Gas Supply to Europe
A Strategic and Global Context

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Erbil, 13th November 2011

Integrated model for global gas supply (field, pipeline and project level) and demand (country level) developed for Toyota

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Darvaza ("The Gate" in Turkoman)
In 1971 an exploration well in the Karakum desert in Turkmenistan penetrated a cavern filled with gas. The drilling rig collapsed into the hole and the engineers set fire to the gas. It is still burning nearly 40 years later. Locals call it the "Gate to Hell".

Strategic Gas Issues - Europe

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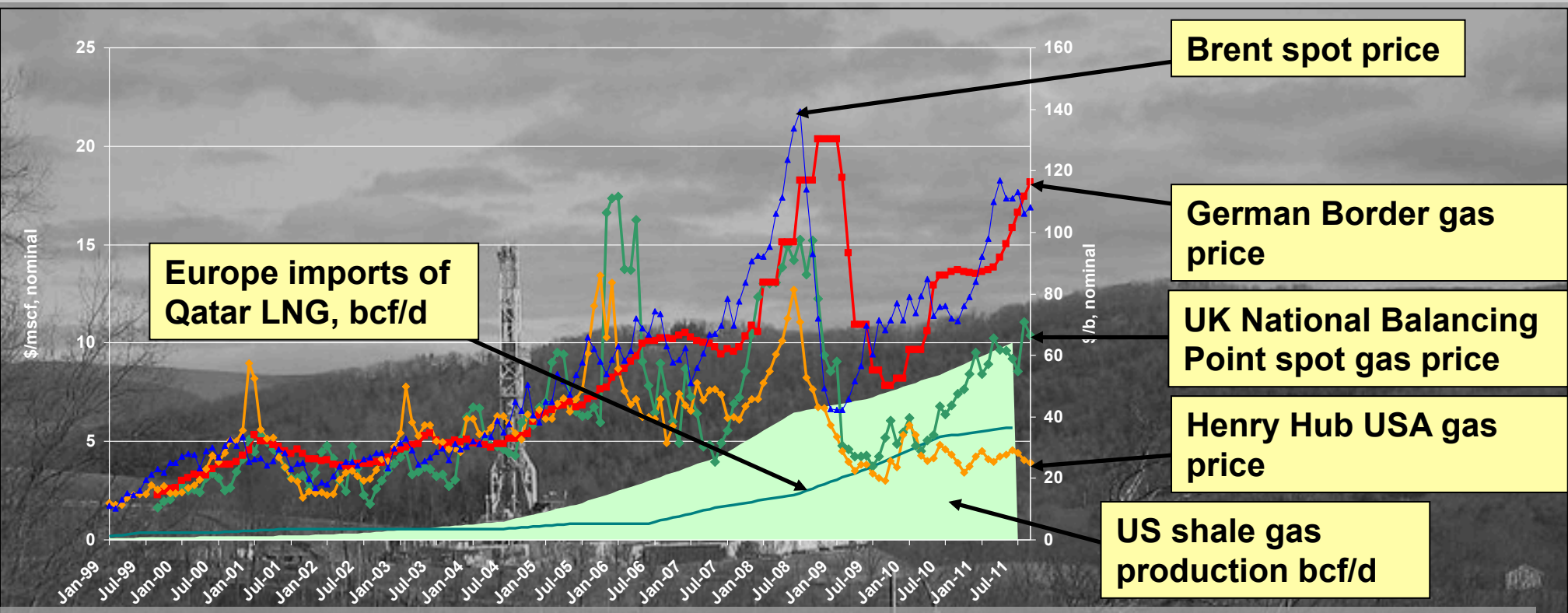
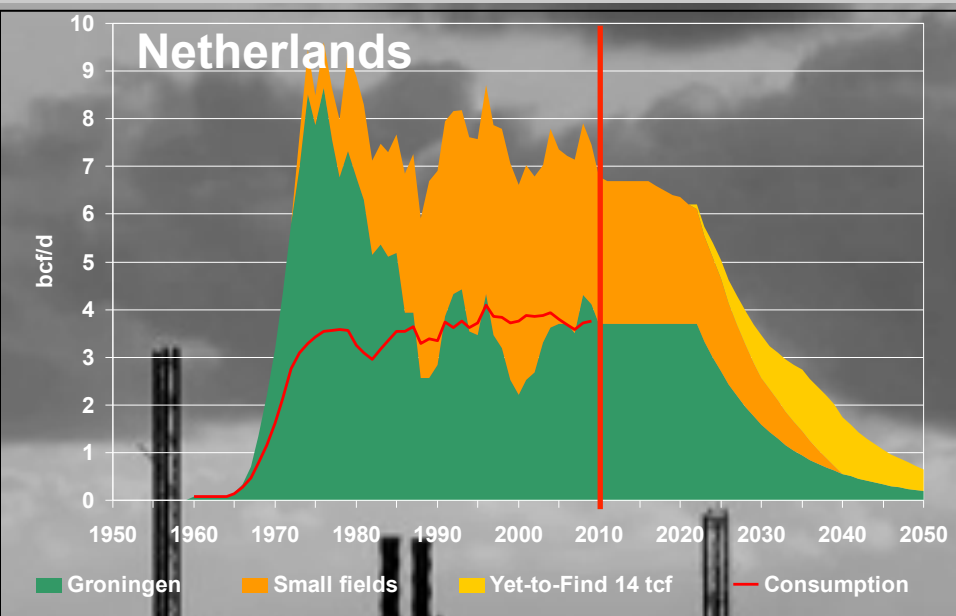
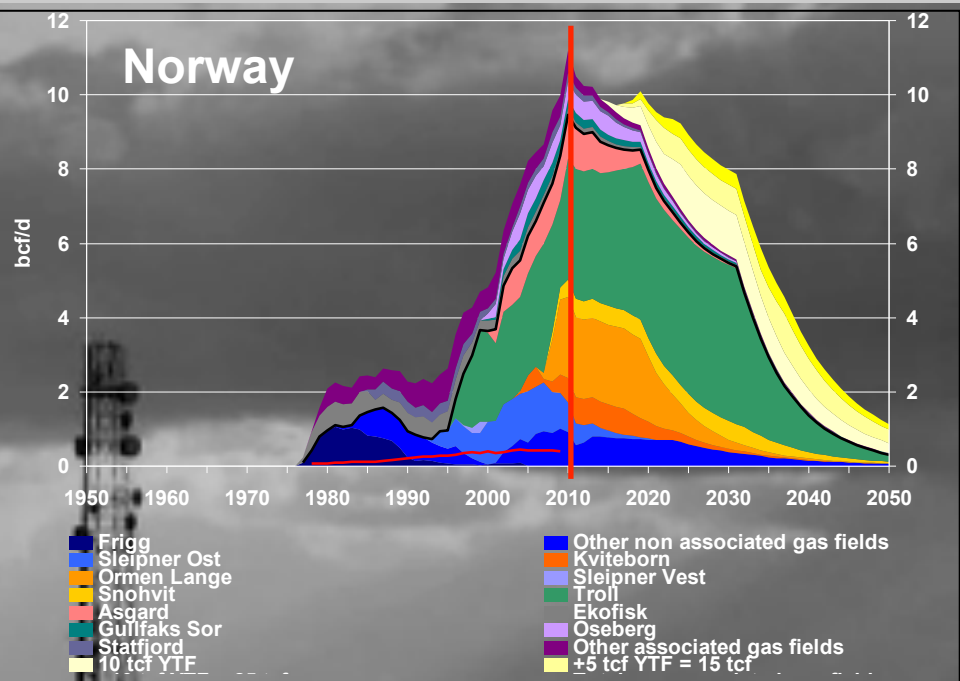
Strategic Gas Issues – Gas price evolution – tale of three markets

