



Unconventional gas

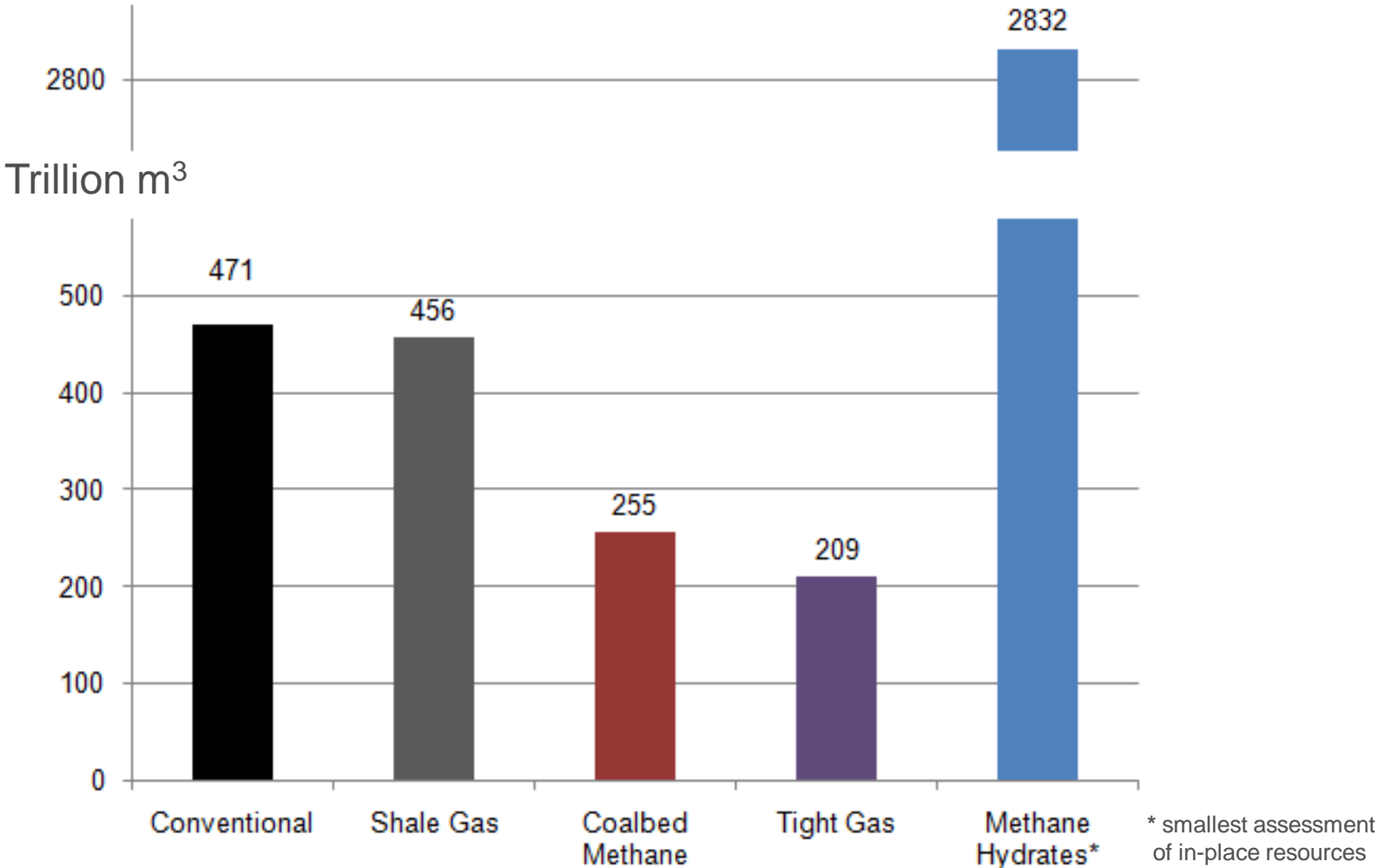
Impact on global gas balance and prices

CBM Utilization and Downstream Commercialization
Unconventional Gas Asia Summit
Beijing, 1 December 2010

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With unconventional, gas reserves grow dramatically



Sources:
Conventional, shale, coalbed and tight: World Energy Outlook, 2009
Methane hydrates: EIA, National Energy Technology Laboratory



The gas industry is changing from long-term/heavy...

The natural gas industry is used to stability and predictability

- Long planning: Easily 5-10 years from price signal to delivery
- Stable growth: Projects additional, not in competition
- Stable flows and demand: Little need to be dynamic
- Sellers' market and terms

Now there have been a few shocks at once – and buyers decide!

