UNIVERSITY OF CAMBRIDGE | Energy Policy Research Group

How 'Integrated' is an Integrated Oil and Gas Company (IOC)? Understanding how and why IOCs pursue alternative business models in global natural gas markets

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Contents

I. Different gas sales strategies in global gas markets

II. Implications of 'portfolio' business model on long-term gas contract market

III. Case studies of Global LNG Suppliers: Shell/BG vs ExxonMobil & Qatar Petroleum

Different gas sales strategies in global gas markets

From the perspective of producers and suppliers of gas, there are two sales strategies in global gas trade: (i) long-term ***'point-to-point'*** contracting or asset-specific relationship strategy, and (ii) integrated production, supply, trading and marketing – ***ISTM sales strategy***

Different gas sales strategies in global gas markets

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Characterization of two strategies

Long-term 'point-to-point' strategy	*ISTM Strategy*
• Long-term contracts are key to manage relationships at each stage of the value chain – from production to burner tip	• Long-term contracts may be important but may not be present at every stage of the value chain because of desire for greater flexibility in reaction to globalisation of gas markets and potential for disruptions (geopolitical, weather, etc)
• Usually gas reserves are developed to serve specific contracts/buyers	• Production and/or other elements of the value chain could be 'disintegrated' using a series of LTCs (e.g., Cheniere)
• High degree of asset specificity	• Lower degree of asset specificity and lower volumes due to *segmentation* of the value chain

ISTM & LNG Portfolio contracts

- In global gas markets, ISTM strategy is closely related to the ability of buyers and sellers (suppliers) to optimise their purchase and sales portfolio.

- The aim of such an optimization is to (i) manage uncertainties, (ii) reduce procurement costs (for buyers), and (iii) improve supply margin (for sellers).

- At the heart of the ISTM strategy, therefore, is trading functionality that allows buyers and sellers to carry out such optimization. Note that this could be both spatial (optimization between different locations) as well as temporal (optimization between different time frames)

- The emergence of LNG 'portfolio' contracts therefore represents such a shift in strategy by LNG buyers and sellers.

- We define LNG portfolio contracts as those contracts without particular production assets attached.

ISTM & LNG Portfolio contracts

- Under such LNG contracts, sellers take full responsibilities to deliver contractual quantities of LNG to buyers.