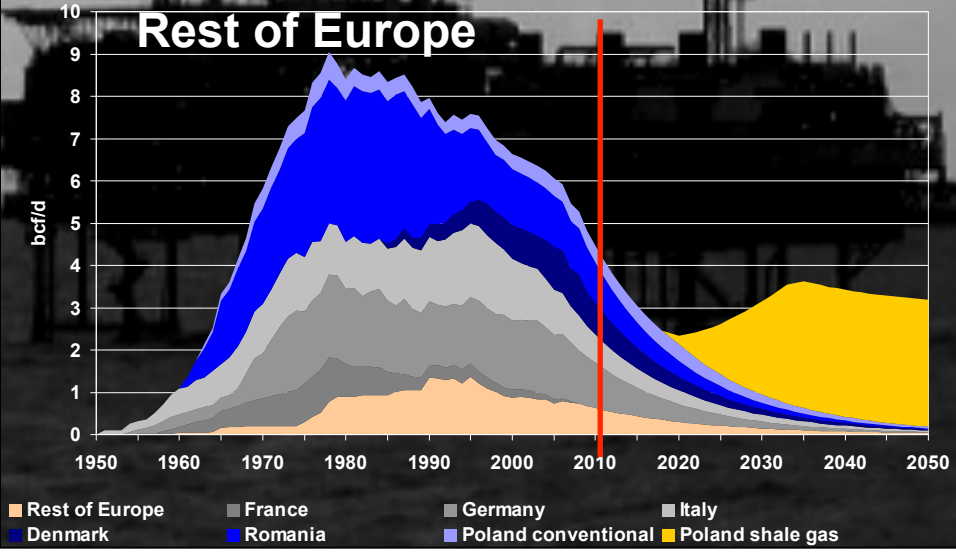


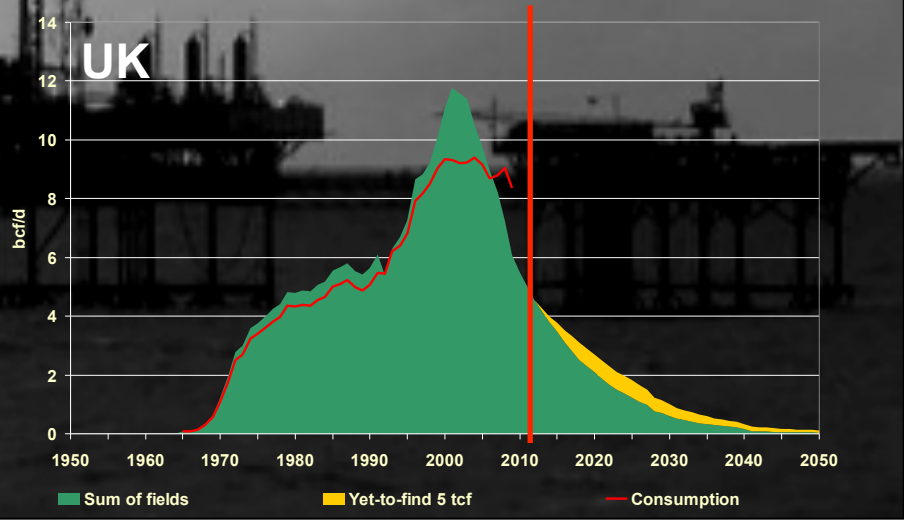
- Decoupling of US gas prices from oil prices started in 2006 as shale gas production rose – gas production not inhibited by low gas price as economics depend on high liquids yield
- Global liquefaction capacity rose from 13 bcf/d in 2000 to 35 bcf/d in 2010 and is expected to exceed 60 bcf/d by 2030
- Europe regasification capacity risen from 5 bcf/d in 2000 to 17 bcf/d in 2010 and is expected to exceed 30 bcf/d by 2030
- Russia and Algeria expected to defend oil price parity contracts – manage supply

Strategic Gas Issues – “indigenous” supply heading for steep decline









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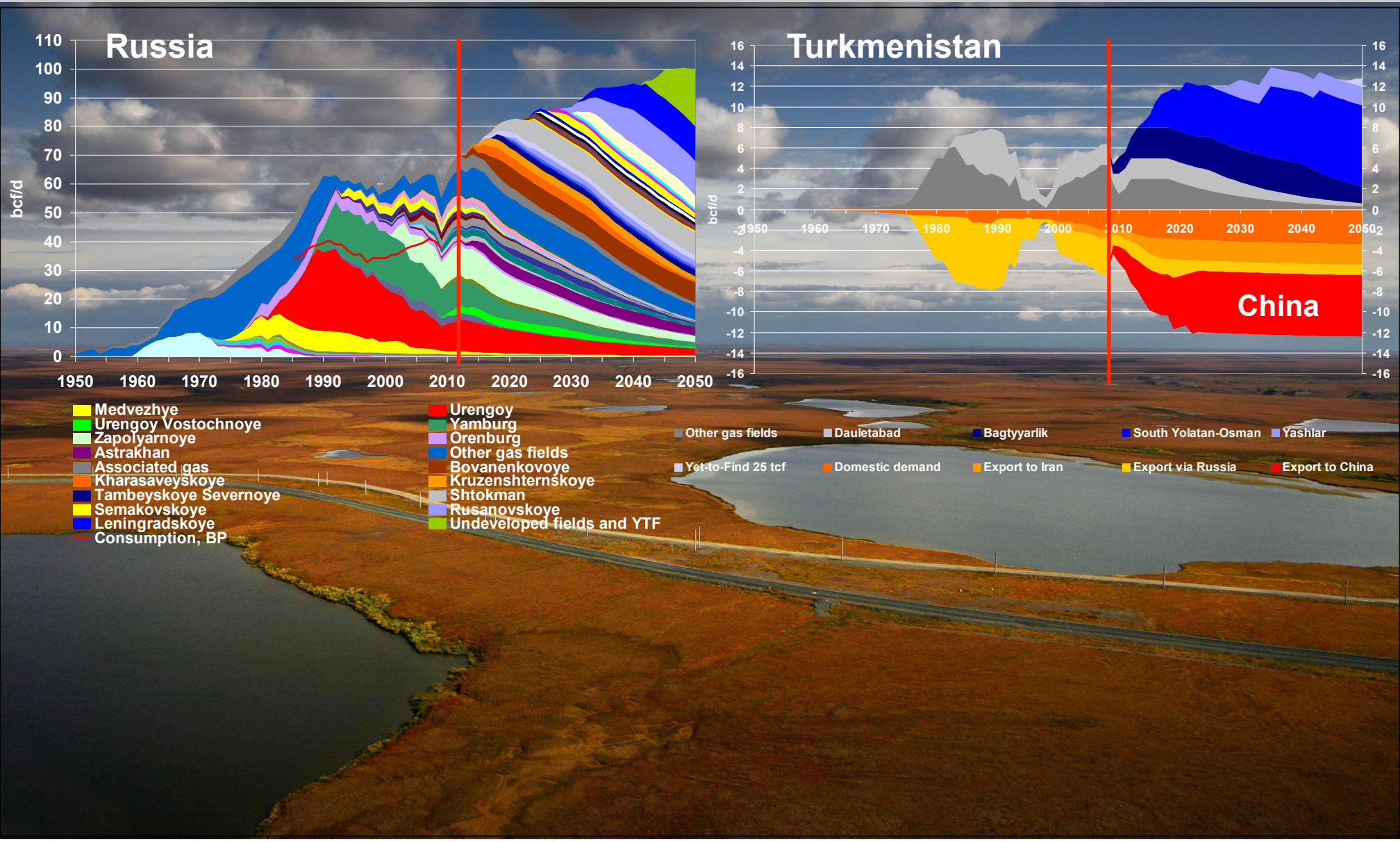
Strategic Gas Issues – Russia dominates…Turkmenistan gas heads to China



