U.S OIL & GAS SECTOR

SKILLS & MARKET UPDATE

May 2015

PROVIDING PEOPLE POWER

Skills Update - Highlights

- **Hiring Trends - Hiring expected to rebound Spring 2015 onwards - Nearly one in five 'profit-confident' companies still expect to add more staff and 53% will maintain their current headcount in 2015**
- **The skills shortage continues into 2015, particularly in the shale and petrochemical sectors**
- **In-demand skills – technical sales, production operators, maintenance technicians, project managers, QA/QC/inspection, accounting & finance, engineers**
- **Removing the oil export ban could create 394,000 to 859,000 U.S. jobs annually**

Hiring Trends In 2015

Many analysts expect hiring to rebound this spring, with 10% of oil and gas companies in the U.S. overall still expecting to expand recruitment this year. The pace of job cuts also appears to be slowing In March 2015 with 1,279 job cuts announced in March 2015, down 92% from February 2015.

In 2015 those oil and gas companies in the U.S. who remain confident of hitting profit goals next year are looking to forge a different path to their peers. 'Profit-confident' companies are looking to differentiate themselves from their less confident peers not just in terms of their financial expectations, but in terms of their thinking on talent retention and show a greater ability to work beyond the oil-price cycle

Nearly one in five 'profit-confident' companies still expect to add more staff and 53% will maintain their current headcount in 2015

States where hiring numbers are still rising include;

- Pennsylvania - now second in the country behind only Texas in terms of natural gas production. Employment growth in the gas fields has slowed recently, but for now it's still growing, with openings in construction and engineering
- Houston - employment growth will be in construction for the $100 billion investments planned in ethane crackers, chemical plants and LNG terminals announced for the Gulf Coast
- LNG projects on the Gulf Coast are still hiring the talent required to drive towards operational status. LNG, along with the Petrochemicals sector are still showing hiring intentions over the next quarter 2015
- Hiring continues in shale gas projects that were already in the go mode and or had already started, although it has slowed down has slowed some, due to pricing of oil, but it has not stopped

26.2.15 http://analysis.petchem-update.com/workforce-development/training-staff-petrochemical-projects-amid-labor-shortage
8.4.15 http://money.cnn.com/2015/04/07/news/economy/oil-prices-jobs-unemployment/
21.4.15 http://abcnews.go.com/Business/wireStory/unemployment-falls-23-us-states-hiring-slows-30470338
Q2015 North America Oil & Gas Global Jobs Index http://www.hays.com/oil-and-gas/Job-Index/NorthAmerica/index.htm
Jan 2015 https://www.dnvgl.com/oilgas/industry-outlook-report/a-balancing-act.html
13.4.15 http://www.npr.org/2015/04/13/397822444/in-pennsylvania-employment-booms-amid-oil-and-natural-gas-bust

The Skills Shortage In 2015

One third of oil and gas companies in the U.S. in 2015 still cite skills shortages as a barrier to growth. Many specialist technical roles will remain challenging to fill and while short-term skills pressures may have abated for many, the problem will persist in the long term. As large numbers of skilled workers start to retire, this is adding to pressures on business critical skills and knowledge transfer in the years ahead;

"*We're bringing along younger people who see the opportunity, but they're not going to be fit to take on these projects in ten years' time. It's going to take them twenty years to get to that stage, so you're going to have a bit of a shortage in the meantime, the other issue for engineering companies is there are very few long-term employees any more – it's basically an employment-at-will type of arrangement – and that doesn't help with the development of experienced project leaders*." Paul Sullivan, WorleyParsons

- 'Profit-confident 'companies are more aware of the importance of talent management and skills
- **Nearly twice as many 'profit-confident 'companies consider skills shortages and the ageing workforce a key barrier to growth, compared with 'profit pessimist' companies**

Fig.1. Top U.S. Oil And Gas Jobs In Highest Demand (as at February 2015)	
Sales & Marketing, Technical Sales –oilfield services are still hiring salespeople — those most in demand those skilled in new technologies, time and relationship efficient	Project Management Once the market picks back up, companies will look to hire handle some of the delayed projects
Field Techs	QA/QC/Inspection
Production Operators	Accounting & Finance
Maintenance Technicians	Engineers – Electrical, Process, Mechanical (Design)

