SGICC News 2/23/16

Energy Week
Carnegie Mellon's Scott Institute for Energy Innovation invites members of the public, students, industry, non-governmental organizations, and foundations to attend our inaugural Energy Week!**.** Each day of Energy Week has a theme: energy research, policy, innovation, education (including an Energy Tech Expo), and Field Trips!

Energy Week is on March 14-18, 2016 at Carnegie Mellon University's campus in Pittsburgh, Pennsylvania.

We will be joined by interesting keynote speakers such as Elizabeth Sherwood-Randall, DOE Deputy Secretary and Lynn Orr, DOE Under Secretary for Science and Energy as well as Bunker Roy, founder of Barefoot College, an organization that works to teach women in rural villages how to install and maintain solar collectors.

Energy Week includes industry-focused roundtables on a variety of topics: the Southwest Pennsylvania energy workforce; industry energy efficiency; energy innovation and entrepreneurship of small- and mid-sized energy companies. In addition, Energy Week participants can sign up for field trips to interesting energy sites in the Western Pennsylvania region. We will also have a "brain swap" where faculty and industry leaders will exchange perspectives on energy research and education at CMU and their companies.

Throughout participants will see and hear interesting talks and presentations by Carnegie Mellon faculty and students.
http://www.cmuenergyweek.org/Home

Natural gas prices struggle near 2-month lows on mild demand outlook

Natural gas for delivery in March on the New York Mercantile Exchange fell to an intraday low of $1.767 per million British thermal units, a level not seen since December 18, before turning higher to trade at $1.834 by 15:35GMT, or 10:35AM ET, up 3.0 cents, or 1.66%. Meanwhile, the more actively-traded April contract tacked on 2.3 cents, or 1.23%, to trade at $1.890 after being down by as much as 1.4% earlier.

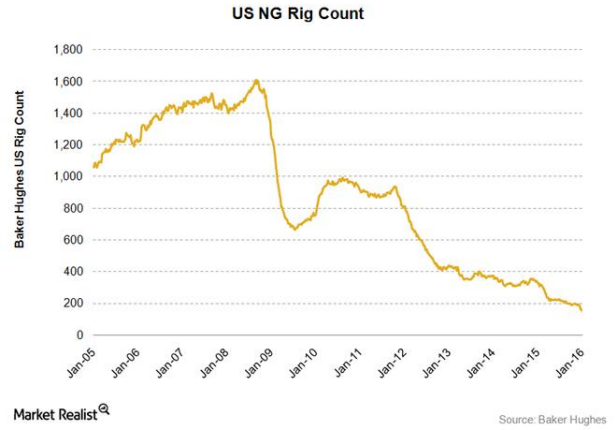
Natural gas futures lost 14.8 cents, or 8.24%, last week, the third straight weekly decline, on expectations of continued mild demand. Updated weather forecasting models continued to point to higher-than-normal temperatures later in February and in early March, dampening late-winter heating demand expectations.

Natural gas storage in the U.S. fell by 158 billion cubic feet last week, according to the U.S. Energy Information Administration, compared to expectations for a decline of 154 billion. That compared with draws of 70 billion cubic feet in the prior week, 110 billion cubic feet in the same week last year and a five-year average of around 176 billion. Total U.S. natural gas storage stood at 2.706 trillion cubic feet, 19.7% higher than levels at this time a year ago and 20.5% above the five-year average for this time of year.

Natural gas futures are down nearly 23% so far this year as a warmer-than-normal winter due to the El Niño weather pattern has limited the amount of heating days and reduced demand for the fuel.
http://www.investing.com/news/commodities-news/natural-gas-prices-struggle-near-2-month-lows-on-mild-demand-outlook-385830
(Investing.com) 2/22/16

The US Natural Gas Rig Count Could Fall, 10th Week in a Row

According to Baker Hughes (BHI), the US natural gas rig count fell by 18 to 104 for the week ending February 5. It fell by five to 122 for the week ending January 29. The US natural gas rig count fell for nine straight weeks for the week ending February 5.



