

Global Gas: Watch out US shale, here come Iran and Egypt

The recent rise in MENA production and discoveries to leave the uncommitted behind, upending LNG pricing regimes

- **Recent breakthroughs in global gas supply from Iran and the East Mediterranean could leave other uncommitted exporters behind:**
 - Iran fully commissioned phase 12 of South Pars and indicated that all South Pars phases (1-24, ex-14) could become operational by end-2017, with a production capacity of >33-Bcf/d.
 - Eni's discovery of the ~30-Tcf Zohr field offshore Egypt is the largest ever in the Mediterranean.
- **It's a race to market; speed matters, as North America, Australia, East Africa, East Mediterranean, Russia and even Qatar all look to produce more.** Canada's LNG export timeline being delayed by nearly a decade due to regulatory, technical and marketing issues is a cautionary tale to all suppliers as is the politically-induced hold on Israel's giant Leviathan field.
- **The persistent global oversupply raises further pressure to loosen terms on volume and destination,** break oil-indexation, and create more opportunities for short-term/spot trading and gas-indexation.
- Citi estimates a 95-Bcf gas inventory build this week with the reclassification, but an 86-Bcf build based on implied flow.

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See Appendix A-1 for Analyst Certification, Important Disclosures and non-US research analyst disclosures.

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Iran and East Mediterranean, key regions in the next wave of global gas supply beyond the US, made major strides in late August, as Iran fully commissioned Phase 12 of South Pars and the biggest gas field in the Mediterranean was discovered off the coast of Egypt. These developments set the stage for a major boost in gas production and could help remake the global gas landscape. This report looks into: (1) these breakthroughs in Iran and Egypt, (2) impacts on key gas exporters, and (3) impacts on pricing regimes and project costs.

Figure 1. Middle East and Africa Natural Gas Supply-Demand Balances (Bcf/d)

Production	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Middle East	22.6	24.3	25.5	28.6	30.8	33.0	35.9	38.6	41.1	47.3	52.3	54.5	56.2	58.1
Iran	6.4	7.6	8.0	9.3	9.9	10.8	12.1	12.8	14.0	14.7	15.5	16.0	15.9	16.7
Israel*	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.4	0.2	0.6	0.7
Kuwait	1.0	0.9	1.1	1.1	1.2	1.2	1.2	1.2	1.1	1.1	1.3	1.5	1.6	1.6
Qatar	2.6	2.9	3.0	3.8	4.4	4.9	6.1	7.4	9.1	12.2	15.6	16.4	17.1	17.1
Saudi Arabia	5.2	5.5	5.8	6.3	6.9	7.1	7.2	7.8	7.6	8.5	8.9	9.6	9.7	10.5
UAE	4.3	4.2	4.3	4.5	4.6	4.7	4.9	4.8	4.7	5.0	5.1	5.2	5.3	5.6
Other Middle East	3.0	3.2	3.3	3.5	3.7	4.2	4.3	4.4	4.5	5.6	5.5	5.5	6.1	5.9
Africa	12.8	13.3	14.2	15.1	17.1	18.6	19.8	20.5	19.3	20.6	20.3	20.8	19.8	19.6
Algeria	7.6	7.8	8.0	7.9	8.5	8.2	8.2	8.3	7.7	7.8	8.0	7.9	7.9	8.1
Egypt	2.4	2.6	2.9	3.2	4.1	5.3	5.4	5.7	6.1	5.9	5.9	5.9	5.4	4.7
Other Africa	2.8	2.9	3.3	4.0	4.5	5.1	6.2	6.5	5.6	6.9	6.4	7.0	6.5	6.8
Middle East + Africa	35.4	37.6	39.8	43.7	48.0	51.6	55.7	59.1	60.5	67.9	72.7	75.3	76.0	77.8
Consumption														
Middle East	20.0	21.4	22.4	25.0	26.8	28.5	30.5	33.5	34.9	38.3	40.5	41.5	42.3	45.0
Iran	6.8	8.0	8.2	9.5	9.9	10.8	12.1	13.0	13.9	14.8	15.7	15.6	15.4	16.5
Israel*	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.3	0.4	0.5	0.2	0.7	0.7
Kuwait	1.0	0.9	1.1	1.1	1.2	1.2	1.2	1.2	1.4	1.6	1.8	1.8	1.8	1.9
Qatar	1.1	1.1	1.2	1.5	1.8	1.9	1.9	1.9	2.4	2.9	3.7	4.0	4.0	4.3
Saudi Arabia	5.2	5.5	5.8	6.3	6.9	7.1	7.2	7.8	7.6	8.5	8.9	9.6	9.7	10.5
UAE	3.7	3.5	3.7	3.9	4.1	4.2	4.8	5.7	5.7	5.9	6.1	6.3	6.5	6.7
Other Middle East	2.3	2.4	2.4	2.6	2.8	3.2	3.3	3.7	3.9	4.4	3.9	4.1	4.4	4.3
Africa	6.3	6.7	7.1	7.8	8.3	8.6	9.3	9.7	9.6	10.4	11.0	11.8	11.6	11.6
Algeria	2.0	2.0	2.1	2.1	2.2	2.3	2.4	2.4	2.6	2.5	2.7	3.0	3.2	3.6
Egypt	2.4	2.6	2.9	3.1	3.1	3.5	3.7	3.9	4.1	4.4	4.8	5.1	5.0	4.6
Other Africa	2.0	2.2	2.2	2.6	3.0	2.8	3.2	3.4	2.9	3.5	3.5	3.7	3.4	3.3
Middle East + Africa	26.4	28.1	29.5	32.8	35.1	37.1	39.8	43.2	44.6	48.6	51.5	53.3	54.0	56.6

