ‘interstate’ system separate from E-E zones
  - ISOs operating ‘European’ pipelines
  - Capacity on ‘European’ pipelines clearly defined, calculated, and sold via tradable long-term contracts
  - Would kick-start a pan-European capacity market
  - Would allow to have *small* zones, reducing inefficiencies
  - **Would allow investment decisions to be *decentralised* – a key feature of a successful liberalised market**
    - Essential to flexibly adapt to rapidly changing supply patterns