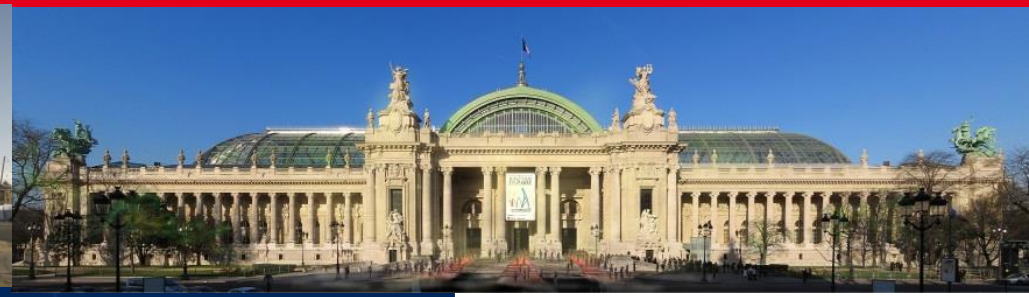
26th World Gas Conference

1 – 5 June 2015, Paris, France



PGCB – Sub Group 2

Wholesale Gas Price Formation

Presentation to Thematic Session – Part 2
Mike Fulwood – Chair PGCB2
June 4th 2015

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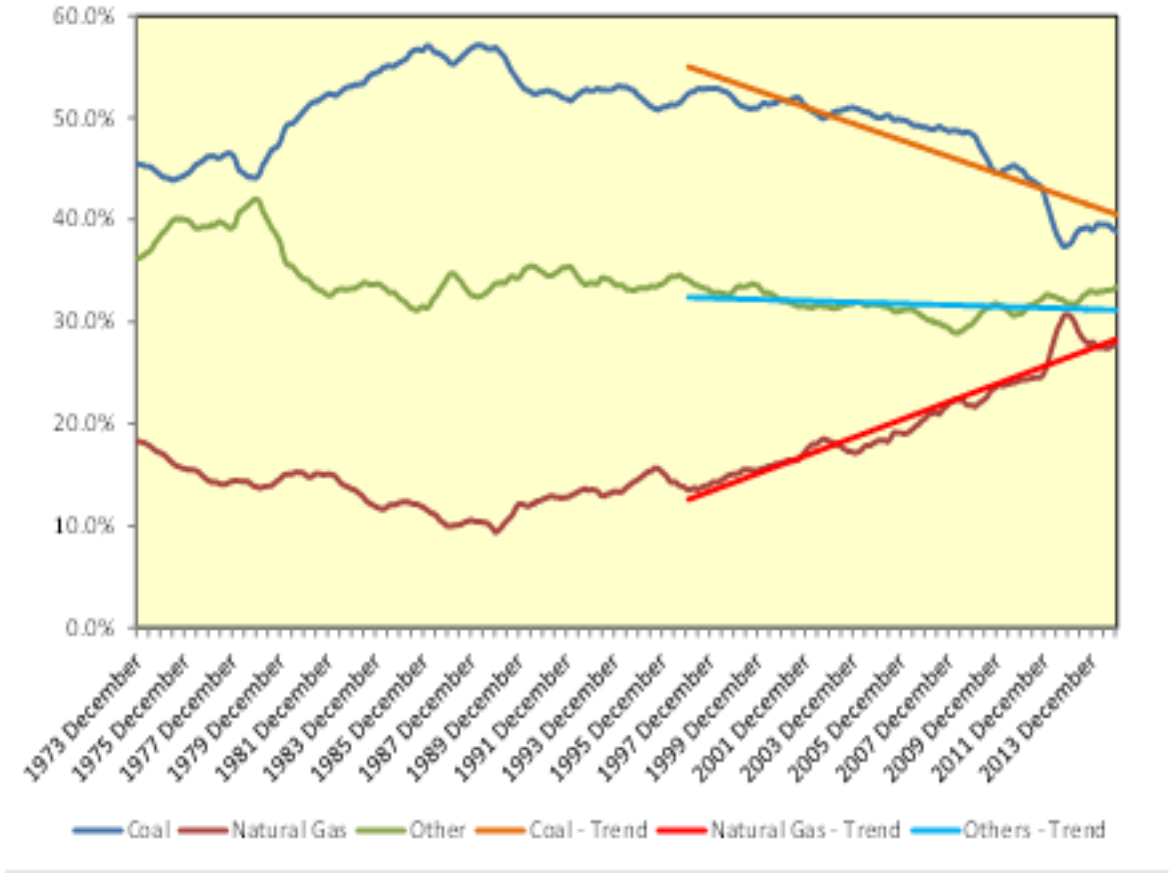
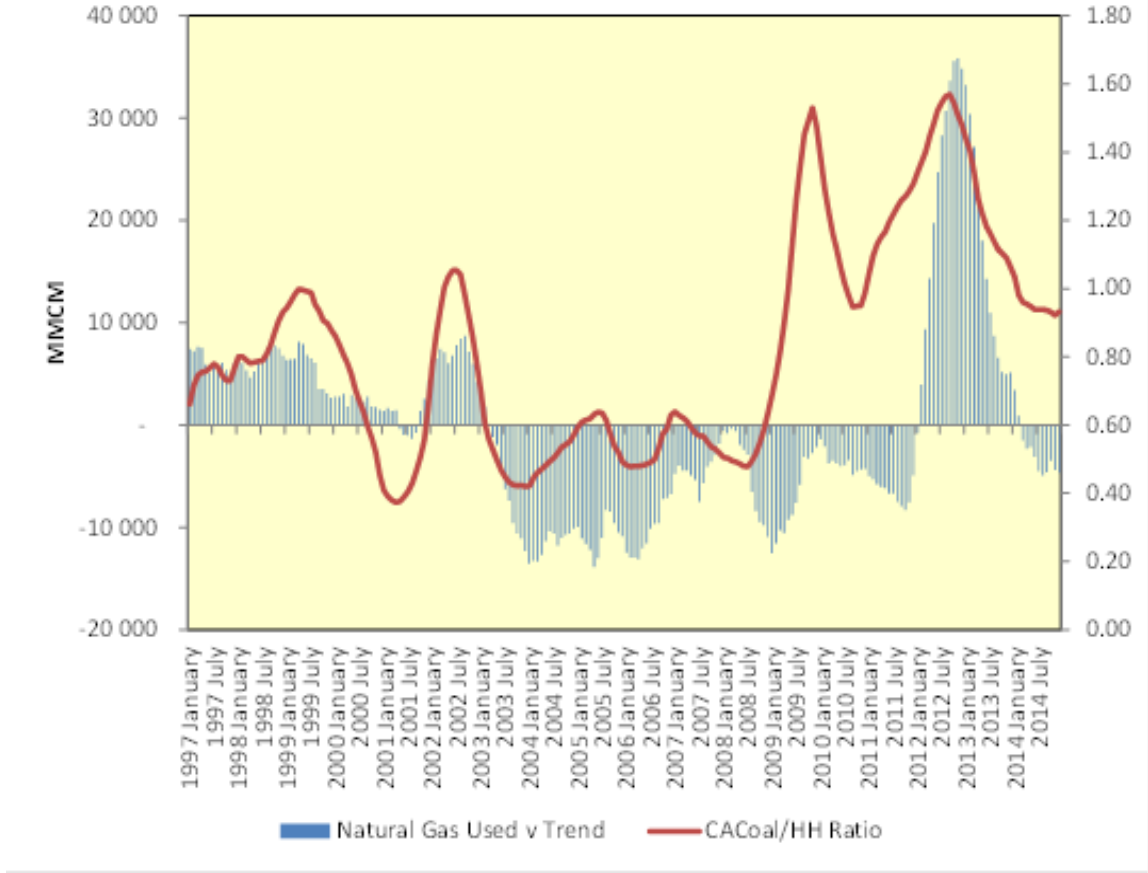
Gas v Coal v Renewables in Power Generation