In 2016, the active weekly US natural gas rig count fell by 58 rigs. The fall was due to lower natural gas prices as a result of long-term oversupply concerns. US natural gas drilling activity fell more than 50% in 2015. The bearish outlook for natural gas prices and the falling trend for natural gas rigs suggest that rig counts will fall more over the coming weeks.

The EIA, in its monthly drilling report, estimates that US natural gas drilling activity will reduce in March 2016 compared to February 2016. The decline in drilling activity should negatively affect drillers like Baker Hughes, Schlumberger (SLB), Superior Energy Services (SPN), Pacific Drilling (PACD), Atwood Oceanics (ATW), and Halliburton (HAL).
http://marketrealist.com/2016/02/us-natural-gas-rig-count-fall-10th-week-row/
By Gordon Kristopher (Market Realist) 2/12/16

Alabama manufacturer makes custom vehicles, including life-saving stroke unit

A Madison company is keeping the area's innovative spirit alive through the development of custom ambulances and emergency vehicles for clients throughout the world.

The company's Mobile Stroke Unit is one of only a couple existing in the world with technology to help victims receive the fastest, highest-quality care available in the event of a stroke. Excellance is also the only company to design and build a custom ambulance that runs solely on compressed natural gas (CNG).
http://www.al.com/business/index.ssf/2016/02/post_306.html
By Lucy Berry | lberry@al.com (AL.com) 2/19/16

Ceramics challenge sand in fracking Utica shale wells
Gas companies exploring potentially high-producing wells in the deep Utica shale while prices remain at multiyear lows face a $2 million question: sand or ceramic? Hydraulic fracturing requires mixing what engineers call a proppant with the water they pump into the well to prop open the cracks created in the shale and release the natural gas or oil it holds.

A mile or so under the surface of Pennsylvania, West Virginia and Ohio in the Marcellus shale, natural sand or grains coated in resin generally will do the trick. But the increased heat and pressure of the Utica — which in some places is twice as deep as the Marcellus but believed by some to hold more gas — are sometimes too much for sand to handle, prompting some companies to use a more expensive proppant made from ceramic.
http://triblive.com/business/headlines/9985297-74/sand-utica-ceramics
By David Conti (Trib Live) 2/21/16

Spending, Rigs Down, But Antero Plans Busy 2016
While it plans to cut its budget and reduce its rig count this year, Appalachian pure-play operator Antero Resources Corp. still has plans for a robust 2016, calling for $1.4 billion in capital expenditures to complete 110 horizontal shale wells in the Marcellus and Utica shales.

Annual Antero Resources Gas & Liquids Production 2011-2016E

Year	U.S. % of World Reserves	NatGas MMcf/d	Y/Y % Chg	NGL MMBL/D	Y/Y % Chg	Crude MMBL/D	Y/Y % Chg	NatGas As % of Total Production	NGLs % of Total Production	Crude Oil % of Total Production	TOTAL
2011	100.0%	230	76.9%	1.9	113.2%	0.5	48.6%	94.0%	4.8%	1.3%	100.0%
2012	100.0%	240	4.3%	0.2	-90.2%	0.1	-90.4%	99.4%	0.5%	0.1%	100.0%
2013	100.0%	485	102.1%	5.8	nmf	0.6	nmf	92.6%	6.7%	0.7%	100.0%
2014	100.0%	868	79.1%	19.5	234.6%	3.6	480.3%	86.3%	11.6%	2.1%	100.0%
2015	100.0%	1203	38.5%	42.6	119.0%	5.7	58.5%	80.6%	17.1%	2.3%	100.0%
2016E	100.0%	1355	12.6%	56.5	32.6%	3.5	-38.5%	79.0%	19.8%	1.2%	100.0%