In the Petrochemicals industry the labour shortage for trades such as welders, pipe fitters, carpenters, scaffold builders, and construction hands is still strong, with 33,000-66,000 pipefittters/fabricators, 16,000 electrical and instrumentation workers and 11,000 welders required for projects in the Gulf Coast

16.3.5 http://www.rigzone.com/news/oil_gas/a/137679/Careers_in_Sales_in_High_Demand_for_N_American_Oil_Gas_Industry_in_Feb/?all=HG2
Jan 2015 https://www.dnvgl.com/oilgas/industry-outlook-report/a-balancing-act.html

26.2.15 http://analysis.petchem-update.com/workforce-development/training-staff-petrochemical-projects-amid-labor-shortage

The Skills Shortage In 2015

Solutions

New technology & 'Millenials'

With the 'great crew change', it is becoming increasingly important for the industry to appeal to the interests and desires of 'millennials' [the tech savvy digital expert generation] to minimize staffing issues resulting from the labour shortage.

The **implementation of new technology is a potential part solution to overcoming this future skills shortage;** *"The opportunity to transfer big amounts of data in a secure and reliable manner will enable a much more free flow of competence. Both data and expertise for decision making will be available anywhere, anytime, and we will spend less time travelling. This will shift the competence needs of the industry and also the cost level in the longer term*,"

Women

The current pipeline of STEM-capable students is inadequate to meet the needs of the industry. One solution would be for oil and gas employers to attract those who traditionally have underrepresentation in STEM fields i.e. women and minorities.

In March 2014 women made up 19% of workers in the oil and gas and petrochemical sectors compared to nearly 50% of the country's workforce overall.

There is a need to expand the partnerships between the industry and academia targeting minorities, such as women, offering valuable job training programs connected to the world of work;

- In North Dakota for example, where demand for workers is outstripping supply, colleges designed to train workers for hydraulic fracturing and drill sites are now setting their sights on recruiting women.
- Regional colleges in boom towns from Pennsylvania to New Mexico have launched one and two year certificates and two-year associate programs to train women, often underwritten by the energy companies that hope to hire them
- BP is aiming for 25% of its group leaders to be women by 2020

1.12.14 http://www.usnews.com/news/special-reports/energy-of-tomorrow/articles/2014/12/01/oil-and-gas-industrys-latest-target-women
HTTP://WWW.THESMARTCUBE.COM/INSIGHTS/BLOG/BLOG-DETAILS/INSIGHTS/2014/09/02/LABOR-SHORTAGE-RATTLING-US-OIL-GAS-INDUSTRYLABOR SHORTAGE RATTLING US OIL & GAS INDUSTRY
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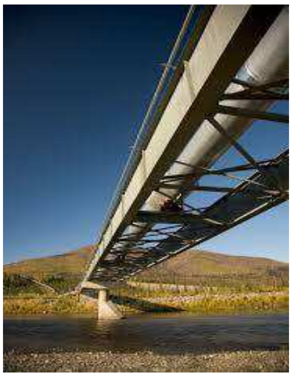
Lifting The Oil Export Ban – Employment Potential



As U.S. energy production has rocketed (see Appendix 1), creating oversupply, there is a growing push from the oil industry to lift the **40-year old ban on exporting oil** [and to remove the 'bureacratic' restrictions on the export of natural gas].

U.S. oil is selling for $10 less than the global benchmark and being stockpiled at historic levels stockpiles (at a 33-year high, according to the EIA). U.S. oil storage capacity is very rapidly approaching full capacity and the industry is running out of U.S. refinery systems to efficiently operate using that light oil which will mean oilfields will have to cut production due to lack of storage facilities and which will then reverberate in job losses.

Those in favour of lifting the ban argue much more effective would be exporting light oil at a premium price into the international market and continuing to import medium and heavy oils which are better designed for the reconfigured U.S. refinery system to run them.