Source: BP, EIA, Citi Research

* From EIA

(1a) The resurgence of Iran as a global gas superpower

On August 29, Iran reached a significant milestone by declaring phase 12 of the South Pars gas development fully operational. The commissioning of phase 12 could be the first in a series of gas project developments that potentially transform its domestic and global gas markets, though the availability of financing and technology is critical to carry this out.

South Pars, a supergiant discovered in 1990, constitutes the second-largest gas field globally. Phases 1 to 10 out of 24 are already producing. Phases 11 through 24 were supposed to be the upstream portion of some massive LNG project development. Indeed, Iran planned to be a major LNG supplier, similar to Qatar. As Qatar developed the North Dome, which is the southern part of the South Pars/North Dome field, Iran was supposed to develop South Pars, the northern part of the combined field with Qatar.

Iran's Petroleum Minister claimed that all South Pars phases, other than Phase 14, could become operational by the end of 2017, which has the capacity to produce more than 33-Bcf/d of gas. FGE estimated that South Pars production could rise by 10 to 15-Bcf/d between now and 2020. As BP Statistical Review's latest data put Iran's production at ~16.7-Bcf/d in 2014, it is possible that Iran's gas production could reach ~31-Bcf/d in 2020. Currently, although those

South Pars phases that are already on stream are not operating at full capacity, they still collectively produce about 13-Bcf/d of gas, or more than 70% of Iran's total gas demand.

Figure 2. Natural gas and oil fields in Iran including Pars South



Source: EIA

The latest addition, Phase 12, is the second largest of the 24-phase development program for South Pars; Phase 12 alone has the capacity to produce 3-Bcf/d of rich gas and 0.11-mb/d of condensate. Phases 15 and 16, which have the capacity to produce 2-Bcf/d of gas and 0.08-mb/d of condensate, should come on stream before the end of the year, too.

Figure 3. Iran's South Pars Phases Planned Gas and Condensate Production

Phase	1	2 & 3	4 & 5	6 & 7 & 8	9 & 10	11	12	13	14	15 & 16	17 & 18	19	20 & 21
Gas Production (Bcf/d)	0.9	1.8	1.8	3.7	1.8	2.1	2.8	1.8	1.8	1.8	1.8	1.8	1.8
Condensate Production (kb/d)	40	80	80	158	80	80	110	80	77	80	80	77	75

Source: POGC, Citi Research

These supplies are crucial for Iran as a domestic fuel source, with infrastructure investments in the tens of billions of USD needed to move gas. As the fourth-largest gas consumer behind the US, Russia and China, Iran uses gas to generate electricity, heat homes, power industrials, supply petrochemicals and assist oil production through gas-injection into aging oil fields. In addition, rising gas-for-oil substitution in electricity generation and increasing demand in the northern part of the country necessitate further expansion of the internal gas transport infrastructure. Strategic plans have called for gas processing facilities to double to 42-Bcf/d by 2025, pipe capacity to expand to 35-Bcf/d by 2017, and pipe export infrastructure to Europe via Turkey to expand.

Figure 4. Selected NIGC Infrastructure Projects

Project	Estimate Investment Cost (\$ million)
9th Trans-Iranian Pipeline	5,137
Requirements for daily ggas transimission of 1 Bcm in 2017	6,326
Gas distribution to the rest of the cities and villages	4,738
Gas distribution to Sistan-Baluchestan Province	1,600
Gas pressure booster stations for the 7th Trans-Iranian Gas Pipeline	322
Phase 2 liam Gas Processing Plant	147
Various underground gas storage projects	1,921
Total	20,191

Source: EIG, NIGC, Citi Research

The discovery of South Pars had also led Iran to pursue LNG exports, first considered in the 1990s. However, pipe gas exports may be more promising than LNG for the moment. Only one of four LNG liquefaction projects, the 1.4-Bcf/d facility near the Assulyeh port, has started construction. For this project, despite having port facilities, storage tanks and other infrastructure, crucial components, such as heat exchangers and processing technology needed for liquefaction, are not available due to sanctions. But if a liquefaction train were added after sanctions are lifted, it is possible for Iran to start exporting LNG in about 4 or so years. Iran is also exploring the possibility of supplying gas to Oman's Qalhat LNG making use of the unused capacity there, as well as Abu Dhabi's Das Island facility, after the expiry of the ADGAS-TEPCO contract.