Source: Bloomberg, company documents

The strategy would easily keep Antero one of the basin's most active operators. Its $1.4 billion budget, which includes $1.3 billion for drilling and completion, is 23% lower than the $1.8 billion it spent last year. But production is still forecasted to grow 15% from 1.493 Bcfe/d in 2015 to 1.715 Bcfe/d this year.
http://www.naturalgasintel.com/articles/105407-spending-rigs-down-but-antero-plans-busy-2016
Jamison Cocklin (NGI Shale daily) 2/19/16

North America's unconventional natural gas resource base continues to expand: IHS
North America's natural gas resource base is more abundant and lower cost than ever, according to a new assessment by IHS. The findings show a considerable growth of the low-cost segment of the resource base since 2010.
The study, *Shale Gas Reloaded: The Evolving View of North American Natural Gas Resources and Costs*, concludes that approximately 1,400 Tcf of natural gas in the U.S. Lower 48 and Canada is recoverable at a current break-even Henry Hub price of $4/MMBtu or less (in real terms). This is a 66% increase over 2010 estimates.

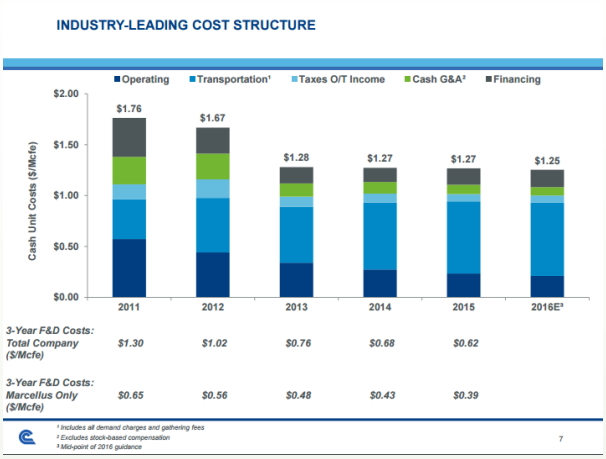
More than half of that (800 Tcf) can be produced at a current break-even price of $3/MMBtu or less, the study finds. These quantities point to long-term, low-cost energy supplies capable of meeting demand projections for at least the next 30 to 40 years.
Shale Gas Reloaded updates the findings of a similar 2010 IHS Energy study, *Fueling North America's Energy Future*. The new study examines 38 major oil and gas plays in North America and Canada. It finds that not only has the 176 Tcf of gas produced since 2010 been replaced by resource additions, but that the resource base has been extended and the cost of producing many of the remaining resources to be significantly reduced.
http://www.worldoil.com/news/2016/2/18/north-america-s-unconventional-natural-gas-resource-base-continues-to-expand-ihs
(World Oil) 2/18/16

Cabot Oil & Gas Shows Double-Digit Production and Reserves Growth

Cabot continues beating estimates amid global glut

Many oil and gas companies are struggling to stay afloat as the global oil supply glut continues, pressuring crude oil prices near historic lows. More bankruptcies are expected to come in the next six months as bank redeterminations take their toll on companies with fewer reserves to use as collateral for their credit facilities. Cabot Oil & Gas (ticker: COG,) is not only weathering the storm, but also posting double-digit growth for a sixth consecutive year despite the current commodity market.

As spring borrowing redeterminations loom around the corner, 79% of borrowers expected to see their borrowing bases decreased by 38%, on average. The price deck at which companies determine their reserves decreased 48% in 2016, meaning most companies have fewer proved reserves to lend against, and potentially seeing some companies going bankrupt in the near future as banks lower the money available to companies.