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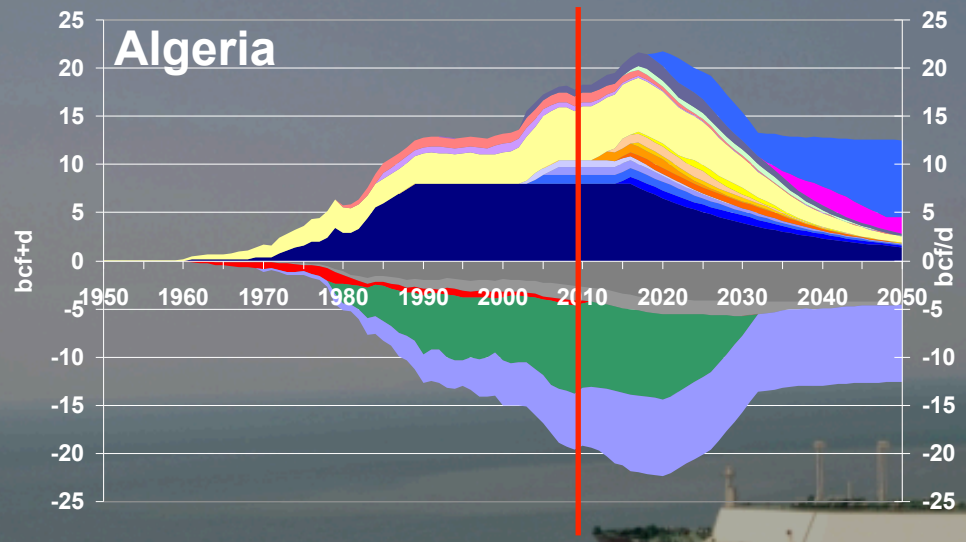
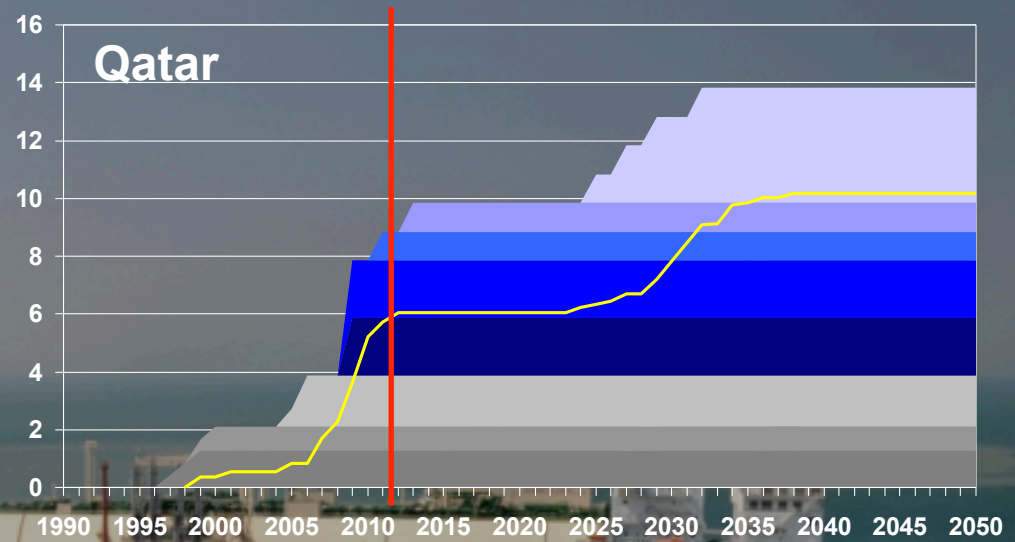
Strategic Gas Issues – Algeria needs shale gas…Azerbaijan has limited spare capacity





Hassi R'Mel
In Amenas
MLE
Rhourde Nouss
Amassak
Blow down injected gas
Losses

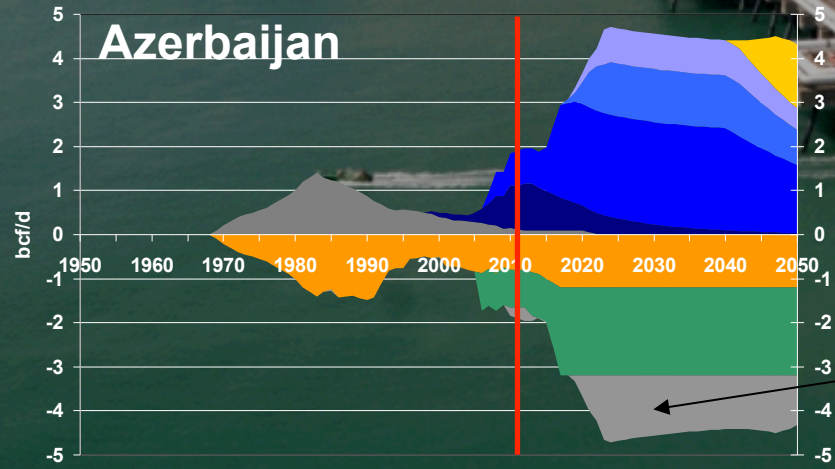
Gassi Touil
Ohanet
Timimoum
Associated gas
Tinrhert
Shale gas
Flared/vented

In Salah
Ahnet
Touat + Reggane
Alrar
Other gas fields
Domestic consumption
Reinjected

Qatar Gas 1
Ras Gas III
Qatar Gas 4

Ras Gas I
Qatar Gas 2
New phases

Ras Gas II
Qatar Gas 3
LNG exported to Europe



Limited spare export capacity – 1.5 bcf/d

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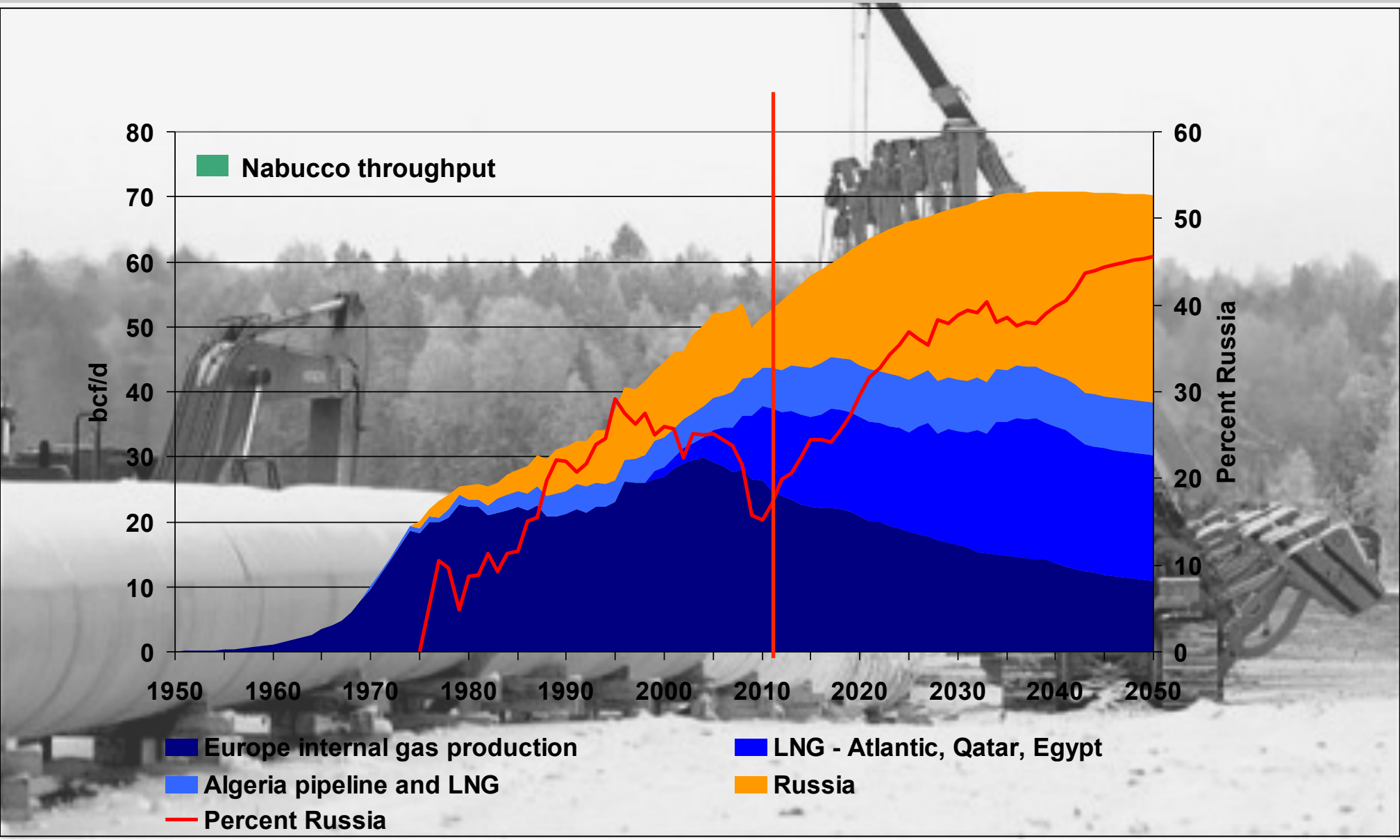
Bahar and Bulla Deniz
Shakh Deniz
Nakhichevan
Domestic demand
Possible excess capacity

Azeri Chirag Gunashli associated gas
Shafag Asiman
Yet-to Find 15 tcf
Export to Turkey

Strategic Gas Issues – gas supply to Europe….Russia starts to dominate after 2020