Figure 5. Iran LNG planned export projects and status

Projects	Iran LNG	Pars LNG	Persian LNG	NIOC LNG
Status	Construction 50% complete. Processing technology still has to be secured	On Hold	On Hold	Shelved

Source: EIG, Citi Research

Additional pipe exports may move ahead sooner, as the country itself could finance and build these projects themselves, and pipe exports are not subject to US sanctions. Iran is considering exports to Oman, UAE, Kuwait and potentially Bahrain.

Financing and technology are critical to Iran's gas ambition. More severe sanctions imposed in 2011 forced many Western companies to leave and pushed back completion dates of oil and gas projects. The lifting of sanctions would not be enough to fully reopen the country to external financing. Other creative ways include financing in the classic form of build-operate-transfer, among others. But for now, an uncertain global LNG market outlook may prevent more advantageous financing to come through. Current sanctions also limited the ability of non-Western companies to participate in Iran.

(1b) Egypt's newfound treasure – largest offshore gas field in the Mediterranean

The second groundbreaking development is Eni's discovery of the supergiant ~30-Tcf Zohr gas field off the coast of Egypt, larger than Israel's ~22-Tcf Leviathan field. Deemed the largest ever gas find in the Mediterranean, Eni's success offshore Egypt could help to supply its domestic market and potentially resume LNG exports.

Figure 6. Location of the Zohr gas field approximately 120 miles off the coast of Egypt



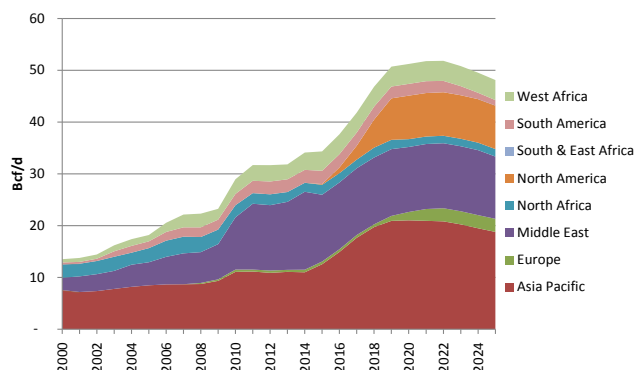
Source: EIA

Egypt has stated that it will not be exporting any of the new-found reserves, at least in the short term. Instead, new supply will be used to help satisfy the rapid domestic demand growth and the desire to replace high-cost imported fuel oil with natural gas. Electricity outages are common due to the shortage of gas, generation and transmission capacity. Eni is said to fast-track development to meet gas demand needs. First production should begin in two years and the full ramp may happen in four years.

(2) Impacts on other major exporters

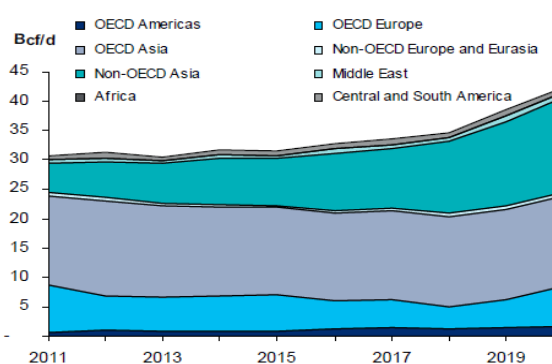
Iranian gas exports should displace some LNG demand in the Middle East and potentially beyond if the LNG option were to go ahead. In any case, the excess LNG would add to the oversupply globally, just as the US, East Africa, East Mediterranean and even Qatar are still angling to produce more, while Russia pursues the dual LNG and pipe export strategy.

Figure 7. Global LNG supply forecasts show that LNG supply is set to build substantially, particularly out of North America



Source: Woodmac, EIA, Citi Research

Figure 8. Global LNG demand forecasts indicate that demand growth may be more limited, exacerbating a supply glut



Source: Woodmac, EIA, Citi Research

(a) Israel: The most direct impact would be on Israel, particularly given the geographical proximity and relatively similar timelines of development.

Although the giant, 22-Tcf field Leviathan offshore of Israel was discovered in 2010, regulatory uncertainty has held up its development.

Since then, not only has European gas demand – a natural end user market – fallen, US LNG exports have raced ahead as a result of the shale gas boom. The ability of US gas to reach Europe, South America and Asia makes it an attractive resource for importers globally.

The recent battle on gas regulation in Israel, which originated from antitrust concerns as Noble and Delek appeared to have duopoly power if viewed in isolation, substantially delayed developments of offshore gas supply and Israel's entry as a global LNG exporter. Indeed, the project is now on indefinite hold due to domestic Israeli politics.