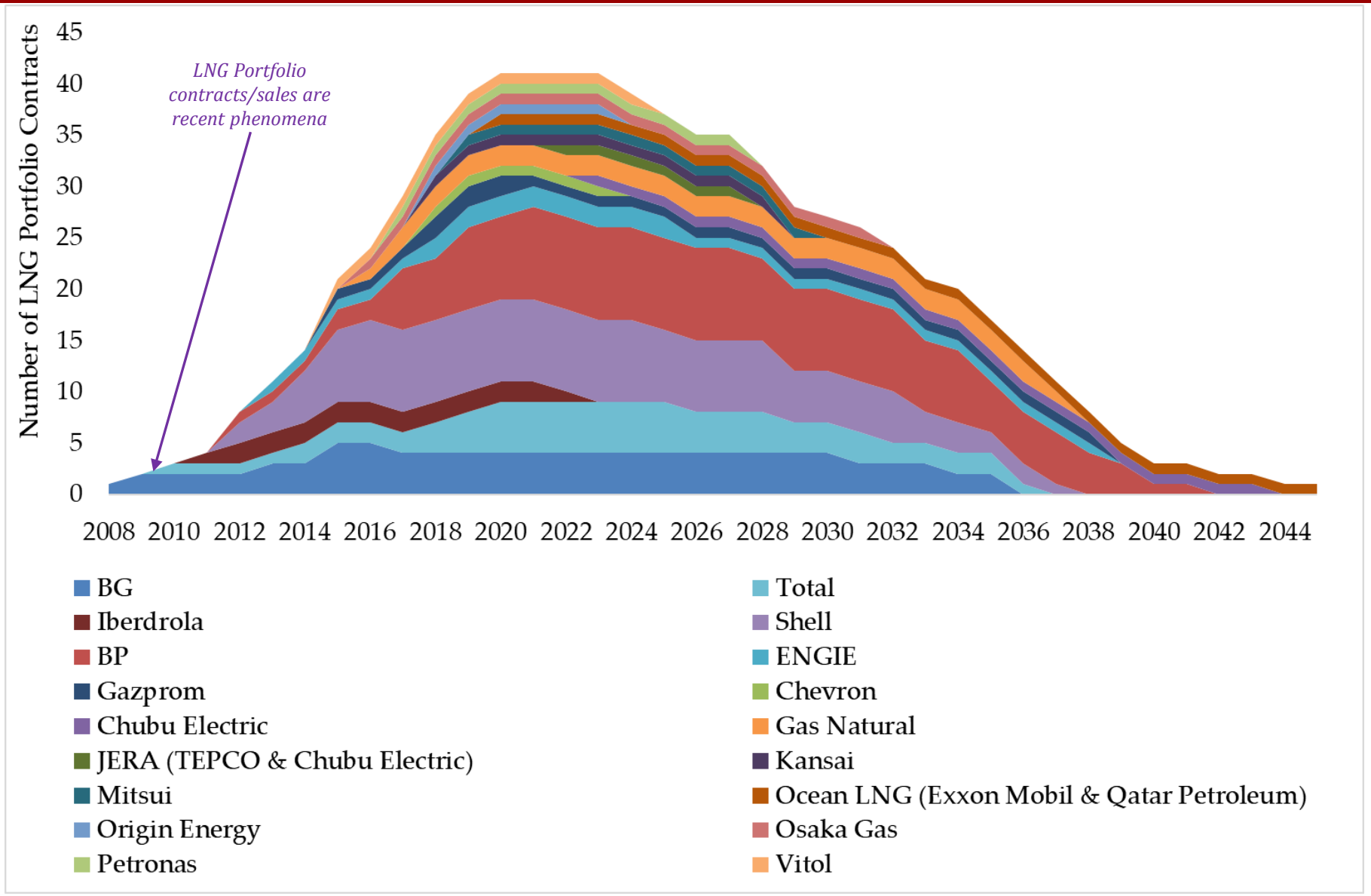
- If sellers do not have enough production assets (for various reasons) to serve all buyers under such contracts they would then have to procure gas on the 'spot' markets and deliver to buyers or they should make up for losses to buyers who have to procure alternative LNG sources

- All in all, such contracts give buyers and sellers desired flexibility to optimize and trade, BUT at a risk.

- Therefore, the more regional gas markets become interconnected as well as more complex (due to liberalization, for example) the more buyers/sellers need to develop various hedging and sales strategies to support ISTM.

- Thus, our hypothesis is that higher complexity of global gas markets (due to globalization of trade, liberalization and shifts to market-based gas transactions) is the driving force behind ISTM

LNG portfolio contracts summary (2017 snapshot)