US Power Generation: Market Shares by Fuel and Price Response

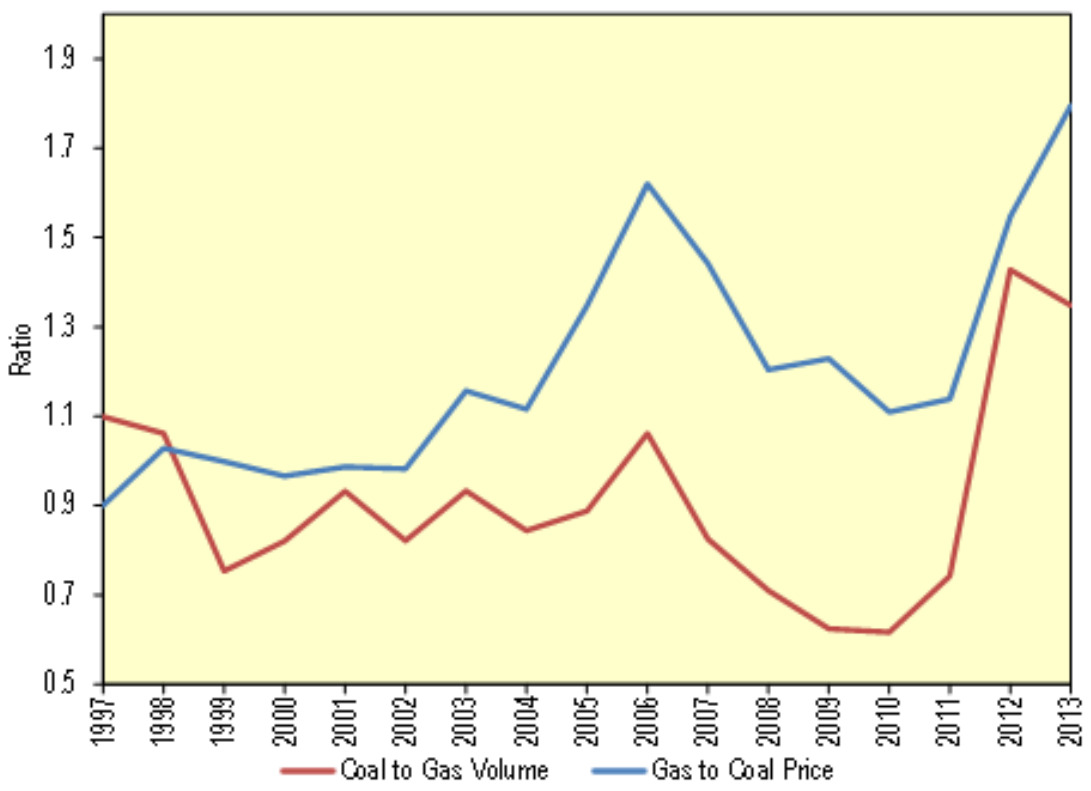




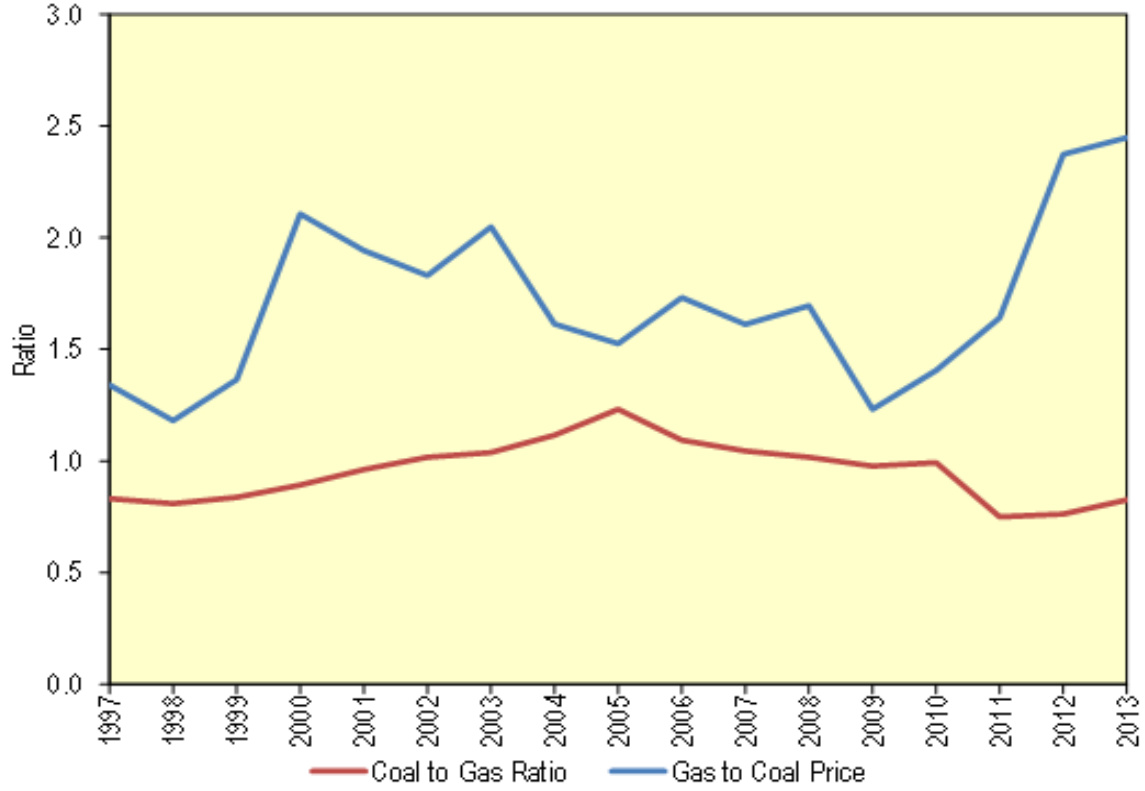
Source: EIA and Nexant Analysis

Gas v Coal v Renewables in Power Generation

UK Gas to Coal Price Responsive



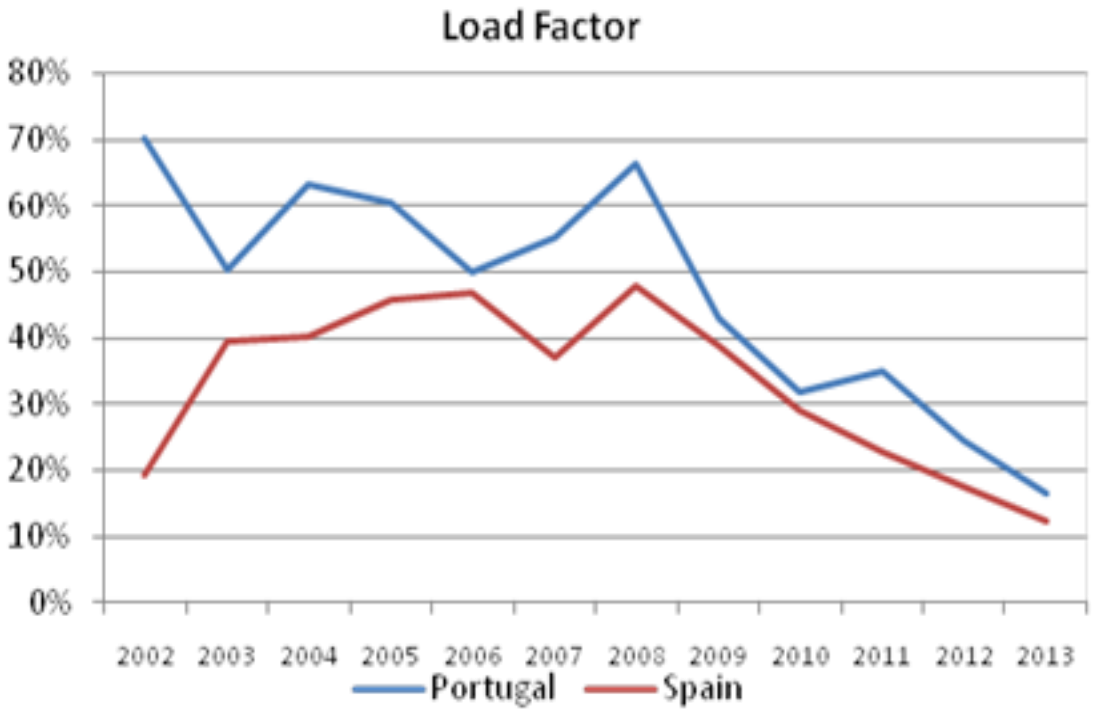
Japan Not as Much



Source: IEA and Nexant Analysis

Gas v Coal v Renewables in Power Generation

Iberian Power: CCGT Load Factors



- In terms of gas and renewables, the example of the Iberian market is that the strong increase in renewables installed capacity and power production in the Iberian Peninsula in the last years has led to
  - a significant increase in price volatility and instability of the system, reducing the space for CCGTs functioning
  - CCGTs have now to operate in an unstable environment, with lower load factors and highly variable operation regimes; these changes are structural and are here to stay.