(b) Canada: Although Canada's natural end user market for its LNG is East Asia, the global LNG oversupply, the resulting low prices and supply displacement should ripple back to Canada. In the East Asia market, leaving aside destination restrictions, Australian and Southeast Asian suppliers would benefit most from low transportation costs, with Canadian LNG's transportation cost advantage over Middle Eastern suppliers coming in barely at around \$0.2/MMBtu.

But with potentially more supply originating from the Middle East (e.g. Iran) and Mediterranean, it is possible that more Middle Eastern supply would head to East Asia, displacing other gas sources. Meanwhile, LNG from the Mediterranean would enjoy lower transportation costs to South and Southeast Asia, another supposed growth area, than Canadian gas. This further limits the market for Canadian gas.

Figure 9. Estimated LNG transportation costs (column = origin; row = destination)

Geographical Region	East Asia	Australasia	South and Southeast Asia	Middle East	South & East Africa	Northern Europe	Southern Europe	North Africa	Western Middle East	Eastern North America	Gulf and Central America	Eastern South America	Western North America	Western South America
East Asia	0.3	1.0	0.9	1.3	1.5	2.4	2.1	2.2	1.9	2.6	2.8	2.1	0.9	1.7
Australasia	0.7	0.6	0.7	1.1	1.1	2.2	1.8	2.0	1.7	2.2	2.3	1.6	1.3	1.5
South and Southeast Asia	0.5	0.8	0.6	1.0	1.1	2.1	1.7	1.9	1.5	2.2	2.4	1.7	1.3	1.7
Middle East	1.1	1.5	0.5	0.3	0.8	1.5	1.2	1.3	1.0	1.8	2.0	1.6	2.0	1.9
South & East Africa	1.2	1.3	0.7	0.6	0.4	1.5	1.2	1.3	1.0	1.6	1.6	1.1	2.1	1.5
Northern Europe	2.5	2.4	1.9	1.6	1.5	0.4	0.7	0.6	0.9	0.8	1.0	1.3	2.7	1.9
North Africa	1.8	2.1	1.3	1.0	1.2	0.5	0.3	0.4	0.3	0.9	1.0	1.1	2.4	1.7
Western Middle East	1.7	2.0	1.1	0.9	1.2	0.7	0.4	0.5	0.2	1.1	1.2	1.2	2.6	1.9
West Africa	1.8	1.8	1.4	1.3	0.7	0.9	0.9	0.6	1.0	1.1	1.1	0.8	2.0	1.3
Eastern North America	2.6	2.1	2.0	1.7	1.4	0.7	0.8	0.6	1.0	0.4	0.4	0.9	2.3	1.6
Gulf and Central America	2.7	2.2	2.2	2.0	1.5	0.9	1.1	0.9	1.2	0.6	0.3	1.0	2.4	1.6
Eastern South America	2.3	1.7	1.8	1.7	1.1	0.9	1.0	0.8	1.1	0.7	0.6	0.6	1.9	1.2
Western North America	0.9	1.2	1.5	1.9	2.0	2.7	2.6	2.4	2.5	2.4	2.6	1.7	0.4	1.1
Western South America	1.7	1.1	2.0	2.1	1.4	1.8	1.8	1.6	2.0	1.7	1.8	0.9	0.7	0.3

Source: Woodmac, Company Reports, Citi Research

In fact, Canada's Kitimat export project in the province of British Columbia is a cautionary tale. Back in 2009, Kitimat announced the possibility of exporting gas by 2014, but environmental concerns, inability to secure offtake contracts and prolonged negotiations with various levels of government and First Nations dragged out its progress. Meanwhile, US LNG and other projects globally zoomed ahead. Hence, if Kitimat were to export LNG at all in the future, it may not do so until well after 2020, or nearly 10 years or more after the original date.

(c) East Africa: Developing the region's vast offshore resource requires massive infrastructure development, as they are completely greenfield.

Although some have completed Front End Engineering Design (FEED), committing

tens of billions for project development before 2020, in a world with lower oil prices and LNG oversupply, may become more difficult.

Coral FLNG may be the furthest ahead, with a target online date of 2019, but it is an unproven technology, so it could be after 2020 before first LNG hits the market. Even so, the global LNG market should still be in oversupply and currently there are no LNG sales contracts announced for Coral.

Firms may farm down or divest their shares; the resulting changes and M&A could further delay the development timeline. Canada's LNG export timeline possibly being delayed by 10 years due to regulatory, technical and marketing issues is a cautionary tale to producers looking to capture a piece of the LNG market.

(d) US: It has the potential to supply much more but the global LNG oversupply should deter more projects beyond the current bunch from going ahead. Hence, there could be a multi-year lull between the latest project reaching Final Investment Decision (FID) and a new set of liquefaction facilities.