Cabot downspacing Marcellus wells ups location count and EURs

In the company's press release today, COG also announced that it has improved EURs and increased its location count by downspacing its laterals in the Marcellus. Cabot has decreased the spacing on its laterals from 1,000 feet to 700-800 feet, resulting in an increase in location count from approximately 3,000 to 3,450. COG also said that the EUR per 1,000 lateral feet for its Lower Marcellus wells increased 6% to 3.8 Bcf, implying an EUR increase to 22 Bcf from 18 Bcf per well, according to analysts at UBS.

http://www.oilandgas360.com/cog-cabot-oil-gas-shows-double-digit-production-and-reserves-growth/

(Oil & Gas 360) 2/19/16

Oil and gas producers 'in distress' as low oil price pain continues

The fall in the oil price to levels that are punishingly low for producers is putting up to $88bn of borrowings potentially at risk. About 30% of the oil and gas industry's debt is now said to be at distressed levels – meaning companies are experiencing financial or operational problems severe enough to put them at risk of default or bankruptcy.

Producers, especially those fracking for shale gas, have borrowed heavily in the past few years and are now counting the cost as revenues tumble. "We effectively had free credit for seven years and an energy transformation, so a lot of capital went into that," said Leslie Biddle of Serengeti Asset Management, a $1.5bn US hedge fund with significant oil and gas investments. "But now the capital markets to exploration and production have shut."

Companies on the distressed list are paying interest at 10 percentage points more than Treasury rates. Standard & Poor's (S&P) says the energy sector accounts for around 31% of the $285bn total distressed debt in the US. Some investors are attracted by the high yields on offer and a belief that the oil price of oil will soon rise. Borrowers, meanwhile, are keen to fund investment by issuing bonds in the hope the price of oil will eventually rise again.

http://www.hitc.com/en-gb/2016/02/21/oil-and-gas-producers-in-distress-as-low-oil-price-pain-continue/

Written by David Hellier, (The Observer) (HITC Business) 2/20/16

Natural Gas Price Increase Inevitable In 2016

Every week, the EIA proclaims a new record for natural gas production. But their own forecasts show that the U.S. will be short on supply by October of this year. A price increase is inevitable beginning later in 2016.

Popular Myth vs Reality

The popular myth is that gas production will continue to increase and that prices will remain low for years. In the myth, price has no effect on production. The reality is that price matters and production is down 1.2 bcfd1 since September 2015 (Figure 1).

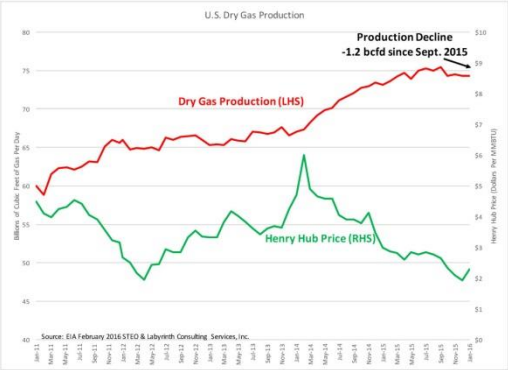


Figure 1. U.S. dry gas production. Source: EIA and Labyrinth Consulting Services, Inc.

The production increases reported by EIA are year-over-year comparisons that don't reflect declines during the last 4 months. Prices have fallen to less than half what they were in early 2014. The average price for the first quarter of 2016 is only $2.25 per MBTU2 (Figure 2).

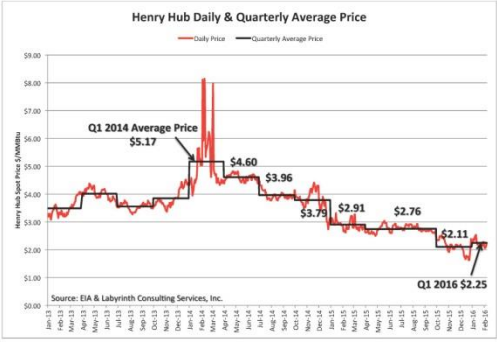


Figure 2. Henry Hub daily and quarterly average natural gas prices. Source: EIA and Labyrinth Consulting Services, Inc.