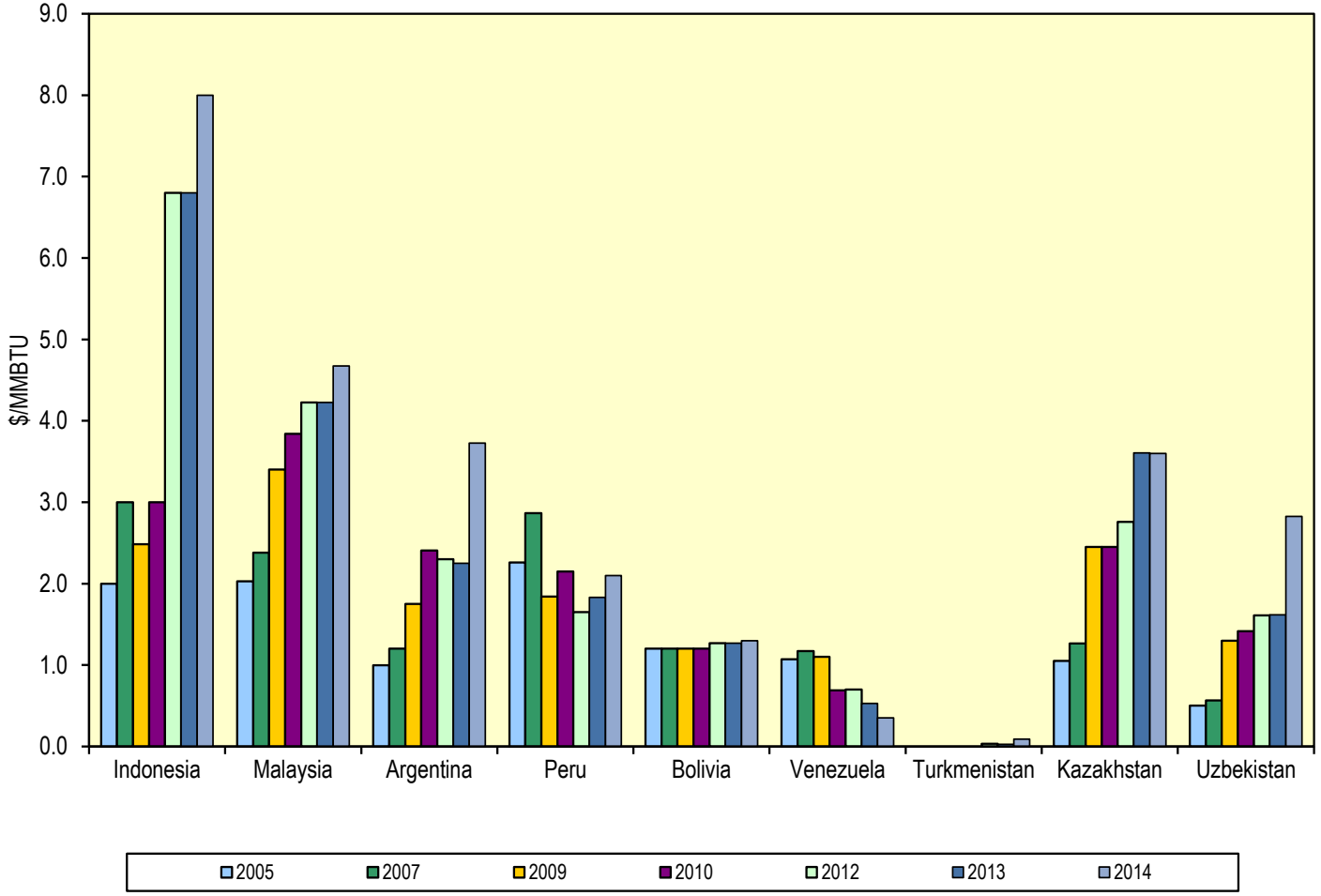
Social Pricing

World Price Formation 2014 – Total Consumption (BSCM)

Region	Total Consumption									
	OPE	GOG	BIM	NET	RCS	RSP	RBC	NP	NK	TOT
North America	0.0	936.0	0.0	0.0	0.0	0.0	0.0	6.0	0.0	942.1
Europe	152.9	291.9	9.5	0.4	10.6	8.3	0.0	4.4	0.0	478.1
Asia	130.4	12.0	3.4	0.0	117.3	18.6	9.1	0.0	0.0	290.9
Asia Pacific	229.5	71.5	20.9	0.0	10.9	71.8	0.0	4.5	0.0	409.1
Latin America	46.1	34.4	6.4	14.2	10.7	32.2	27.0	1.0	0.0	172.1
FSU	34.2	144.4	27.8	0.0	233.1	90.0	103.3	8.8	0.0	641.6
Africa	8.4	0.0	6.4	1.3	1.5	16.8	86.0	0.8	0.0	121.1
Middle East	8.1	4.0	73.1	0.0	0.0	357.6	10.3	9.5	0.0	462.6
Total	609.6	1 494.3	147.5	15.8	384.2	595.4	235.7	35.0	0.0	3 517.5