(e) China: Although Chinese firms and national oil companies are already involved in Iran's upstream sector, which could give them a leg-up in other projects, the lack of key technical expertise and a downward revision in Chinese gas demand expectation may reduce Chinese firms' desire to get involved. China was supposed to be the great growth engine for gas and LNG but demand growth has slowed substantially on weak macroeconomic factors and unfavorable pricing inside the country. In fact, major Chinese buyers are looking to renegotiate contract terms (e.g. Sinopec on APLNG and CNOOC on other projects) or reselling contracted cargoes. However, some firms in China have in the past not honored contracts, such as coal import contracts in the last few years, as seaborne coal prices started to collapse.

Nonetheless, as part of the "One Belt, One Road" development strategy, Chinese NOCs may still pursue projects, including the possible Iran-China gas pipeline, more for geopolitical reasons.

(3) General impacts on global gas pricing regimes and project development

(a) Pricing: New LNG liquefaction capacity is starting up just as demand growth is moderating, creating more pressure to lower prices and loosen contract terms, particularly on destination restrictions. These developments are calling into question the viability of long-term contracts in their current forms. Oil-indexation and destination restrictions do not reflect market fundamentals. Increased options in the market and low spot prices are adding pressure to transform contracts to reflect short-term fundamentals, with volume and destination flexibility (including the reselling and diversion of LNG cargoes). Renegotiations of these long-term contracts would lead to increased spot sales and swaps.

The success of renegotiation could hinge on the existing relationship between current buyers and sellers locked in contracts, whether there are reopener provisions, and the sellers' financial and operational flexibility. Legally, clauses on price renegotiation may require parties to show that market conditions have changed not temporarily but permanently, so that pricing would have to change to reflect new market conditions.

(b) Project costs: To cut cost, new developments in LNG liquefaction may have to be more modular, both in the pieces and equipment used. Low-cost FLNG, if successful, could unlock offshore resources without the need to build on-shore facilities. Expanding brownfield facilities could give existing LNG suppliers cost advantages as well without building infrastructure anew, though the size of the upstream reserves would have to be large enough to support continued export expansion. The latter point favors brownfield US exporters, as gas supply can come from almost anywhere in North America, given its very well-established gas pipeline network linking major production areas.

Woodside's Browse FLNG in Australia and possible Eni's Coral FLNG offshore Mozambique may be promising but not others. Maintaining momentum is key to a project's viability in the planning stage. Without new projects in the pipeline sufficiently far along in their development stages, the future LNG shortage could loom larger.

Weekly US Gas Storage

Citi estimates a 95-Bcf gas inventory build this week with the reclassification, but an 86-Bcf build based on implied flow, vs. a 69-Bcf build last week and a 79-Bcf build last year.

Figure 10. EIA Natural Gas Inventory Estimates

	L48 Injection/Withdrawal	East	Prod	West	L48 Inventory	East	Prod	West
This week	95	74	19	2	3,194	1,584	1,129	481
Last week	69	53	12	4	3,099	1,510	1,110	479
Last year	79	59	10	10	2,801	1,522	841	438
Surplus to last year					393	62	288	43
	Weekly CDD				Weekly HDD			
This week	91	47	30	14	2	2	0	1
Last week	105	61	30	14	1	0	0	1
Last year	98	51	35	11	0	0	0	0

Source: EIA, Citi Research

Figure 11. Weekly injection/withdrawal and inventories table

Week	Injection (Withdrawal) - Bcf									Inventories - Bcf								
	This yr	Last yr	5-yr avg	5-yr min	5-yr max	3-yr avg	3-yr min	3-yr max	This yr	Last yr	5-yr avg	5-yr min	5-yr max	3-yr avg	3-yr min	3-yr max	This yr	Last yr
7/10/2015	99	107	70	28	107	88	58	107	2,767	2,219	2,765	2,219	3,189	2,731	2,219	3,189		
7/17/2015	61	90	52	26	90	64	41	90	2,828	2,307	2,815	2,307	3,217	2,790	2,307	3,217		
7/24/2015	52	88	54	28	88	66	52	88	2,880	2,389	2,868	2,389	3,241	2,857	2,389	3,241		
7/31/2015	32	82	52	24	96	70	32	96	2,912	2,467	2,916	2,467	3,261	2,911	2,467	3,261		
8/7/2015	65	78	56	20	78	69	65	78	2,977	2,555	2,977	2,555	3,308	2,975	2,555	3,308		
8/14/2015	53	88	64	47	88	66	53	88	3,030	2,630	3,040	2,630	3,374	3,045	2,630	3,374		
8/21/2015	69	75	66	55	75	70	67	75	3,099	2,709	3,098	2,709	3,402	3,100	2,709	3,402		
8/28/2015	95	79	57	28	79	55	28	79	3,194	2,801	3,172	2,801	3,429	3,161	2,801	3,429		
9/4/2015	78	92	75	27	103	61	27	92	3,272	2,891	3,245	2,891	3,496	3,229	2,891	3,496		
9/11/2015	79	90	73	46	90	68	46	90	3,351	2,988	3,335	2,988	3,576	3,317	2,988	3,576		
9/18/2015	90	97	90	74	111	88	80	97	3,440	3,100	3,430	3,100	3,653	3,413	3,100	3,653		
9/25/2015	95	112	94	77	112	97	77	112	3,535	3,205	3,524	3,205	3,725	3,502	3,205	3,725		
10/2/2015	91	105	94	72	112	89	72	105	3,626	3,299	3,607	3,299	3,776	3,576	3,299	3,776		