Hedges made when prices were in the $5-range carried many companies through falling prices as they continued to produce like there was no tomorrow. Tomorrow has arrived and the hedges are gone. Over-production in the Marcellus Shale means that producers have to compete for limited pipeline capacity by deeply discounting their sales price. The best core area locations are commercial at $4 per mcf3 but wellhead prices averaged only $1.75 per mcf in 2015.

No Simple Solution to Falling Supply

There is no simple solution to falling supply. That's because almost half of U.S. supply is conventional gas and it is in terminal decline. Now, shale gas is also in decline (Figure 3).

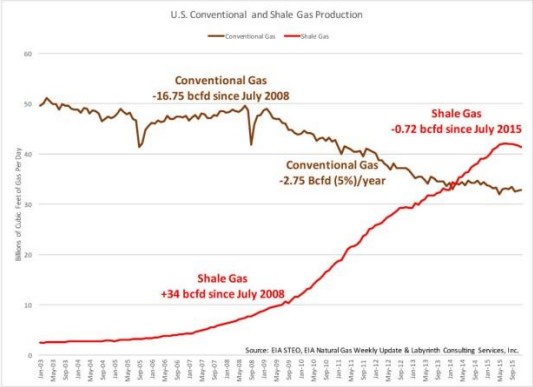


Figure 3. U.S. conventional and shale gas production. Source: EIA and Labyrinth Consulting Services, Inc.

Conventional gas supply has fallen 16.75 bcfd since July 2008. Until July 2016, increases in shale gas production more than offset those losses. Conventional gas will continue to decline at about 5% per year because few companies are drilling those plays. Shale gas must, therefore, continue to grow by at least 15 bcfd per year just to offset annual conventional gas decline (~2.5 bcfd per year) and legacy shale gas production decline (~12.5 bcfd per year). It will take 15 bcfd of new shale gas production in 2016 to keep U.S. production *flat*.

The biggest declines since peak production are from the older "legacy" shale gas plays namely, the Barnett, Fayetteville and Haynesville (Table 1).

Billions of Cubic Ft/Day	Haynesville	Barnett	Fayetteville	Marcellus	Eagle Ford	Antrim	Bakken	Other	Utica	Woodford	Total
Maximum Production	7.21	5.01	2.90	15.57	5.02	0.34	0.99	5.94	3.07	2.09	42.08
Dec. 2015 Production	3.57	3.39	2.36	15.05	4.73	0.24	0.94	5.94	3.07	2.09	41.37
Change	-3.64	-1.62	-0.54	-0.52	-0.30	-0.10	-0.04	0.00	0.00	0.00	-0.72

Table 1. Summary table of shale gas volume changes since peak production. Source: EIA and Labyrinth Consulting Services, Inc.

Although additional reserves exist in the Barnett and Fayetteville plays, the core areas have been largely developed and marginal areas require substantially higher gas prices to be commercial. There is only one horizontal rig operating in the Barnett and there are none in the Fayetteville.

Marcellus production declined 0.52 mcfd since July 2015. Most of this probably represented intentional shut-ins because of low wellhead prices. Marcellus production can grow but new pipelines are needed to turn reserves into supply. Even with additional infrastructure, production will peak in the next few years just like in the older plays.

A Supply Deficit Even In The Optimistic EIA Case

The EIA forecasts that net dry gas production will increase 1.4 bcfd in 2016 and 1.6 bcfd 2017. Even with that optimistic forecast, their data still shows that the U.S. will have a supply deficit beginning in the last quarter of 2016 (Figure 5). A more realistic forecast implies a much greater deficit that begins sooner.