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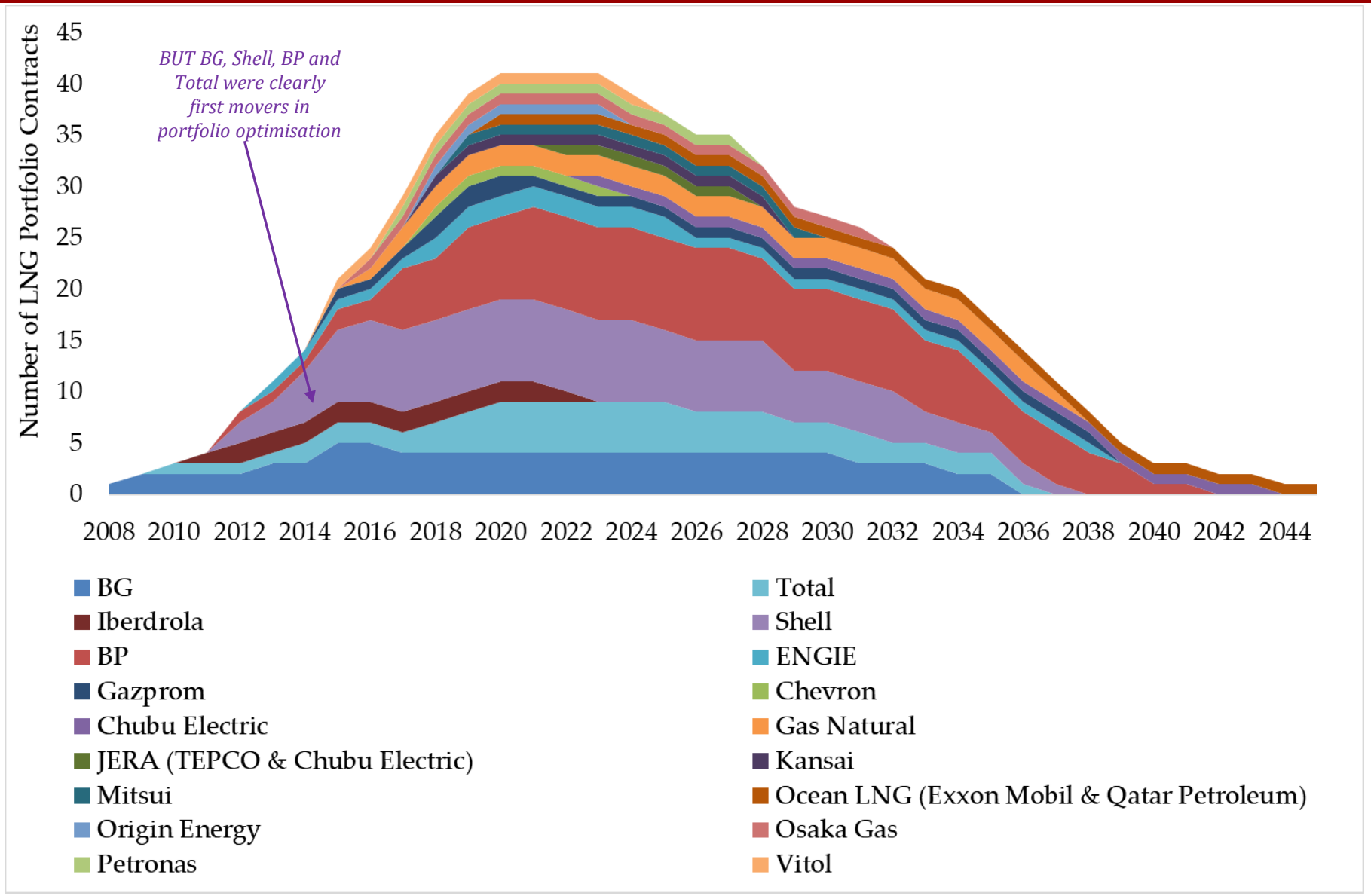

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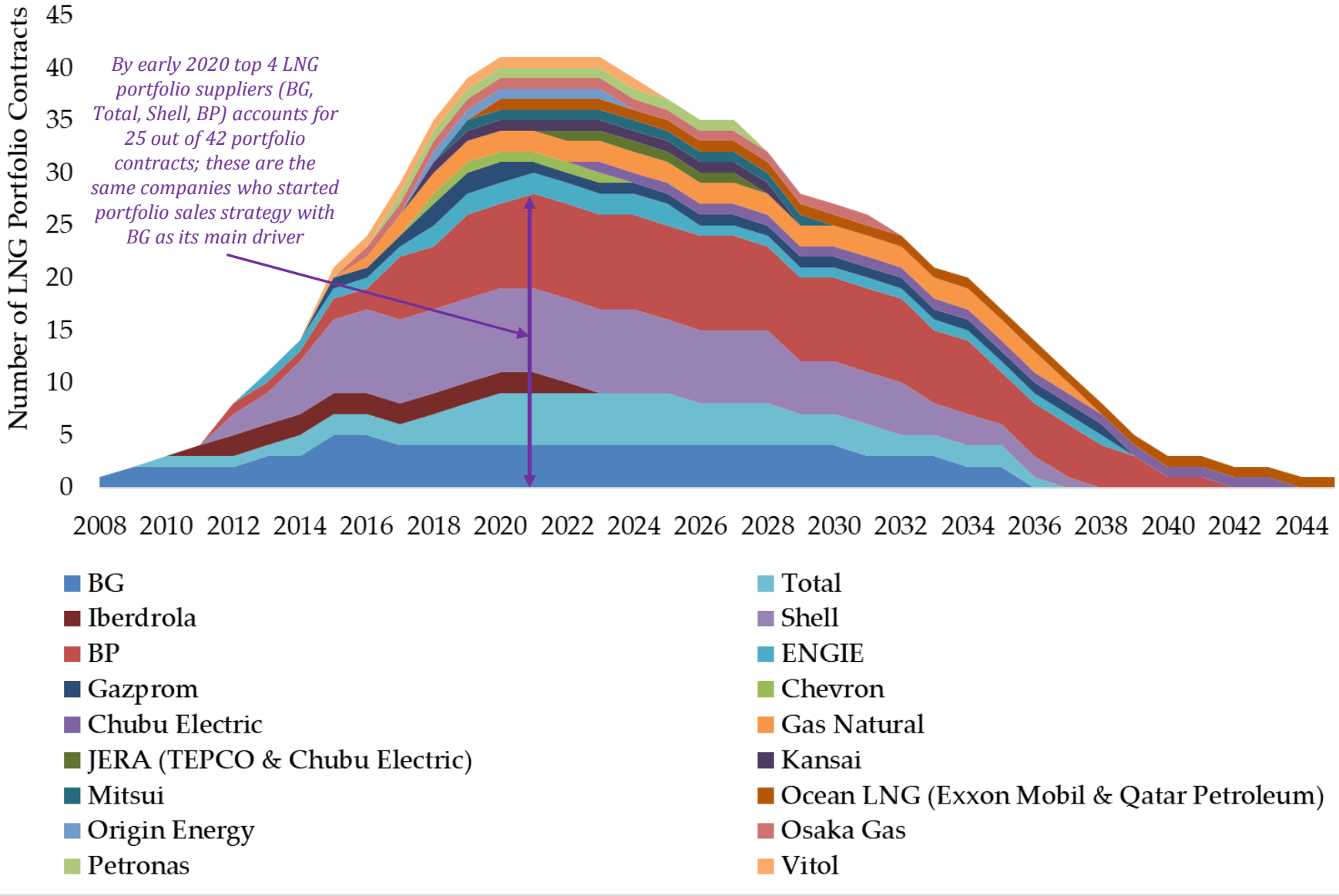