Source: EIA, Citi Research

Figure 12. Weekly supply-demand table

Week	Total demand	ElecGen	ResComm	Industrial	Total supply	Production	Imports (Canada)	Exports (MX)	Imports (LNG)	CDD	10-yr avg	HDD	10-yr avg
7/10/2015	65.3	30.1	8.4	20.7	78.3	75.2	5.8	-2.8	0.1	90	92	1	1
7/17/2015	69.5	34.2	8.3	20.8	77.2	74.3	5.6	-2.8	0.1	101	96	0	1
7/24/2015	70.8	35.0	8.5	21.0	76.8	73.8	5.8	-2.8	0.1	112	99	0	1
7/31/2015	73.3	37.3	8.5	21.0	78.2	75.1	5.8	-2.8	0.1	114	98	0	1
8/7/2015	70.9	35.2	8.4	21.0	78.6	75.3	6.0	-2.7	0.1	105	103	0	1
8/14/2015	69.9	34.4	8.3	20.9	78.0	75.3	5.3	-2.6	0.1	102	97	0	1
8/21/2015	69.2	33.3	8.5	21.0	79.6	76.1	6.2	-2.7	0.1	105	96	1	1
8/28/2015	66.2	30.7	8.4	20.7	79.7	76.6	5.7	-2.7	0.1	91	91	2	1
9/4/2015	67.4	31.8	8.3	20.8	79.6	76.7	5.5	-2.7	0.1	98	83	1	3
9/11/2015	66.2	30.9	8.3	20.8	78.6	76.3	5.3	-3.1	0.1	89	74	1	4
9/18/2015	64.7	28.9	8.8	20.7	78.6	76.3	5.3	-3.1	0.1	72	64	6	8
9/25/2015	63.9	27.2	9.8	20.8	78.6	76.3	5.3	-3.1	0.1	60	61	13	12
10/2/2015	64.5	25.7	11.6	21.0	78.5	76.6	4.9	-3.2	0.1	45	46	26	24

Source: EIA, Citi Research

Figure 13. US Monthly Natural Gas Supply-Demand Balance (normal weather for bal-2015 and 2016)

	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14	Jul-14	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Y/Y Change	Annual
Total Supply	73.0	71.9	71.5	72.2	73.8	73.7	74.3	74.8	74.7	76.3	77.2	79.6	4.3	74.4
Prod	66.8	67.1	68.1	69.4	70.6	70.8	71.3	71.6	71.7	72.8	73.0	75.2	4.5	70.7
LNG	0.3	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	(0.0)	0.2
Exports to Mexico	(1.6)	(1.8)	(1.9)	(1.8)	(2.0)	(2.1)	(2.2)	(2.1)	(2.1)	(2.0)	(1.9)	(1.9)	(0.1)	(2.0)
Imports from Canada	7.4	6.3	5.1	4.55	5.15	5.00	5.12	5.24	5.03	5.38	5.9	6.1	(0.1)	5.5
LNG Exports	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Demand	104.1	97.8	82.6	65.2	58.3	58.5	61.5	62.9	61.5	63.3	82.6	88.8	2.3	73.9
IND	23.4	22.9	21.9	20.6	19.8	19.7	19.9	20.0	20.1	20.7	22.7	23.0	0.8	21.2
ResComm	49.6	49.8	35.7	19.8	11.7	8.6	8.3	8.2	9.6	14.9	32.1	35.7	0.8	23.7
EG	22.4	19.3	17.8	18.3	21.8	25.5	28.4	30.4	25.9	22.9	19.7	21.0	0.4	22.8
Pipe Use	2.9	2.8	2.3	1.8	1.6	1.6	1.7	1.8	1.7	1.8	2.3	2.4	0.1	2.1
Lease and Plant Fuel	4.0	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	4.0	4.0	0.1	3.9
Transport	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0	0.2
Inventory (Bcf)	1,925	1,200	857	1,066	1,548	2,005	2,400	2,768	3,163	3,564	3,402	3,116		