CEOs from ConocoPhillips and 10 other companies have lobbied lawmakers in March 2015 to end the oil export ban claiming it will benefit the entire U.S. economy and some are optimistic about Congress' willingness to lift the ban on oil exports by second-half 2015 or early 2016. Lifting the ban could;

- Lead to more demand from overseas for U.S. oil and gas and bring the U.S. closer to becoming the world's leading energy producer
- **Create 394,000 to 859,000 jobs annually across the U.S. economy during the period 2016-2030 with every new oil production job creating three jobs in the supply chain and another six jobs in the broader economy, not only in the oil-producing states, but across every U.S state**

ig.2. Removal Of Oil Export Ban – Employment (no. new workers)

	2016	2017	2018	2019	2020	2021-30 average	2016-30 average
Scenario 1 - Base Production Case							
US crude oil export supply chain	105,748	250,201	293,140	258,227	212,508	73,384	123,577
US crude oil export total	**358,610**	**811,250**	**963,720**	**863,310**	**699,520**	**221,532**	**394,118**
Scenario 2 - Potential Production Case							
US crude oil export supply chain	149,521	351,675	439,578	414,198	371,202	187,413	240,020
US crude oil export total	**521,500**	**1,206,160**	**1,536,730**	**1,483,210**	**1,320,000**	**681,645**	**858,932**

Notes

- **The Base Production Case** is a conservative view based on known defined oil and gas plays and assumes limited technology improvements over current performance. **The Potential Production Case** includes additional known, but less well defined areas of existing plays and assumes moderate drilling performance and technology improvements in the future
- **The short-term trade impact (2016–20)** reflects a rapid increase in capital spending, while **the long-term trade impact (2021–30)** moderates as the economy adjusts to changes in the trailing level of investment and moves toward a new equilibrium with lower economic impacts

20.4.15 http://www.ft.com/cms/s/0/9bffa672-e79b-11e4-8e3f-00144feab7de.html#axzz3YY4f5gaB /23.1.14 http://www.brookings.edu/research/papers/2014/01/lift-ban-us-oil-exports-boersma-ebinger /10.3.15 https://www.ihs.com/Info/0315/crude-oil-supply-chain.html /10.4.15 http://www.oilandgasinvestor.com/us-gears-greater-role-global-oil-trade-790451 /4 April 2015 http://www.forbes.com/sites/steveforbes/2015/04/01/how-to-reenergize-the-hard-hit-oil-gas-industry/ http://www.reuters.com/article/2015/03/17/us-usa-shale-oil-report-iduskbn0md0bm20150317/ 18.3.15 http://www.cbsnews.com/news/should-the-u-s-oil-export-ban-be-lifted/ http://www.forbes.com/sites/energysource/2015/04/07/give-americas-energy-workers-a-fair-go-lift-the-oil-export-ban/ http://www.reuters.com/article/2015/03/17/us-usa-shale-oil-report-iduskbn0md0bm20150317

TEN LIVE GROUP

Lifting The Oil Export Ban –Supply Chain Employment Potential

Lifting the oil export ban could have a far reaching impact on the supply chain across all states. The economic benefits vary considerably across supply chain industries and by state.

In **states where the crude oil industry predominates**, such as Texas, core supplier industries such as construction and well services are poised to reap the largest economic benefit in terms of jobs and value-added followed by professional services, which play a large role in supporting crude oil activity.

In **non-producing states/ states with low crude oil production**, such as Florida and New York, the benefits are distributed differently across the supply chain industries. Key supplier industries that would benefit include machinery manufacturing in Illinois, information technology in Washington and financial services and insurance in Connecticut

Fig.3. Removal Of Oil Export Ban – Supply Chain Employment (no. new workers) - By Sector

	Industrial Equipment& Machinery	Construction & Well Services	Professional Financial & Other Service	Materials	I.T.	Logistics	Average no. workers annually 2016-2030
Scenario 1 –Base Production Case							
% Of All Supply Chain Jobs	26%	21%	20%	21%	8%	4%	123,577
Scenario 2 - Potential Production Case							
	Industrial Equipment& Machinery	**Construction & Well Services**	**Professional Financial & Other Service**	**Materials**	**I.T.**	**Logistics**	**Average no. workers annually 2016-2030**
% Of All Supply Chain Jobs	28%	19%	20%	21%	8%	4%	240,020

Notes
While the impact of lifting the oil export ban could vary significantly in terms of Supply Chain Employment Potential dependent on production output scenario [see Fig.2], the *distribution* of impacts across sectors is very similar in the Base Production and Potential Production cases, as can be seen above

10.3.15 https://www.ihs.com/Info/0315/crude-oil-supply-chain.html

Removal of Restrictions On Export Of Natural Gas – Export Terminals

The U.S. government has so far been slow to approve new export terminals for LNG. **The US Energy Department has** said four LNG export terminals are under construction and the first wave of LNG export shipments may begin before the end of this year or in early 2016 to India and Japan