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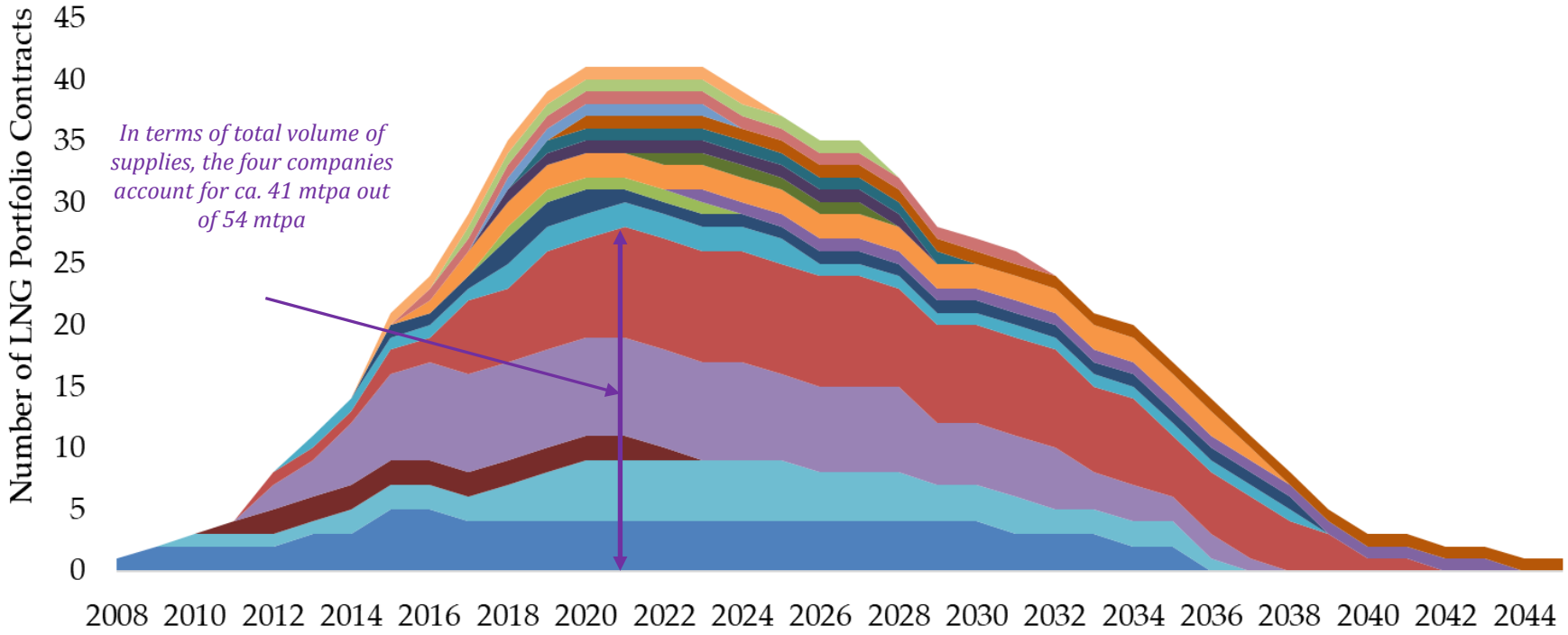