	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Y/Y Change	Annual
Total Supply	79.6	79.8	78.2	77.6	77.2	77.7	78.2	78.6	77.8	77.2	78.2	78.7	3.8	78.2
Prod	74.4	74.7	74.5	74.5	74.4	74.6	75.2	76.1	75.5	75.8	76.5	77.0	4.6	75.3
LNG	0.7	0.8	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.2
Exports to Mexico	(2.2)	(2.3)	(2.4)	(2.5)	(2.6)	(2.7)	(2.8)	(3.1)	(3.1)	(3.2)	(3.2)	(3.2)	(0.8)	(2.8)
Imports from Canada	6.9	6.5	5.8	5.4	5.4	5.6	5.8	5.5	5.3	4.9	5.3	5.4	0.1	5.7
LNG Exports	-	-	-	-	-	-	-	-	-	(0.6)	(0.6)	(0.6)	(0.1)	(0.1)
Total Demand	103.0	108.9	81.1	68.3	61.0	66.0	69.0	68.2	64.4	68.2	77.7	93.1	3.5	77.4
IND	23.9	24.5	22.4	21.3	20.7	20.6	20.9	20.9	20.8	21.6	22.8	24.1	0.8	22.0
ResComm	45.1	54.7	31.6	18.4	11.7	9.0	8.4	8.4	9.4	16.5	26.3	39.6	(0.4)	23.3
EG	22.9	21.4	22.5	22.5	24.1	29.6	33.5	32.8	28.1	23.9	22.1	22.4	2.7	25.5
Pipe Use	2.8	3.1	2.3	1.9	1.7	1.8	1.9	1.9	1.8	1.9	2.2	2.7	0.1	2.2
Lease and Plant Fuel	4.0	4.0	4.0	4.0	4.1	4.0	4.0	4.0	4.0	4.0	4.1	4.1	0.1	4.0
Transport	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.1	0.3
Inventory (Bcf)	2,392	1,578	1,488	1,767	2,270	2,619	2,905	3,228	3,629	3,907	3,923	3,480		

	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Y/Y Change	Annual
Total Supply	78.0	77.7	77.3	76.6	77.1	76.8	76.6	76.5	76.1	75.1	76.5	76.5	(1.5)	76.7
Prod	76.5	76.4	76.3	76.2	76.1	76.0	75.9	75.8	75.7	75.6	76.6	76.6	0.9	76.1
LNG	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	(0.1)	0.1
Exports to Mexico	(3.4)	(3.5)	(3.5)	(3.6)	(3.6)	(3.7)	(3.7)	(3.8)	(3.8)	(3.9)	(3.9)	(3.9)	(0.9)	(3.7)
Imports from Canada	5.5	5.3	5.0	5.1	5.7	5.5	5.5	5.5	5.3	4.9	5.3	5.4	(0.3)	5.3
LNG Exports	(0.6)	(0.6)	(0.6)	(1.1)	(1.1)	(1.1)	(1.1)	(1.1)	(1.1)	(1.7)	(1.7)	(1.7)	(1.0)	(1.1)
Total Demand	97.2	98.3	83.2	70.4	65.1	65.4	67.2	67.5	64.3	68.7	78.4	93.8	(0.8)	76.6
IND	24.6	24.4	23.3	22.3	21.5	21.3	21.4	21.5	21.5	22.4	23.6	25.0	0.7	22.7
ResComm	43.4	44.8	31.7	19.6	12.6	9.1	8.4	8.5	9.6	16.6	26.4	39.7	(0.7)	22.5
EG	22.0	21.8	21.5	22.2	24.8	28.9	31.1	31.2	27.0	23.4	21.8	22.0	(0.7)	24.8
Pipe Use	2.8	2.8	2.4	2.0	1.8	1.8	1.9	1.9	1.8	1.9	2.2	2.7	0.0	2.2
Lease and Plant Fuel	4.1	4.1	3.9	3.9	4.0	4.0	4.0	4.0	4.0	3.9	4.0	4.0	(0.1)	4.0
Transport	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.1	0.4
Inventory (Bcf)	2,886	2,290	2,105	2,293	2,666	3,005	3,298	3,576	3,931	4,130	4,071	3,535		

Source: EIA, Citi Research

Note: Forecasts in Italics

Figure 14. Annual US natural gas supply-demand balance (2009-2020)

Natural Gas (Bcf/d)	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total Supply	62.9	64.7	67.2	69.2	70.1	74.4	78.2	76.6	76.4	77.1	78.2	79.1
Production*	55.6	57.5	61.8	64.9	66.2	70.7	75.3	76.1	79.4	82.9	86.6	88.9
LNG	1.2	1.2	1.0	0.4	0.2	0.2	0.2	0.1	0.1	0.1	0.0	0.0
Exports to Mexico	(0.9)	(0.8)	(1.4)	(1.6)	(1.9)	(2.0)	(2.8)	(3.7)	(4.6)	(5.1)	(5.5)	(6.1)
Imports from Canada	7.0	6.8	5.8	5.5	5.6	5.5	5.7	5.3	4.3	4.3	4.3	4.3
LNG Exports							(0.1)	(1.1)	(2.7)	(5.0)	(7.2)	(8.1)
Total Demand	63.3	65.9	66.6	69.6	71.7	73.9	77.4	76.6	76.4	77.1	78.2	79.1
Industrials	17.7	18.5	18.9	19.5	20.4	21.2	22.0	22.7	23.7	24.5	25.3	26.1
ResComm	21.7	21.9	21.4	19.3	22.9	23.7	23.3	22.5	22.7	22.9	23.1	23.2
Electricity Generation	18.8	20.2	20.8	25.0	22.4	22.8	25.5	24.8	23.3	22.8	22.6	22.3
Pipe Use	1.7	1.8	1.8	1.9	2.0	2.1	2.2	2.2	2.2	2.3	2.4	2.4
Lease and Plant Fuel	3.4	3.5	3.7	3.8	3.8	3.9	4.0	4.0	4.2	4.3	4.5	4.6
Transport	-	-	-	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.5
Demand + Exports	64.2	66.7	68.0	71.2	73.5	75.9	80.3	81.4	83.8	87.3	91.0	93.2