- High prices can fall with oversupply
 - Little contact or correction during lead time – many projects at once and market power often underestimated
 - Unconventional, new LNG + recession!
- Markets expect quicker reaction time from signal to delivery
 - Gas demand could fall in Europe, and so could load factors
 - Greater value of flexibility
- Buyers' market and terms – a new world for many!

...to more flexible and nimble with unconventional gas

Development started with many small companies...

- Entrepreneurial, cost-conscious and close to the ground

	Conventional gas	Unconventional gas
Field footprint	Large	Small
Lifetime	Long life (several years)	Short life (few months)
Development cost	High cost	Lower cost
Flexibility	Less flexible, high load factor	More flexible
Investor size	Mostly large actors	Attractive for small players

...but it attracted interest from most oil and gas majors

- Financial strength and capacity for rapid technology development

US LNG import terminals are turning around – full circle!

The US has exported LNG to Asia from Alaska for decades

- Not very large volumes, but better profits than "exports" to other US states

Last few years, LNG imports have grown – and forecasted import, too!

- Falling domestic production and growing demand
- Imports from Canada, Mexico, and global LNG

With unconventional gas at home:

- Less LNG is needed
- Pipelines from Canada now export
- Still some spare gas possible
- Demand may grow more...
- Talk of exporting shale!

Sabine Pass is turning around

- Already re-exporting cargoes (to UK)
- Liquefaction planned from 2015

Sabine Pass LNG export terminal



Source: lngworldnews.com

The discount to oil is expected to grow

Gas is becoming more like oil

- From local to more global
- Prices are “contagious”, levels in markets impact each other
 - Especially in periods of oversupply or shortage
 - “Loose” LNG acts as equaliser, evening out

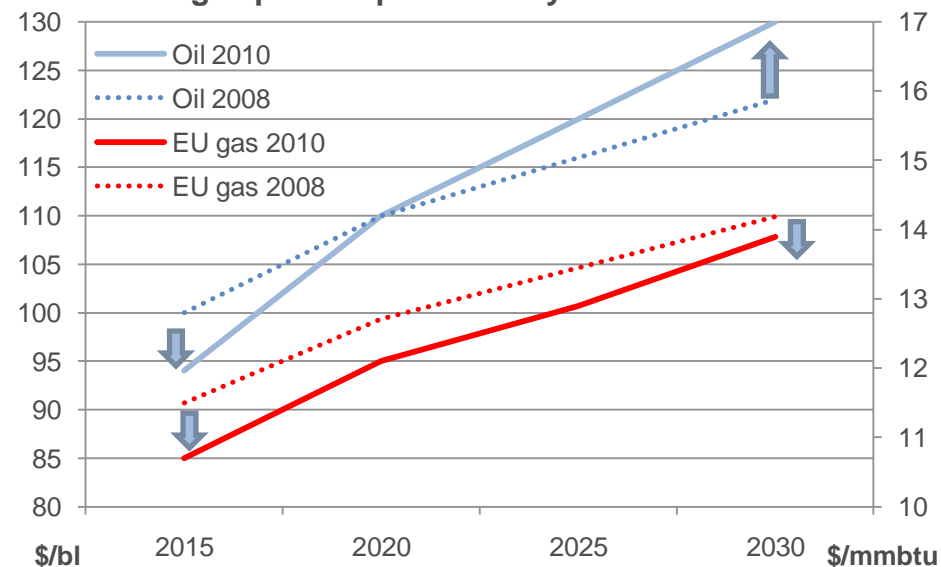
As with oil, volatility is not popular

- Many prefer steady prices, even at higher level
- What is the level needed for production to vary?

Still varying stories in the market, though...

- Re-link to oil soon
 - Woodmac, Eurogas
- Lower prices and larger volume
 - IEA, Shell, ExxonMobil,

Oil and gas price expectation by IEA in 2008 and 2010



Data: IEA, 2010

Gas has been seen as a scarce expensive import...

Politicians perceived a growing vulnerability to gas supply...

- High prices – both oil-link contracts and spot markets during winter
- Some bottlenecks and interruptions exacerbated the perception
- Expectation of gas shortage, especially LNG