LNG portfolio contracts summary (2017 snapshot)

Seller	average contract volume, bcm/year	total contract volume	earliest start date	Latest end date	N of contracts	Peak volume, bcm/year	Peak year	Contract volume as % of total LNG equity production (2015)	business focus
BG	2.355	329.7	2008	2035	5	16.524	2015	110.5%	all-oil&gas
BP	0.780	209.1	2012	2041	9	10.703	2021	11.0%	all-oil&gas
Shell	0.915	190.4	2012	2037	8	10.072	2016	22.2%	all-oil&gas
Total	0.787	106.2	2010	2036	5	6.528	2020	26.3%	all-oil&gas
Gazprom	1.559	74.8	2015	2038	2	3.971	2018	8.1%	upstream-gas
Ocean LNG (JV - ExxonM & Qatar Petroleum)	1.768	46.0	2020	2045	1	1.768	2020	n.a.	upstream-gas
Gas Natural	0.876	38.6	2016	2037	2	1.836	2017	n.a.	midstream-downstream-gas
Iberdrola	0.692	16.6	2011	2022	2	1.510	2012	n.a.	downstream-electricity
Chubu Electric	0.408	8.6	2023	2043	1	0.408	2023	n.a.	downstream-electricity
ENGIE	0.162	8.4	2013	2038	2	0.422	2018	4.0%	midstream-downstream-electricity&gas
Petronas	0.707	7.8	2017	2027	1	0.707	2017	0.0%	upstream-oil&gas
Vitol	0.544	5.4	2015	2024	1	0.544	2015	n.a.	commodity trading
Chevron	0.680	4.1	2018	2023	1	0.680	2018	0.0%	upstream-oil&gas
Origin Energy	0.680	4.1	2018	2023	1	0.680	2018	n.a.	upstream-oil&gas
Kansai Electric	0.272	3.0	2018	2028	1	0.272	2018	n.a.	downstream-electricity
Mitsui	0.218	2.4	2019	2029	1	0.218	2019	0.0%	upstream-oil&gas
Osaka Gas	0.122	2.0	2016	2031	1	0.122	2031	n.a.	downstream-gas
JERA (TEPCO+Chubu)	0.095	0.6	1.632	1.632	1	0.095	2022	n.a.	downstream-electricity

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BG's entire equity production are sold as 'portfolio' contracts; it seems that BG also procures on short-term markets or from other producers to fulfil their portfolio sales

Different gas sales strategies in global gas markets

From the perspective of producers and suppliers of gas, there are two sales strategies in global gas trade: (i) long-term ***'point-to-point'*** contracting or asset specific relationship strategy, and (ii) integrated production, supply, trading and marketing – ***ISTM sales strategy*** or asset-backed trading strategy