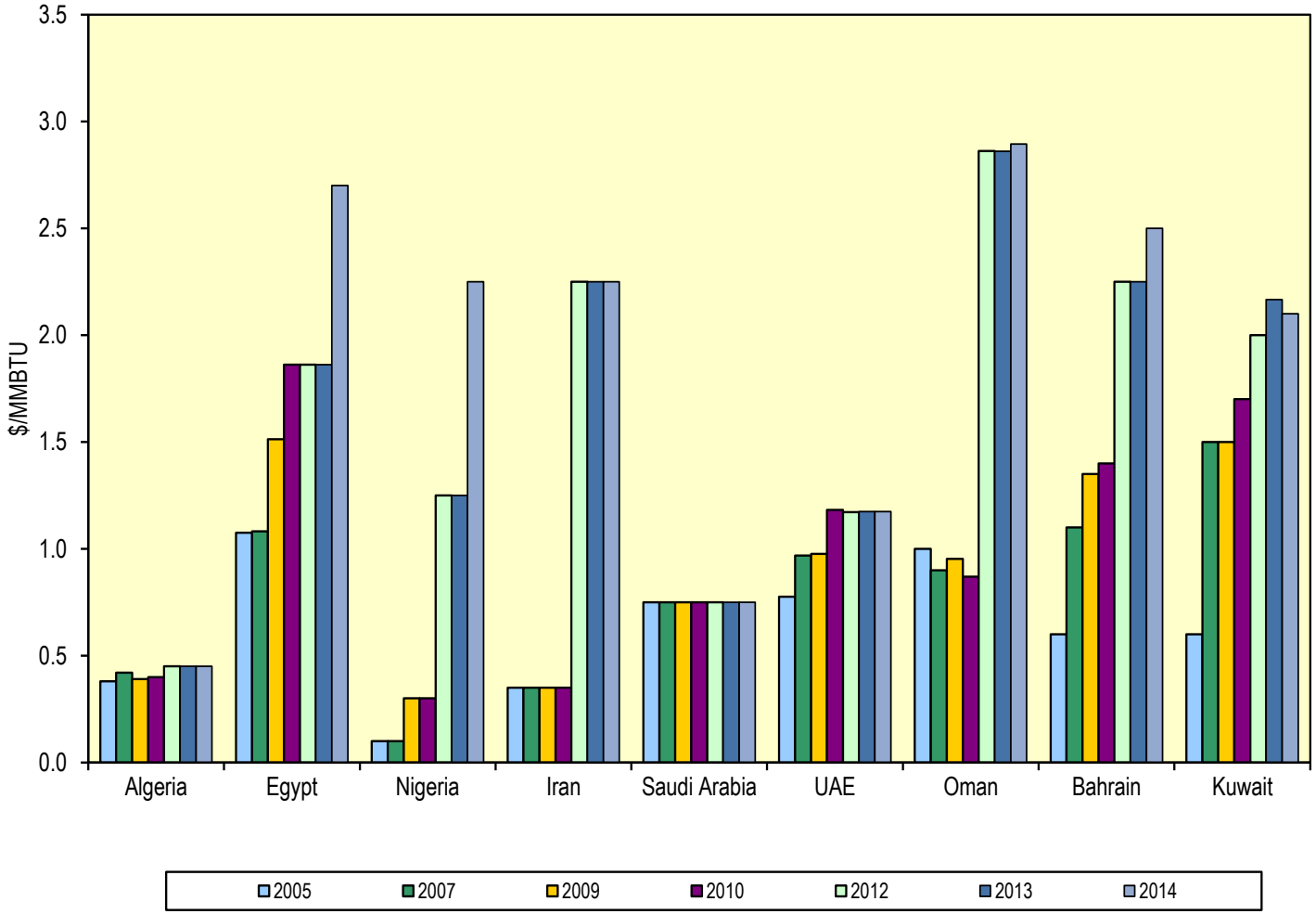
The four main regions where Social Pricing (the RSP and RBC categories from the survey) have significant shares are Latin America, FSU, Africa and Middle East. Asia has some in the Indian sub-continent while in Asia Pacific it is mainly Indonesia and Malaysia

Social Pricing Changes – AP, LA & FSU



- Large price increases in Indonesia, Malaysia, Argentina, also Kazakhstan and Uzbekistan
- Other producers flat prices
- Venezuela sharp fall as exchange rate collapsed against US dollar

Social Pricing Changes – AF & ME



- Noticeable rises in Egypt and Nigeria as subsidies begin to be removed
- Oman, Bahrain and Kuwait begin or about to begin importing, encourage development of more expensive reserves