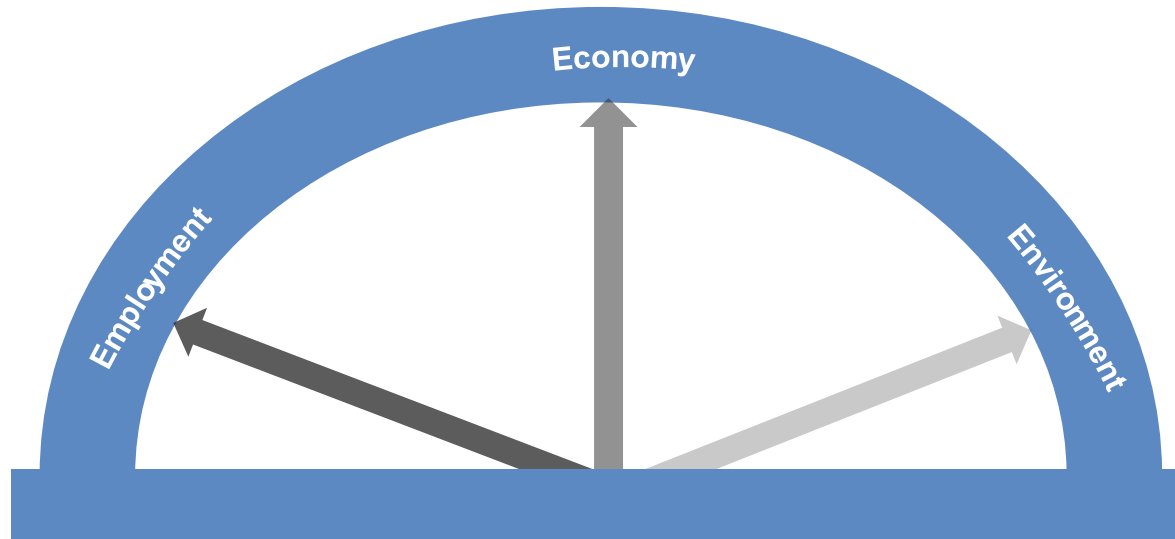
...showing strong interest in reducing the large import bills of gas

- Large cash drain on economies + security of supply issues
- Growing interest in domestic economy + green
- EU, China and others adjusted policies

Recession at first confirmed need to reduce imports...

- Peak oil-link prices hit the market at winter time in full-blown recession
- Continued focus on domestic and renewable energy forms

...but thoughts of own reserves could swing politics



Security of supply – at times emotional

- Positive value, but often not quantified
- National resources get points here

Trade balance also a factor in energy policy

- Reducing imported fossil fuels (especially from the Middle East) a classic
- Even more important during economic downturn?

In recession, even employment matters in energy policy

- Impact on attractiveness of CBM in old coal districts

In Poland, unconventional gas could outcompete CCS

Poland largely relies on coal for power...

- Large reserves give low-cost electricity production
- Reluctance to import gas dependence on Russia

... but capacity needs replacing by 2030

- Old inefficient plant breach EU standards
- Carbon costs rendering plant uncompetitive
- Binding target to reduce GHG emissions by 2020

Will Poland build new coal plant with CCS...

- Continue to use abundant domestic coal resource
- Pioneer in CCS technology

...or gas plant running on unconventional gas?

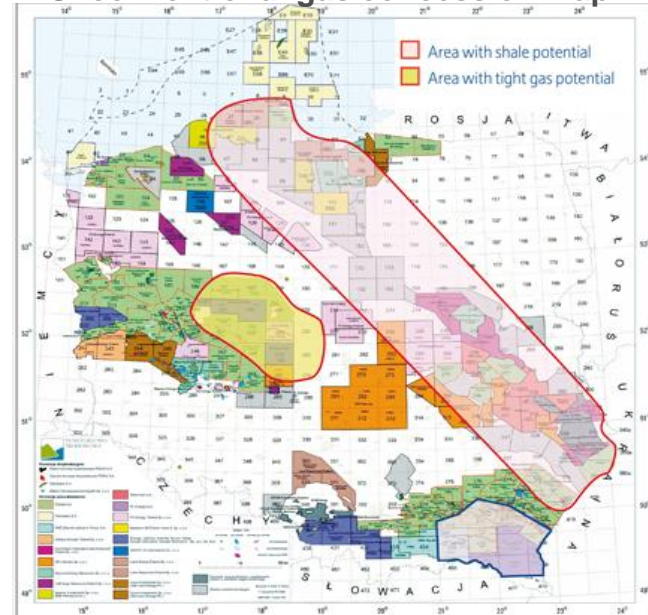
- Most active EU country in developing domestic unconventional reserves
- Cheaper than CCS while meeting security of supply and climate targets (affordable without EU grants)

Belchatow –largest EU coal plant



Source: coalpowerplants.blogspot.com, 2010

Unconventional gas concession map



Source: Polish Ministry of Environment, 2010

To conclude, unconventional gas changes the market!

Short term impact of unconventional gas

- Perception of shortage gone – some confidence in secure supplies
- More “loose” LNG globally – pressure on prices
- More difficult to decide on large export investments – fields + pipes
- Growing uncertainty for more expensive wind and nuclear generation

Medium term impact

- With perceived oversupply, worries of high prices and SoS wane
- Politicians and boards more positive to gas as fuel?

Long term possible impact

- Large production of gas in Asia, Europe, Australia and America
- Large share of energy mix, at sustained lower prices

Very long??

We are happy to discuss further!

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