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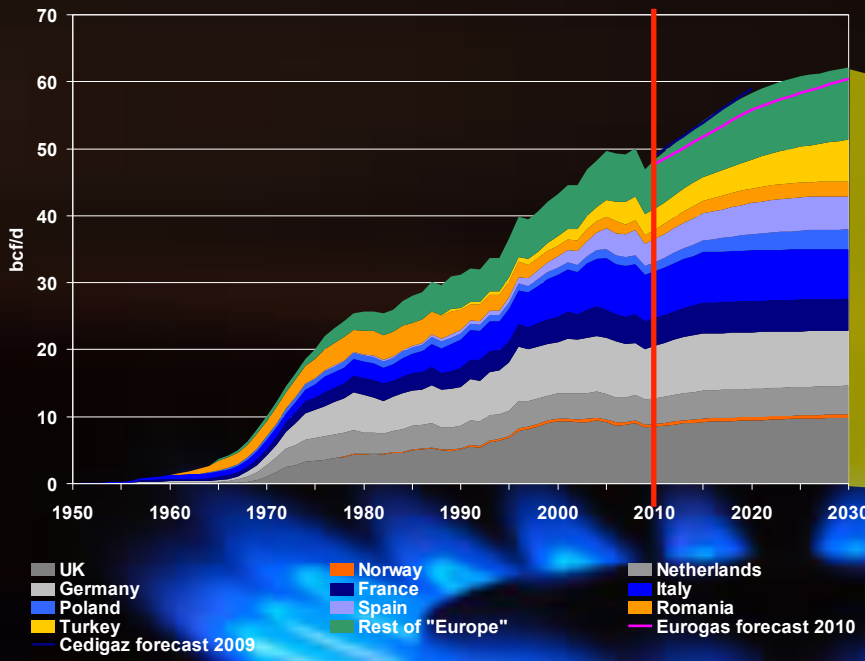
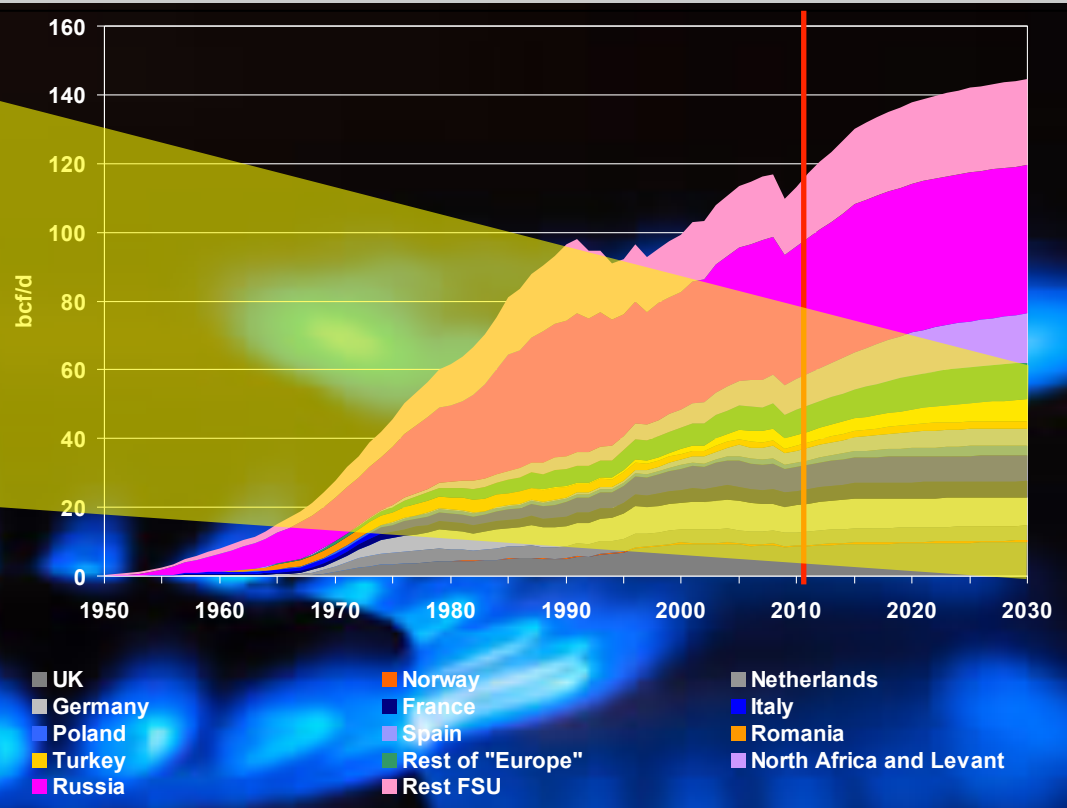
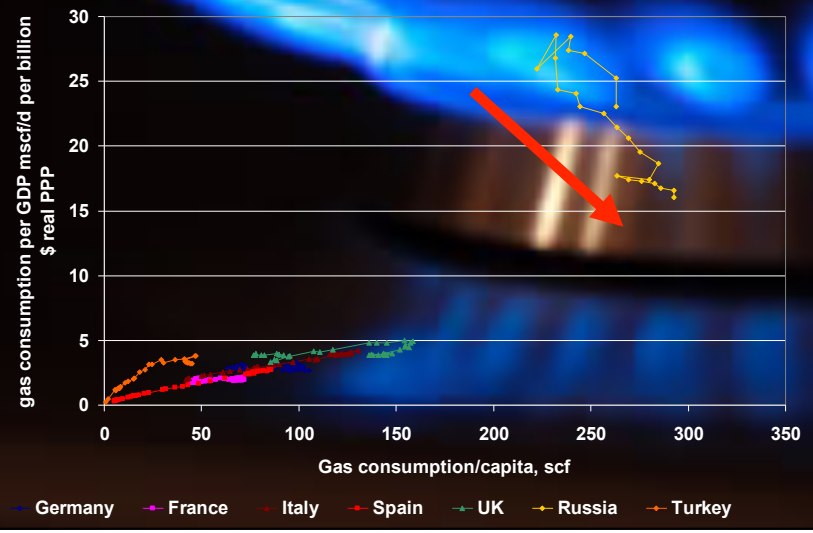
Strategic Gas Issues – Russia is the largest consumer of its own gas







Russia is a very inefficient user of gas – gas per capita increasing and twice W Europe – gas intensity is 3 times W Europe

Capacity to cut domestic consumption to meet export demand – 5-10 bcf/d!

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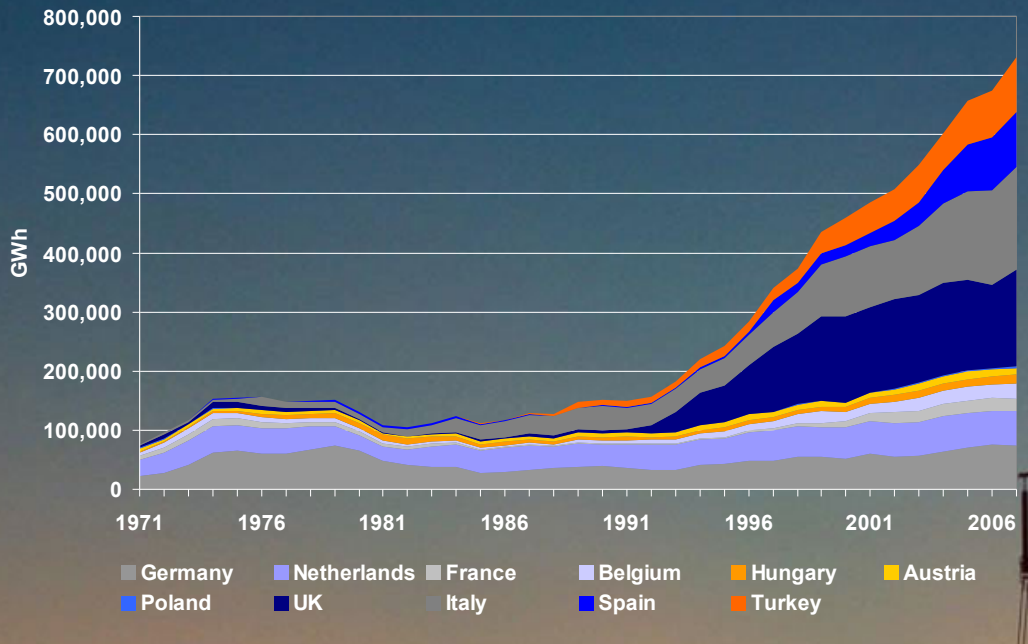
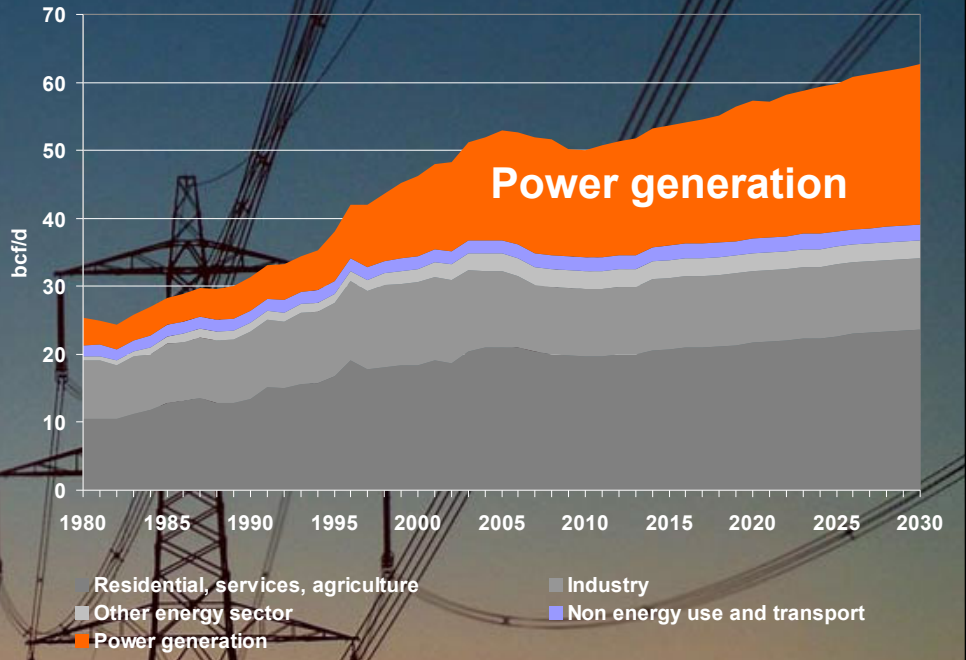
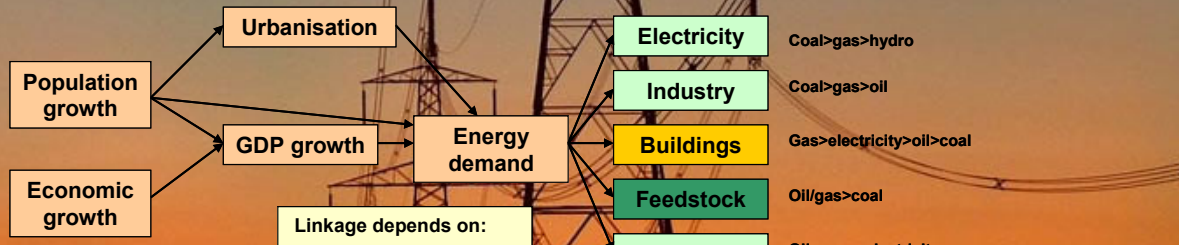
Strategic Gas Issues – Power generation drives demand growth…no more nuclear?