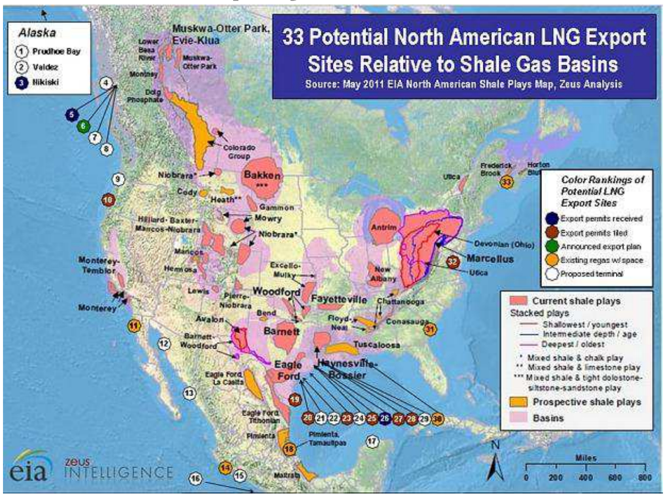
However in April 2015 the natural gas industry's trade group, Natural Gas Alliance (ANGNA), stepped up pressure on the U.S. Government to approve plans for LNG export terminals, arguing there is strong overseas demand for natural gas and the U.S. risks missing an opportunity to dominate the global market unless it acts quickly. It urged the U.S. Government to speed up its approval of applications for LNG export terminals such as Cove Point in Maryland (closest to the Marcellus Shale) which is awaiting final approval by the U.S. Department of Energy.

By 2035 LNG exports could contribute as much as $10 to $31 billion per state to the economies of natural gas-producing states, such as Texas, Louisiana, and Pennsylvania

Non-natural-gas-producing states will also benefit, partly due to the boost in demand for steel, cement, equipment, and other goods. States with a large manufacturing base, such as Ohio, California, New York, and Illinois, will see economic gains as high as $2.6 to $5.0 billion per state.

Removal of Restrictions On Export Of Natural Gas – Employment Potential

- In 2012, unconventional oil and natural gas development supported 2.1 million jobs, and it is **projected to support 3.9 million jobs by 2025**
- Natural gas-producing states could see employment gains as high as 60,000 to 155,000 jobs by 2035
- Large manufacturing states, such as California and Ohio, will see employment gains upwards of 30,000 to 38,000 jobs in 2035
- There could also be significant job growth in states where LNG export terminals could be built. For example, in a high export scenario, in which an Alaska- based terminal is built, Alaska can expect up to a $10 billion addition to state income and over 36,000 added jobs resulting from LNG exports

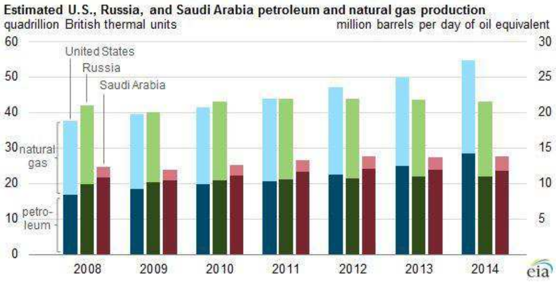


16 April 2015 http://stateimpact.npr.org/pennsylvania/2015/04/
Feb 2015http://www.api.org/~/media/files/policy/lng-exports/lng-primer/liquefied-natural-gas-exports-highres.pdf
9.1.15 http://rt.com/business/221075-usa-launch-gas-export/
27.4.15 http://www.telegraph.co.uk/finance/newsbysector/energy/11563761/US-to-launch-blitz-of-gas-exports-eyes-global-energy-dominance.html

Appendix 1 – Market Update – Oil Production

U.S. Was Top Global Oil and Gas Producer In 2014

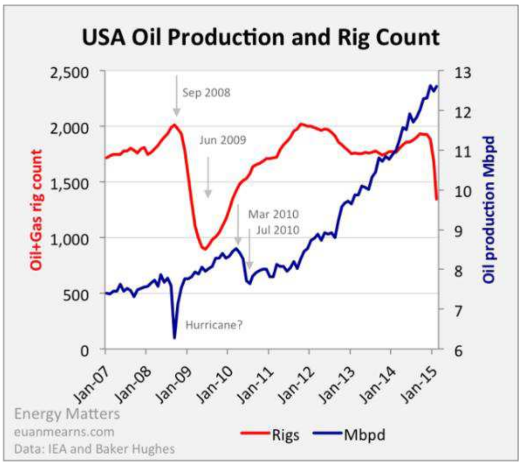
In April 2015 the U.S. EIA (Energy Information Administration) confirmed the U.S. beat Saudi Arabia and Russia to maintain its lead as the world's top producer of petroleum and natural gas in 2014. The U.S. produced nearly twice the petroleum and natural gas hydrocarbons as produced by Saudi Arabia in 2014.