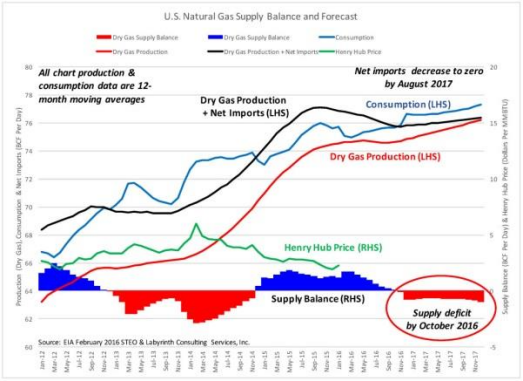


Figure 5. U.S. natural gas supply balance and forecast. Source: EIA and Labyrinth Consulting Services, Inc.

What is different this time, however, is that *net* imports will reach zero in early 2017 because of decreasing imports from Canada and increasing exports. Add to that the challenge of replacing conventional gas depletion, and there is a much more serious supply problem than EIA's already questionable forecast suggests.

Export plans of at least 7 bcfd by 2020 are not helpful considering the challenges of meeting domestic supply in coming years (Figure 6).

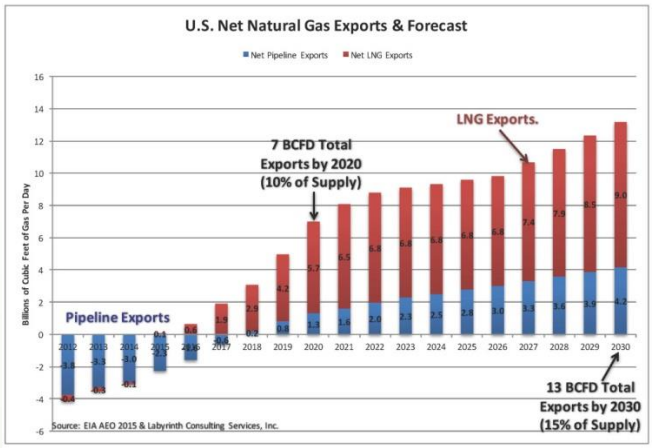


Figure 6. U.S. net natural gas exports. Source: EIA and Labyrinth Consulting Services, Inc.

The prospect of exports increasing to 13 bcfd by 2030 is even more troubling absent some new shale gas play that we don't know about yet.

Higher Gas Prices Are Inevitable

A few years ago, the oil and gas industry convinced the world that the U.S. had 100 years of natural gas. Some of us cautioned that it is worth reading the fine print, that there is a difference between a resource and a reserve. The harsh light of reality eventually reveals that what seems too good to be true usually is. The obvious solution to declining gas supply is higher prices.

The EIA's STEO forecast calls for $3.17 per MBTU gas prices by December 2016 and for $3.62 by December 2017. Those prices will not support necessary drilling in legacy shale gas plays. EIA's AEO 2015 reference case does not call for gas prices to reach $5 per mcf until 2025. We can't afford to wait 9 years.

It is, therefore, inevitable that natural gas prices must increase sooner, preferably in the next 12 to 24 months. If oil prices remain low, a shale-gas revival may save the domestic E&P business. During the last supply deficit in 2014, gas prices averaged $4.36 per mcf compared to only $2.63 in 2015.

But it will take time for producers to reverse the decline in drilling and production. It may be difficult to raise capital for renewed drilling given the current distress in the oil and gas industry. Something will have to give sooner than later. That will be natural gas export.

http://www.forbes.com/sites/arthurberman/2016/02/21/natural-gas-price-increase-inevitable-in-2016/#58108bc61a76

Art Berman ,Contributor (Forbes) 2/21/16

As U.S. shale sinks, pipeline fight sends woes downstream
Within weeks, two low-profile legal disputes may determine whether an unprecedented wave of bankruptcies expected to hit U.S. oil and gas producers this year will imperil the $500 billion pipeline sector as well.

In the two court fights, U.S. energy producers are trying to use Chapter 11 bankruptcy protection to shed long-term contracts with the pipeline operators that gather and process shale gas before it is delivered to consumer markets. The attempts to shed the contracts by Sabine Oil & Gas (SOGCQ.PK) and Quicksilver Resources (KWKAQ.PK) are viewed by executives and lawyers as a litmus test for deals worth billions of dollars annually for the so-called midstream sector.