Linkage depends on:

- Government policies
- Maturity of economy
- Geography
- Energy efficiency/intensity

Preference depends on:

- Convenience
- Strategic issues
- Availability and 'industrial inertia'
- Price differentials
- CO2 pricing
- Technology
- Government policies
- International treaty obligations
- Popular pressure
- Urbanisation – urban environment

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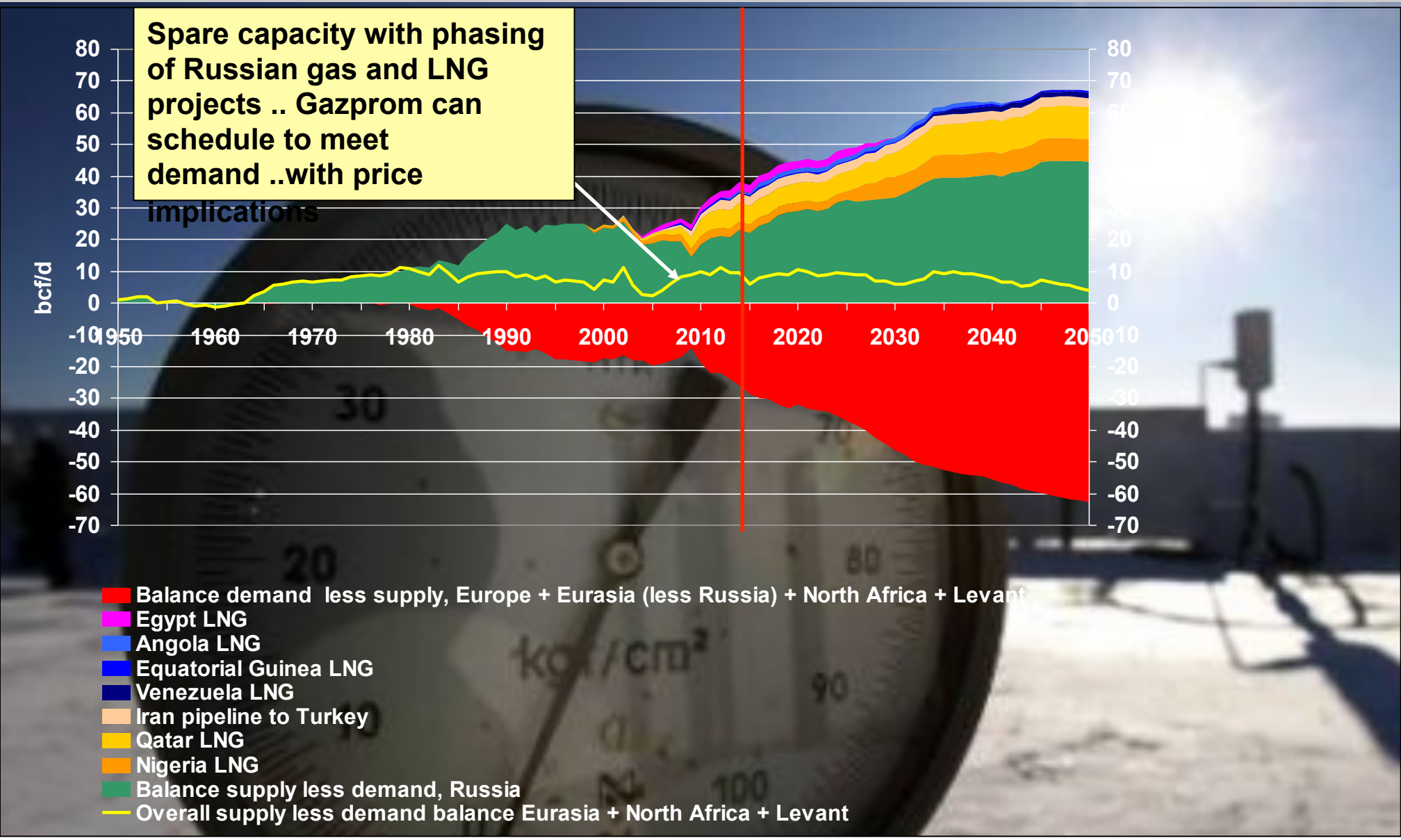
Strategic Gas Issues – Spare supply capacity of 6-8 bcf/d without Iran or Nabucco



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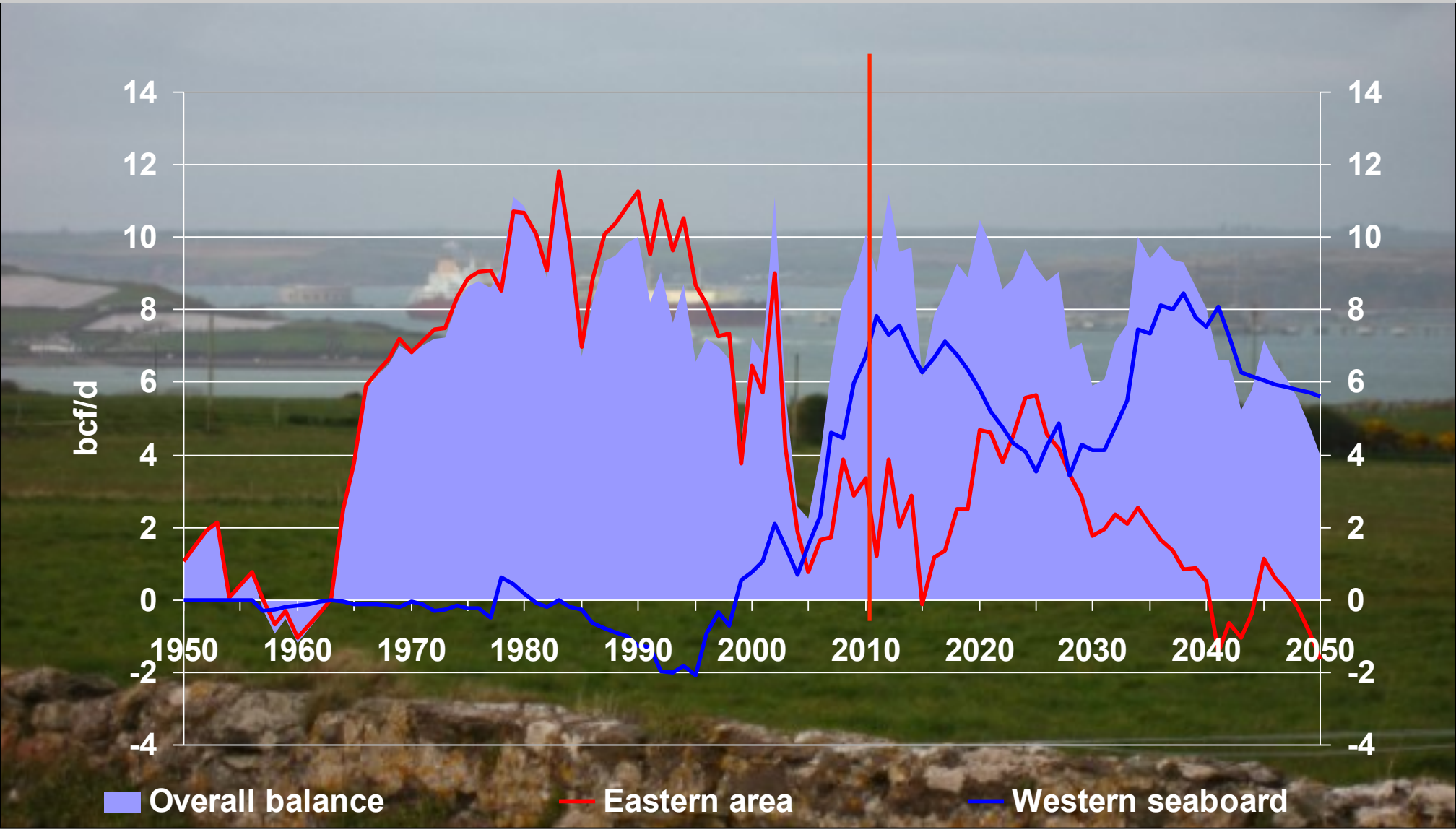
Strategic Gas Issues – but Qatar driven to produce for NGLs …spare supply capacity in east and west