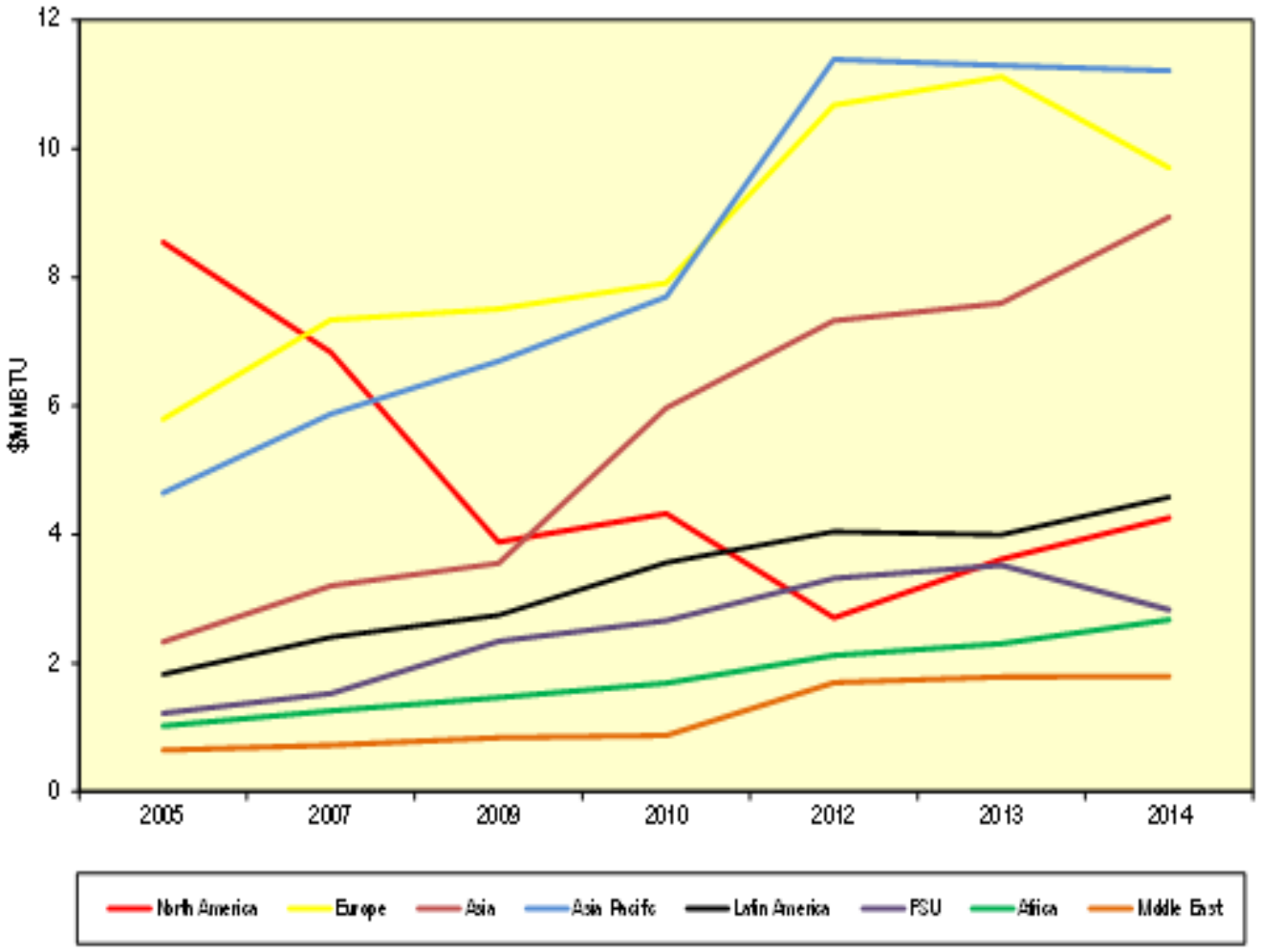
Social Pricing

- Many countries with Social Pricing have been increasing prices over time because they were
  - traditionally large producers and exporters, who have been caught with rising demand and stagnating or declining production, leading to the need or potential need for imports – Indonesia, Malaysia, Argentina, UAE, Bahrain and Kuwait
  - for budgetary reasons, to reduce the impact of subsidies on their finances and/or to encourage the development of higher cost reserves – Kazakhstan, Uzbekistan, Egypt, Nigeria, Iran and Oman.
- Some countries have not raised prices and these have tended to be those who remain completely self-sufficient and export in significant quantities – Peru, Bolivia, Turkmenistan, Algeria and Saudi Arabia.

Globalisation of Gas Markets and Gas Price Convergence

- Consider conditions for globalisation and connectivity
- Key parameters are infrastructure, contractual / regulatory and pricing
- Parameters are both internal to a specific market (typically a country) and external to that market
- Builds on work at OIES by Howard Rogers and also IEA on gas trading in Asia

Globalisation of Gas Markets and Gas Price Convergence



- Gas price convergence does not mean prices are the same everywhere but move together and affected by the same factors – reflect basis differentials
- Better if called “price connectivity”
- Price mechanism and drivers in the respective markets have been very different and there has been little or no “price connectivity” between the regions in reality
- Price connectivity is only likely to arise where there is gas traded between countries and regions.