Pipeline operators have argued the contracts are secure, but restructuring experts say that if the two producers manage to tear up or renegotiate their deals, others will follow. That could add a new element of risk for already hard-hit investors in midstream companies, which have plowed up to $30 billion a year into infrastructure to serve the U.S. fracking boom.

A judge on New York's influential bankruptcy court said on Feb. 2 she was inclined to allow Houston-based Sabine to end its pipeline contract, which guaranteed it would ship a minimum volume of gas through a system built by a Cheniere Energy (LNG.A) subsidiary until 2024. Sabine's lawyers argued they could save $35 million by ending the Cheniere contract, and then save millions more by building an entirely new system. Fort Worth, Texas-based Quicksilver's request to shed a contract with another midstream operator, Crestwood Equity Partners (CEQP.N), is set for Feb. 26.

Nordheim, like many midstream operators, has long considered its gas gathering and transportation agreements to be nearly bankruptcy-proof. The midstream operator's lawyer compared it to a property deed restriction that forever limited the height of building. Such restrictions are said to "run with the land," and generally cannot be rejected in bankruptcy. Sabine's lawyers seemed to sway the judge when they countered that the contract language never transferred ownership rights, and if it did, it applied to mineral rights, not land rights. Judge Chapman did not say when she would rule but told the hearing she was "inclining" toward ruling in Sabine's favor. She encouraged the parties to reach a deal.

The infrastructure that midstream firms have built remains in high use so far, including the more than 12,000 miles of new pipelines commissioned since 2010. U.S. oil production is expected to fall only modestly, and most analysts expect prices to rebound somewhat in coming years.

"We believe gathering contracts such as ours are not the type of contract that would be rejected," said Alan Armstrong, President and CEO of Williams Companies Inc. But he also said they were following the Sabine case closely.
http://www.reuters.com/article/us-usa-oil-lawsuits-idUSKCN0VV0DK
By Tom Hals (Additional reporting by Joshua Schneyer; Editing by Jonathan Leff) (Reuters) 2/22/16

First U.S. shale gas exports imminent as tanker docks at Sabine Pass
A liquefied natural gas (LNG) tanker on Sunday docked at the Sabine Pass terminal in Louisiana, with only days to go before the United States ships its first export cargo of seaborne gas from the lower 48 states.
U.S. exports will add to a wave of supply coming from Australian projects at a time when demand falters in major consuming countries and prices have plummeted in line with oil.

Expected to become an importer of LNG until just a few years ago, the shale gas revolution in the United States that unlocked cheap, abundant supplies has wreaked havoc on global gas markets as LNG meant for the country was redirected around the world.
http://www.reuters.com/article/us-cheniere-energy-lng-idUSKCN0VV0SK
By Jacob Gronholt-Pedersen (Reuters) 2/22/16

Qatar, Maersk and Shell join forces to develop LNG as marine fuel
Qatar and Royal Dutch Shell have agreed to develop liquefied natural gas (LNG) as a marine fuel for use by the world's largest container shipping company, A.P. Moller-Maersk, Qatargas said in a statement on Monday.

Qatargas, the world's largest LNG producer, said the three companies signed a memorandum of understanding which sees Qatargas 4, a joint venture between Qatar Petroleum and Shell, producing the fuel for use by Maersk Line.
http://af.reuters.com/article/commoditiesNews/idAFL8N1611S1
(Reuters) 2/22/16

DSME Wins Order to Upgrade LNG Carrier to FSU
South Korean shipbuilder Daewoo Shipbuilding & Marine Engineering (DSME), which has the world's best technology to build liquefied natural gas (LNG) carriers, will acquire experience that build all ships related to LNG regasification systems by winning an order for a LNG carrier to be converted into a floating storage unit (FSU).