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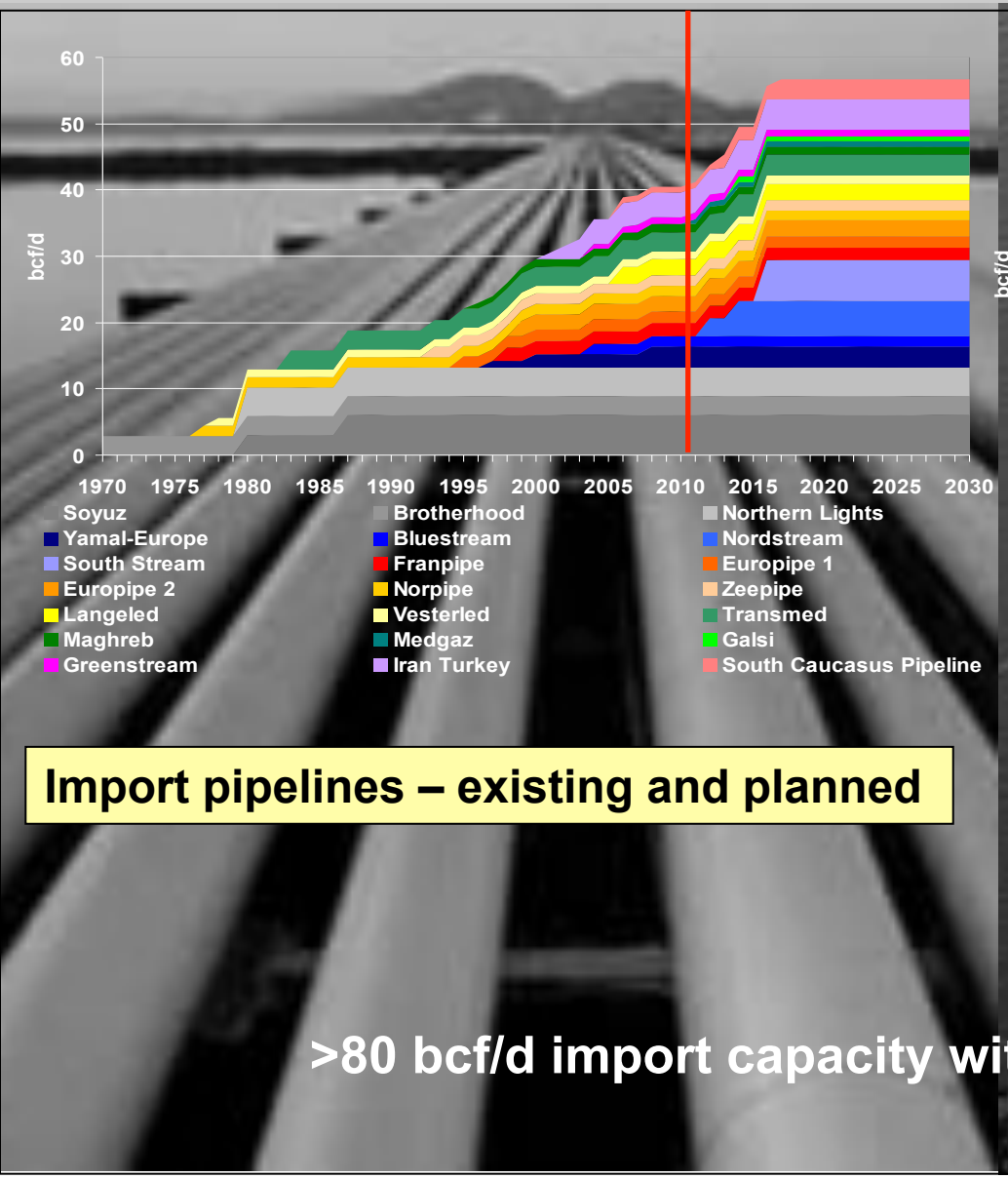
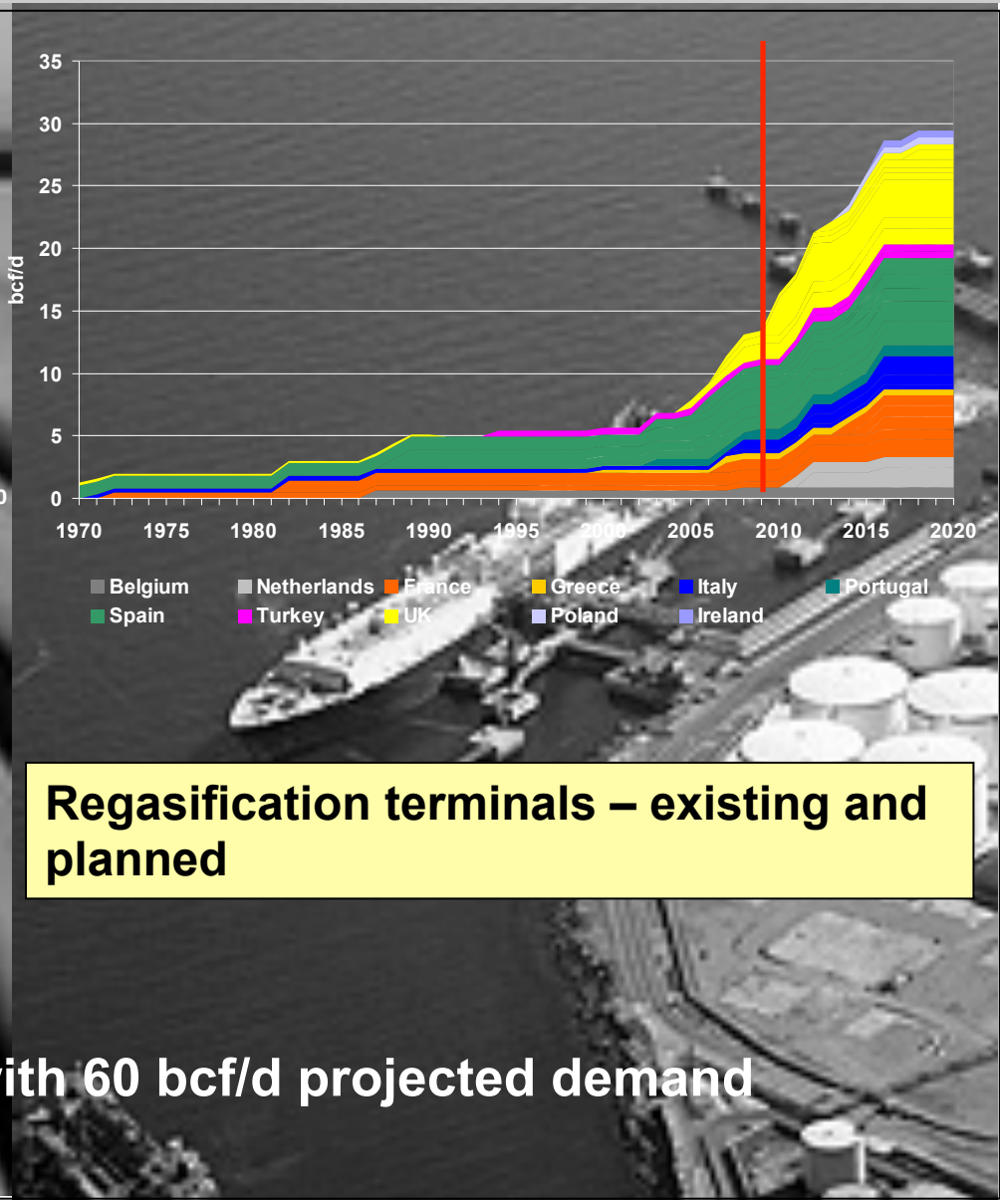
Strategic Gas Issues – spare capacity in supply infrastructure