Conditions for Globalisation and Connectivity

- Infrastructure
  - Internal
    - Domestic pipeline capacity also has to be sufficient to allow for the free flow of gas in response to price signals – an element of over-building of capacity can be desirable.
    - Diversified import capacity both pipeline and LNG – over capacity can be desirable
  - External
    - Existence of infrastructure to move gas between regional markets, together with…
    - ….sufficient volume of flexible and divertible gas

Conditions for Globalisation and Connectivity

- Contractual / Regulatory
  - Internal
    - Market liberalisation encompassing regulated third party access to key infrastructure and unbundling of supply and transportation.
    - Market structure which incorporates demand flexibility and fuel switching, especially in power sector, in response to prices
  - External
    - Supply chains which allow the diversion of flexible gas – removal of destination clauses in pipeline and LNG contracts
    - Physical ability of suppliers to move LNG between geographically spread regional markets – shipping costs for remote suppliers could rule out some trades. Qatar is geographically well placed for Atlantic and Pacific Basin as will the US for exports

Conditions for Globalisation and Connectivity

- Pricing
  - Internal
    - Deregulation of prices at the wholesale level is a minimum requirement, including large users in power and industry. Competition at residential level may not be required.
    - Development of liquid trading hubs
  - External
    - Motivation by key players to move away from oil indexed (OPE) pricing in contracts to hub based (GOG) pricing
    - Emergence of portfolio / trading companies in the LNG market who aggregate both LNG supplies as well as LNG markets and then can supply the various markets with supplies from different sources.

Conclusions

- Wholesale Gas Price Survey
  - The trend in price formation mechanisms over the surveys between 2005 and 2014 shows the share of GOG rising by 12 percentage points (5.5% from trading hubs, 1.5% from spot LNG and 5% from bilateral negotiations), while OPE has declined by 7 percentage points.
  - In Europe there has been a broadly continuous move from OPE to GOG since 2005, with the latter's share increasing from 15% in 2005 – when OPE was 78% – to 61% in 2014 – when OPE had declined to 32%.
  - While OPE has lost share in Europe and, to a much lesser extent, in Asia Pacific, there have been gains in share in Asia with a rise from 35% to 45% between 2005 and 2014
- Changing Contracting Practices
  - The transition to GOG pricing away from OPE in Europe has led to changes in contracting practices.
  - The change in contracting practices in other regions is less developed.
  - With the advent of potential exports of LNG from the US, Henry Hub pricing is being introduced into future contracts and the LNG contracts are becoming unbundled

Conclusions

- Trading Hubs and Liquidity
  - The development of trading hubs has been a consequence of changes in gas markets and regulation
  - As trading hubs develop, the question is asked whether they are liquid enough to provide confidence in pricing transparency and discovery at the hubs and the ability to buy and sell gas
  - The development of a trading hub in Asia and the LNG market in particular is some way behind the North American and European markets
- Gas v Coal v Renewables in Power Generation
  - The price competition between gas and coal in power generation is not universal in all markets – load switching based on relative prices evident in US, UK and Germany, less so in Japan and not at all in China
  - The strong increase in renewables installed capacity and power production in the Iberian Peninsula in the last years has led to significant increase in price volatility and instability of the system, and CCGTs have now to operate in an unstable environment, with lower load factors

Conclusions

- Social Pricing
  - The four main regions where Social Pricing (the RSP and RBC categories from the survey) have significant shares are Latin America, FSU, Africa and Middle East. Asia has some in the Indian sub-continent while in Asia Pacific it is mainly Indonesia and Malaysia
  - Many countries with Social Pricing have been increasing prices over time because they were traditionally large producers and exporters, who have been caught with rising demand and stagnating or declining production, or for budgetary reasons to reduce the impact of subsidies on finances
  - Some countries have not raised prices and these have tended to be those who remain completely self-sufficient and export in significant quantities
- Globalisation of Gas Markets and Gas Price Convergence
  - Many factors need to come together if gas prices globally are to become more connected. Ultimate connectivity would seem to require the development of liquid trading hubs in all the key markets
  - Infrastructure, both within and between markets, has been crucial as it enables gas (pipeline or LNG) to move freely. Need for proper market liberalisation including regulated TPA and unbundling
  - Introduction of new participants such as portfolio / trading companies into the key markets and the changing pricing mechanisms to GOG away from OPE