The company announced on Feb. 17 that it has signed a deal with Canadian shipping company Teekay LNG Partners to upgrade a LNG carrier, which was placed an order in Feb. last year, to a LNG-FSU. The LNG-FSU is an upgraded version of the existing LNG carrier by mounting regasification systems to store and supply LNG to the land.
http://www.hellenicshippingnews.com/dsme-wins-order-to-upgrade-lng-carrier-to-fsu/
(Hellenic Shipping News) 2/19/16

Marcellus, manufacturing conference planned
CHARLESTON — The West Virginia Manufacturers Association will host the second annual Marcellus and Manufacturing Development Conference March 23-24 at the Charleston Civic Center in conjunction with the West Virginia Construction and Design Exposition. The event combines the former WVMA Leadership Summit and Marcellus-to-Manufacturing Conference, according to a news release.

Several seminars are planned on topics including industrial demand, energy and national security, and U.S. Sen. Shelley Moore Capito will serve as the keynote speaker. The conference is free of charge, but registration is required at www.wvexpo.com.
http://www.herald-dispatch.com/business/marcellus-manufacturing-conference-planned/article_9bb1bf84-d787-11e5-8a9d-1f8949dfefe5.html
(Herald Dispatch)

Opportunities to Use Natural Gas and Propane as a Transportation Fuel in Pennsylvania
Thursday, February 25, 2016 - 2:00pm to 4:00pm

Natural gas and propane are increasingly gaining a foothold as alternative fuel sources for Pennsylvania's transportation sector. Across the state, transit agencies and other large fleets are converting from gasoline to natural gas or propane because of cost and environmental benefits. However, use of natural gas or propane is not limited to large fleets. Opportunities exist for small fleets or individual vehicles such as mid-size delivery vans and trucks, taxis, and high-mileage commercial vehicles. Opportunities also exist to become a station owner.
https://www.usea.org/event/opportunities-use-natural-gas-and-propane-transportation-fuel-pennsylvania

4th Annual Energy Invitational
April 11th and 12th at the Nemacolin Woodlands' Mystic Rock Golf Course.
All proceeds from this event will benefit Junior Achievement programs in the Western Pennsylvania and West Virginia areas. Sponsorship packages range from $2,500 to $15,000 and may include:

- A round of golf for a foursome with carts
- Evening reception invitation
- An overnight stay at Nemacolin Woodlands Resort
- Recognition through advertisements and signage on course
- Hole sponsorships

This event will help support Junior Achievement's *JA Careers in Energy* program, which educates students in PA and WV about opportunities in the energy and STEM fields.
https://www.juniorachievement.org/web/ja-westernpa/energy-invitational

New Subscriptions
If you are not currently receiving this newsletter directly, and you would like to be added to the distribution, please send an email to mjc33@psu.edu and enter the words "subscribe SGICC" in the subject line.

About the SGICC
The Ben Franklin Shale Gas Innovation and Commercialization Center (www.sgicc.org) is designed to harness innovation and new technologies to maximize the economic return to Pennsylvania's citizens from the Marcellus and Utica shale formations. The Center's goal is to increase sustainable employment and wealth creation in Pennsylvania that has the potential to outlast the initial exploration, production and transportation of natural gas from the formations. The Center will also identify, support and commercialize technologies and early-stage businesses that enhance responsible stewardship of the environment while properly utilizing this transformative energy asset.

William J. Hall, CPG
Director
Shale Gas Innovation and Commercialization Center
Ben Franklin Technology PArtners
115 Technology Center Building, University Park, PA 16802
Office: 814 863 4881 Cell: 814 933 8203
billhall@rtto.psu.edu

Mike Chmela, Editor
Shale Gas Innovation and Commercialization Center
Ben Franklin Technology PArtners
115 Technology Center Building, University Park, PA 16802
Office: 814.865.6878
mjc33@psu.edu