Import pipelines – existing and planned



Regasification terminals – existing and planned

>80 bcf/d import capacity with 60 bcf/d projected demand

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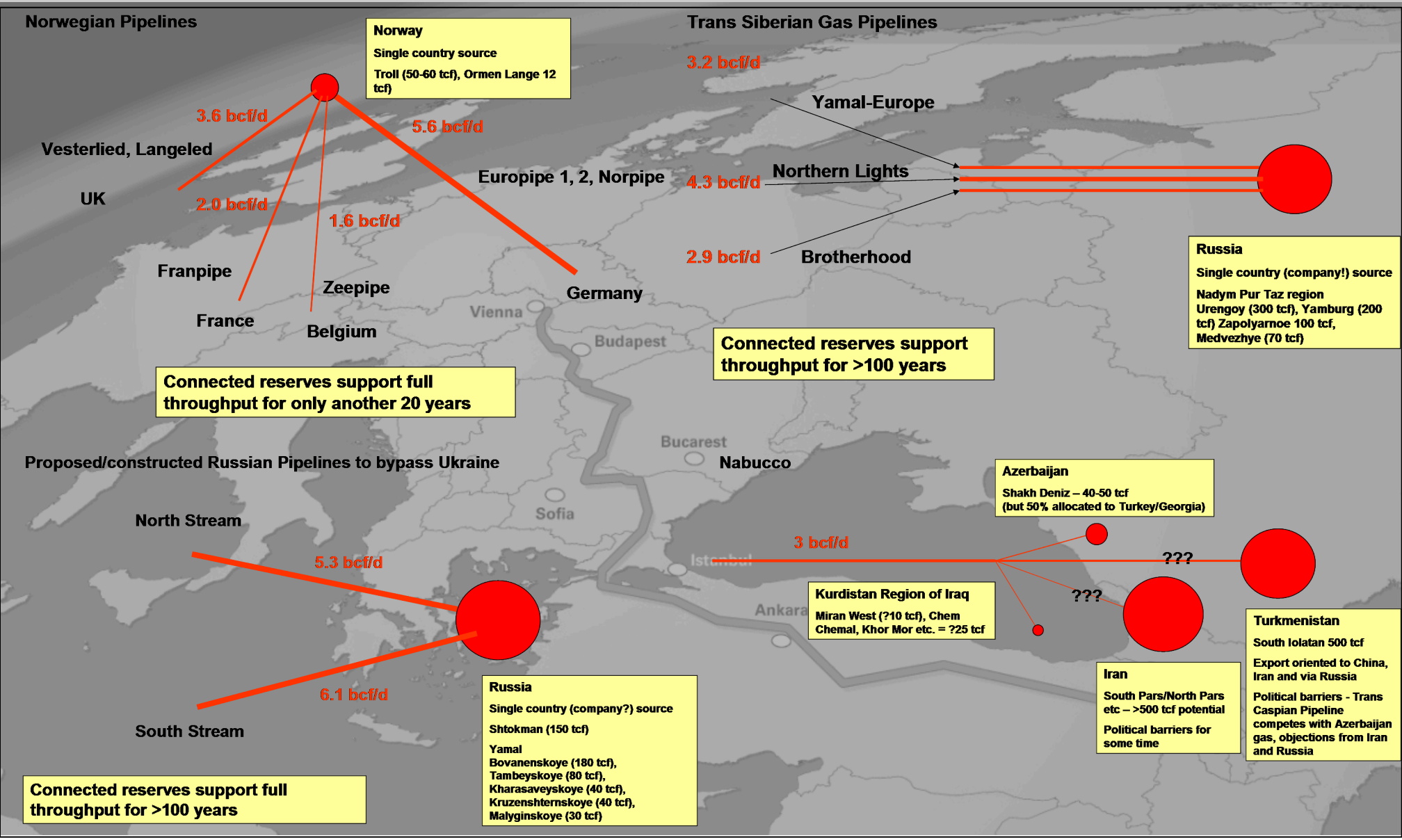
Strategic Gas Issues – pipelines need simplicity and large scale gas resources



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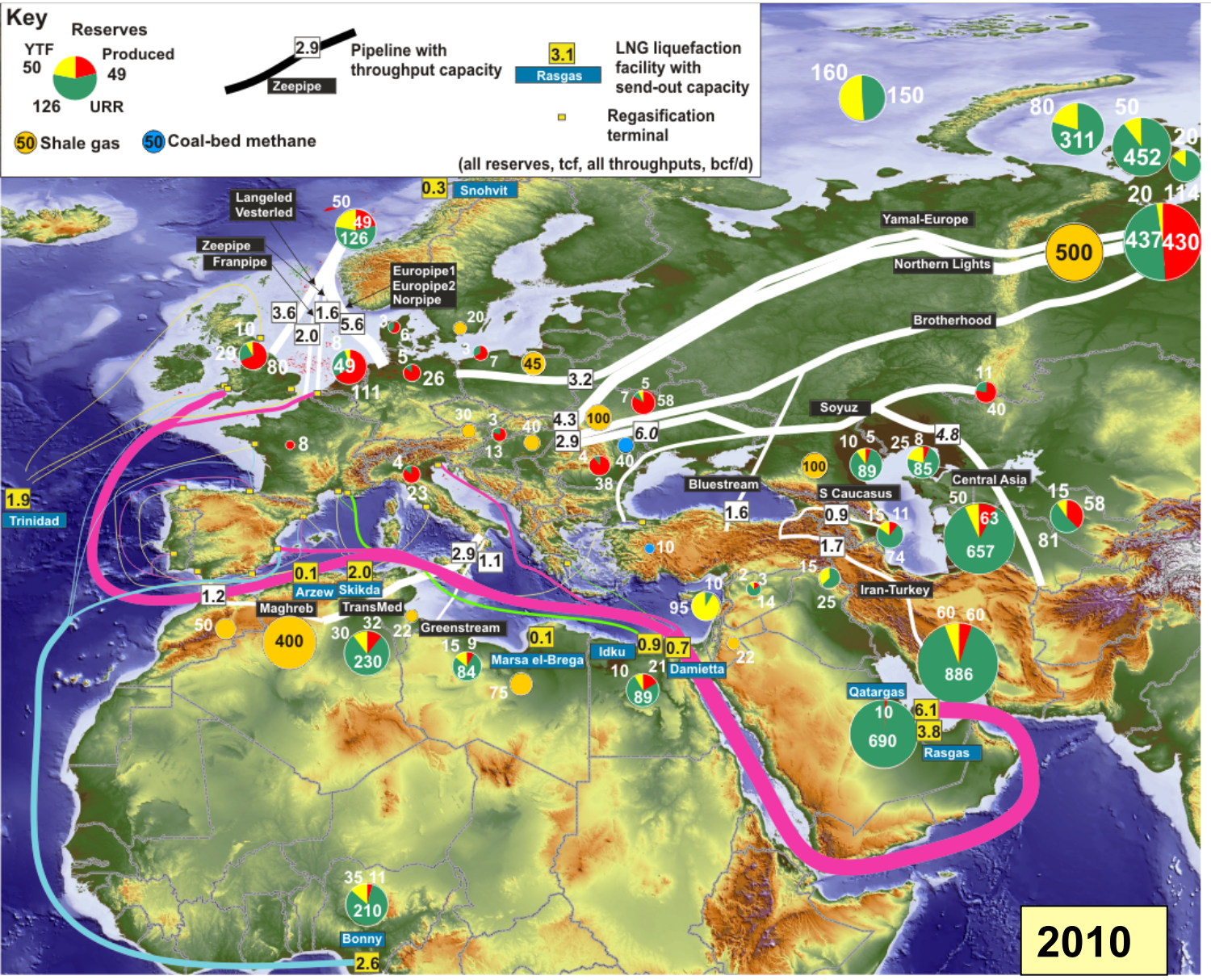
Strategic Gas Issues – Europe 2010