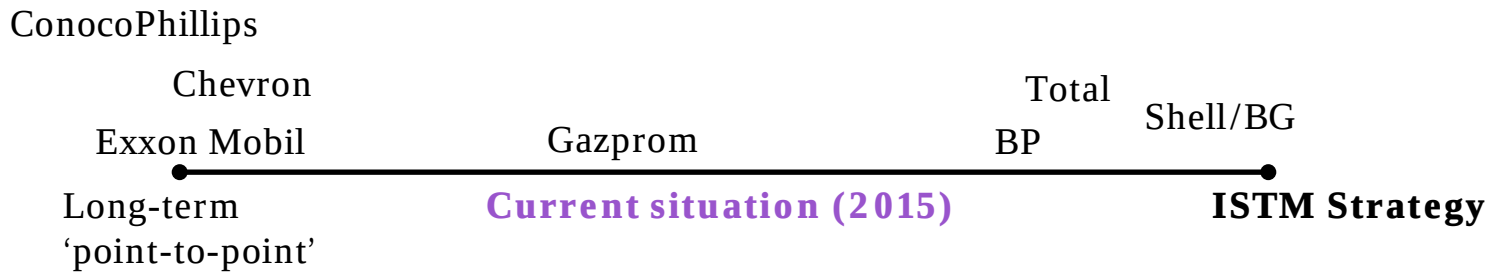
Characterization of two strategies

Long-term 'point-to-point' strategy

- Long-term contracts are key to manage relationships along the entire value chain – from production to burner tip
- Usually gas reserves are developed to serve specific contracts/buyers
- High degree of asset specificity

ISTM Strategy

- Long-term contracts may be important but may not be present at all level of the value chain
- Production and/or other elements of the value chain could be 'disintegrated' from a series of LTCs
- Lower degree of asset specificity due to *'break down'* in the value chain



Contents

Implications of 'portfolio' business model on long-term gas contract market

$$L_i = Constant + \beta_1 Q_i + \beta_2 Q_i^2 + \beta_3 Dummy_i^{NWE\_Post98} + \beta_4 Dummy_i^{Rof\_EU\_Post98} + \beta_5 Dummy_i^{Portfolio\ LNG} + \beta_6 Dummy_i^{LNG}$$

- Our model builds on Joskow (1987 AER) and von Hirschausen and Neumann (2008) we have added dummy variables for LNG portfolio contracts and other contracts
- where L_i is the duration of contract *i*,
- Q_i is the annual contract quantity (ACQ),
- $Dummy_i^{NWE\_Post98}$ is a dummy variable taking the value 1 if the contract was for deliveries to the UK, Germany, Belgium, France or the Netherlands after 1998 and 0 otherwise,
- $Dummy_i^{Rof\_EU\_Post98}$ is a dummy variable taking the value 1 for a contract delivered to the rest of the EU (excluding the north-west European markets mentioned above) after 1998 and 0 otherwise,
- $Dummy_i^{PortfolioLNG}$ is a dummy variable taking the value 1 for contracts delivered from portfolio LNG suppliers (such as BG, Shell or BP), i.e. contracts not tied to a particular production location, and 0 otherwise, and
- $Dummy_i^{LNG}$ is a dummy variable taking the value 1 for all LNG contracts in the sample and 0 otherwise.

Implications of 'portfolio' business model on long-term gas contract market

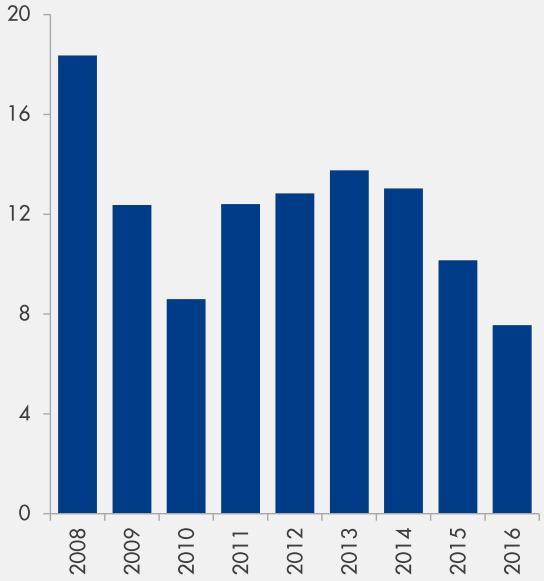
Independent Variables	Regressors	L_i – Contract duration
Constant		18.168 (0.764)
Q_i	β_1	0.827*** (0.179)
Q_i^2	β_2	-0.022*** (0.008)
$Dummy_i^{NWE\_Post98}$	β_3	-5.419*** (0.880)
$Dummy_i^{Rof\_EU\_Post98}$	β_4	-1.510* (0.805)
$Dummy_i^{PortfolioLNG}$	β_5	-3.263*** (1.113)
$Dummy_i^{LNG}$	β_6	-1.640** (0.686)
R-squared		0.113
Adjusted R-squared		0.104
No. observations		580

Standard errors are reported in parentheses; *** indicates significance at least at the 99% level; ** indicates significance at least at the 95% level; * indicates significance at least at the 90% level