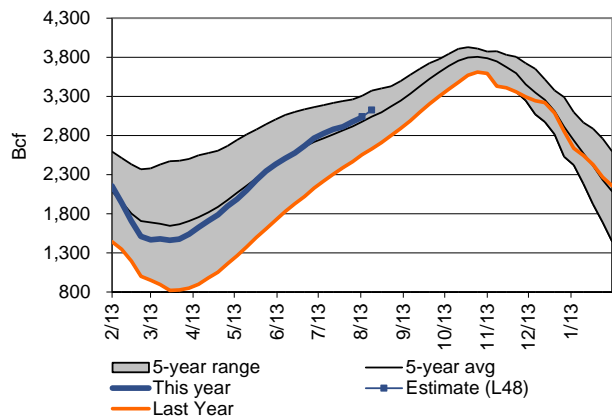
* Production in 2017 and beyond derived by matching total supply with total demand

Source: EIA, Citi Research

Note: Forecasts in Italics

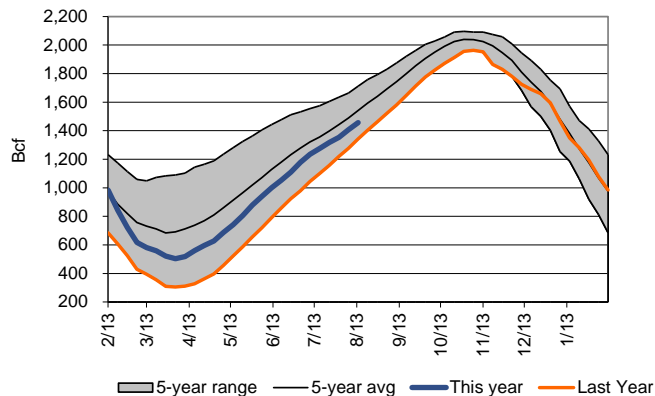
Gas Inventories

Figure 15. Lower 48



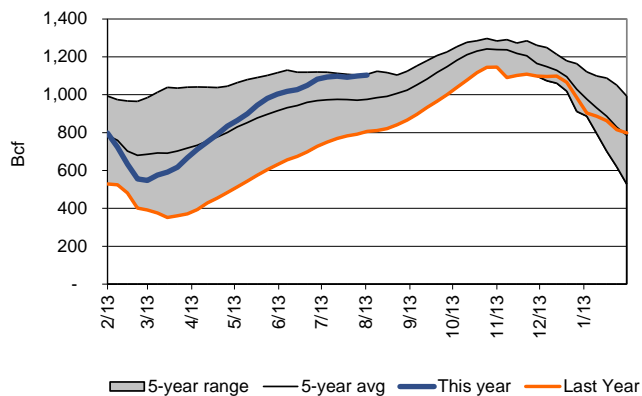
Source: EIA, Citi Research

Figure 16. East region



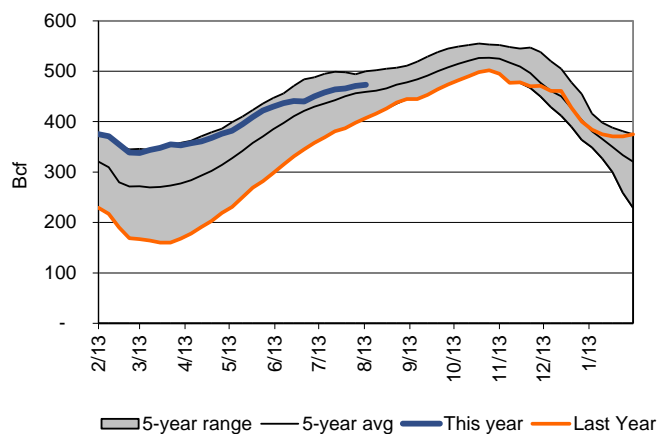
Source: EIA, Citi Research

Figure 17. Producing region



Source: EIA, Citi Research

Figure 18. West region



Source: EIA, Citi Research

Appendix A-1

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