Eastern market – Russian supplies through pipelines on oil price parity

Western market – Diverse LNG supplies on spot price trading hubs (partial decoupling)

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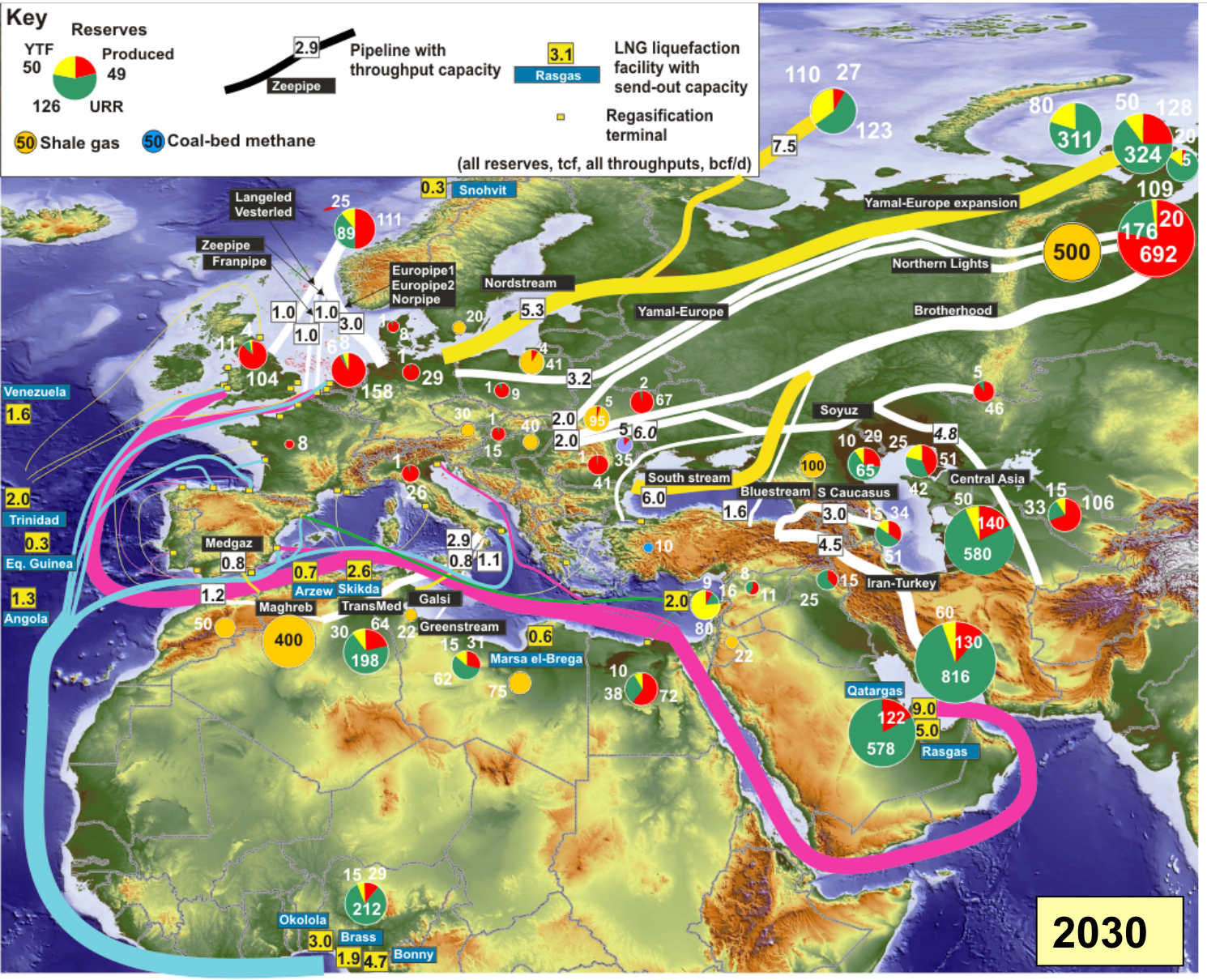
Strategic Gas Issues – Europe 2030



Changes

Europe's indigenous gas supplies in steep decline

Egypt importing gas

Levant basin in production

Yamal and Shtokman developed

South Stream and **Nordstream** built

LNG from Qatar and Atlantic basin - USA??

Iran exporting only to Turkey

Turkmenistan gas going mainly to China

Algeria developing shale gas

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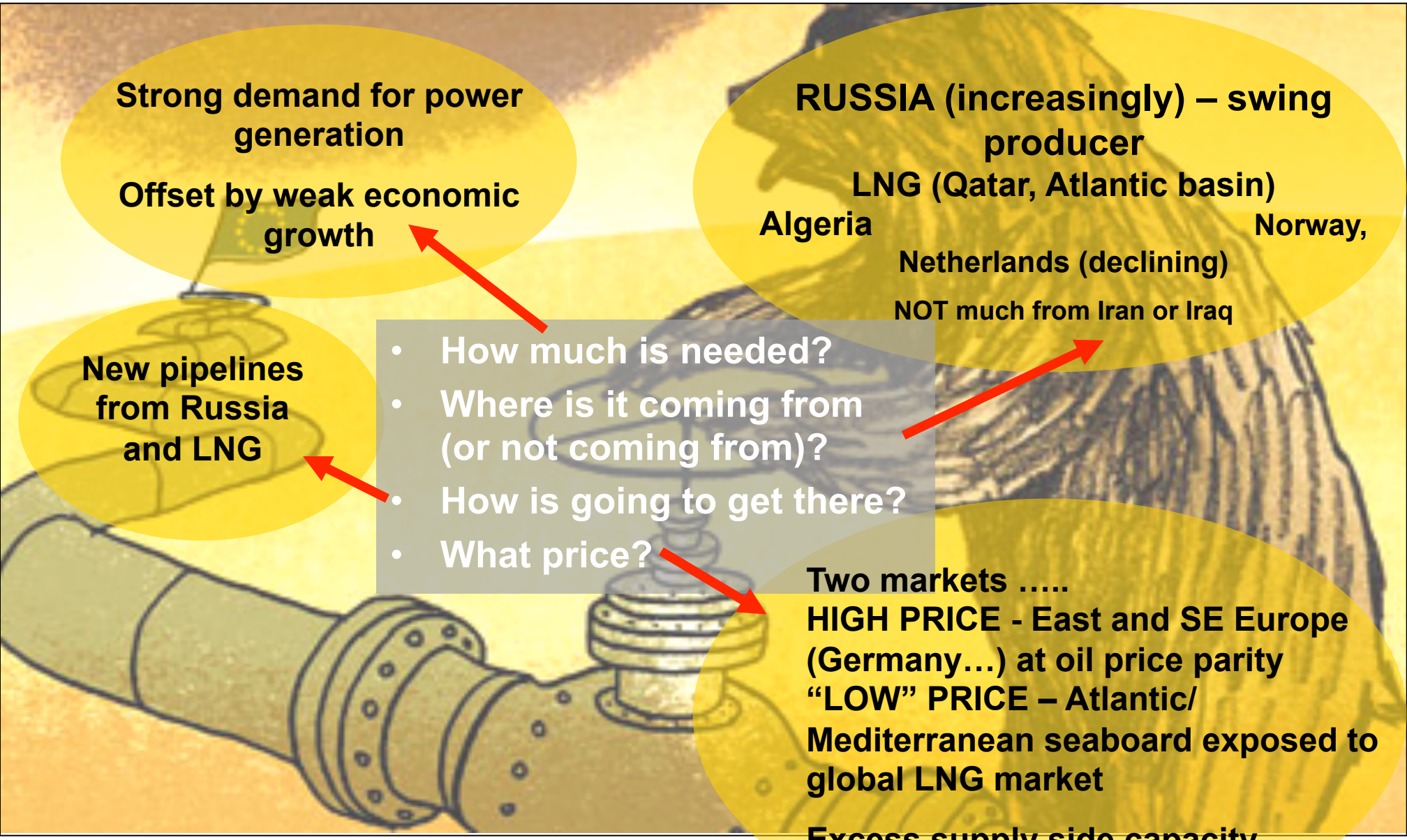
Strategic Gas Issues - Europe



Strong demand for power generation

Offset by weak economic growth

RUSSIA (increasingly) – swing producer

LNG (Qatar, Atlantic basin)

Algeria

Norway,

Netherlands (declining)

NOT much from Iran or Iraq

New pipelines from Russia and LNG

- How much is needed?
- Where is it coming from (or not coming from)?
- How is going to get there?
- What price?

Two markets …..

HIGH PRICE - East and SE Europe (Germany…) at oil price parity

"LOW" PRICE – Atlantic/ Mediterranean seaboard exposed to global LNG market

Excess supply side capacity

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