Implications of 'portfolio' business model on long-term gas contract market

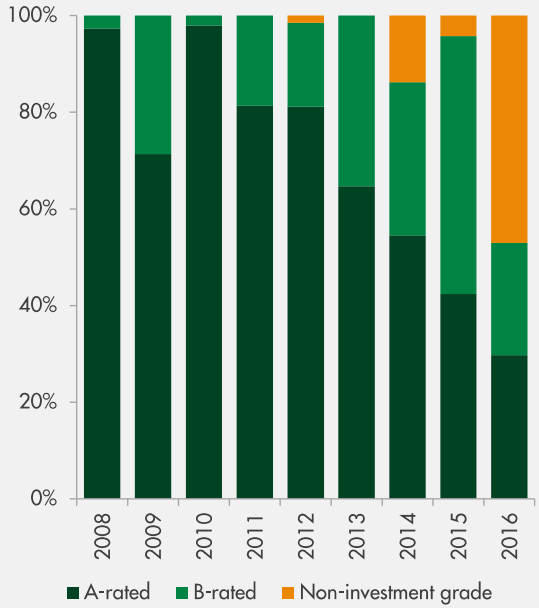
1. Contracts delivered to north-west European gas markets after the enactment of the first energy package (1998) were substantially shorter – by at least five years on average – than the other contracts in the sample.
2. Contracts delivered to other European markets after 1998 were also generally shorter ($\beta_4 = -1.51$) than the other contracts in the sample (though stat. significance at .1 level). As such, market liberalisation in Europe, together with a general reduction in the capital intensiveness of infrastructure assets, has indeed reduced the role of LTCs, specifically, by negatively affecting the duration of such contracts.
3. LNG contracts were shorter on average than pipeline gas contracts ($\beta_6 = -1.64$). This confirms our thesis that (i) LNG is more flexible by nature and (ii) access to LNG markets reduces the overall level of asset specificity involved in gas trade, especially for European pipeline gas trade.
4. Importantly, Portfolio LNG contracts were at least 3 years shorter on average than other gas contracts in the sample. This confirms the argument that as gas trade becomes globalised with higher uncertainties, the role of point-to-point LTCs will diminish while ISTM and portfolio optimization and trading will give suppliers and buyers competitive edge.
5. Finally, as suggested by the transaction cost economics framework, the presence of dedicated assets, measured indirectly as the volume of ACQ, increases contract duration but at a diminishing rate (the slope of ACQ squared term β_2 is negative) (see Joskow, 1987 for details).

Reinforced in Shell's 2017 LNG Outlook



Source: Shell interpretation of IHS (Energy LNG Sales Contracts

2016



Contents

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Shell/BG and Exxon Mobil/Qatar Petroleum

Shell/BG

- First portfolio LNG contract signed with KOGAS for delivery in 2008-2016;
- Majority of BG deliveries were from Equatorial Guinea; BG has long-term purchase contract (@90% HH) with EG LNG, a JV led by Marathon Oil -> BG acted as an 'intermediary' and made huge profits
- Shell's first portfolio contract (2012) was with Osaka Gas for 25 years; the contract was flexible: the first 5 years are committed to volume targets without an associated production asset with an option to extend to 20 years but linked to FID Prelude LNG
- Shell's second portfolio contract (2012) was a legacy contract it took over from Repsol, which initially signed a 16 year deal with CFE (Mexico)
- Portfolio of LNG supplies allowed BG and Shell to divert cargoes and arbitrage price differentials between regional markets

Exxon Mobil/Qatar Petroleum

- Exxon Mobil's LNG production is concentrated mostly in Qatar, India, Australia (Gorgon LNG), and Papua New Guinea (PNG LNG)
- Qatar Petroleum (QPC) is the majority (65-70%) JV partner with ExxonMobil, Shell, Total and ConocoPhillips in Qatargas and RasGas. QPC is in charge of all marketing activities
- Sometimes QPC sells LNG to JV partners who are free to ship where needed
- QPC has 16.8mmtpa of uncontracted and destination-free LNG, or ca. 21% of Qatar's entire production
- When it comes to sales strategy QPC is being advised by oil & gas majors (XOM, Shell, Total, etc.)
- Recently Ocean LNG was set up as a JV between EM & QPC to market 'third party' LNG; first portfolio contract was with Centrais Elétricas de Sergipe (Brazil) starting 2020 for 20 years