Increase In U.S. Oil Production Forecast 2015 - 2016

While U.S. producers have cut capital expenditures, resulting in a reduction in oil rig count (825 in March 20 2015 vs 1,473 in 2014, **production hasn't slowed from existing wells.**

2014 was a record year for U.S. Oil Production, the largest Increase in over 100 Years. U.S. crude oil production increased by 1.2m barrels per day to 8.7m barrels per day in 2014, the largest increase since recordkeeping began in 1900. Oil production increased by 16.2% in 2014, the highest annual growth rate since 1940. **The EIA expects U.S. oil production to increase to 9.3m barrels per day in 2015 and 9.5m barrels per day in 2016**, close to the 9.6mbarrels per day highest annual average level of U.S. production in 1970.

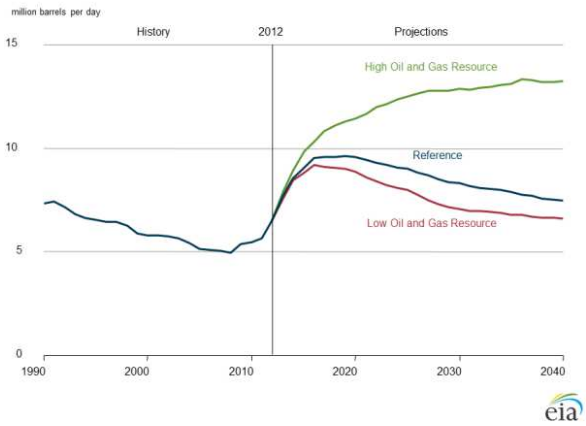


U.S. Oil Production Forecast To 2040

Future crude oil production rates depend on resource availability and production costs, however **the EIA forecasts a peak in production around 2020, after which production is still expected to plateau for several decades.**

Projections of U.S. tight oil production are uncertain, because large portions of the known formations have little or no production history and because technology improvements could increase well productivity while reducing drilling, completion, and production costs. The High and Low Oil and Gas Resource cases illustrate the potential impacts of changes in the Reference case assumptions regarding technology advances and the resource size and quality.

Figure MT-52. Total U.S. crude oil production in three cases, 1990-2040

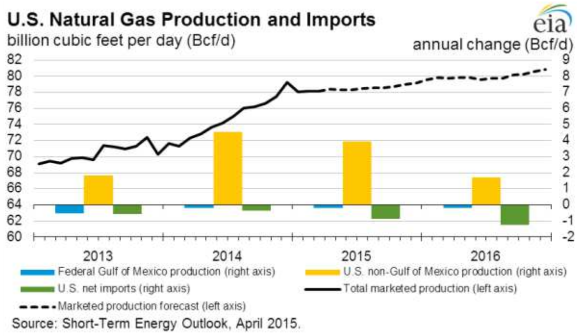


http://www.forbes.com/sites/steveforbes/2015/04/01/how-to-reenergize-the-hard-hit-oil-gas-industry/
8 April 2015 http://watchdog.org/210809/oil-gas-boom
EIA Drilling Productivity Report 13.4.15 http://www.eia.gov/petroleum/drilling/#tabs-summary-2
http://www.eia.gov/forecasts/steo/report/us_oil.cfm
3 4.15 http://breakingenergy.com/2015/04/03/oil-industry-shakes-off-bane-of-gluttony-by-end-of-2015/
https://www.businessspectator.com.au/article/2015/4/9/energy-markets/us-remains-largest-producer-oil-and-gas
http://instituteforenergyresearch.org/analysis/2014-record-year-for-u-s-oil-production-largest-increase-in-over-100-years/
http://instituteforenergyresearch.org/analysis/2014-record-year-for-u-s-oil-production-largest-increase-in-over-100-years/
http://www.eia.gov/forecasts/aeo/mt_liquidfuels.cfm

Increase In U.S. Natural Gas Production 2015-2016

The EIA expects that natural gas production will increase by 5% in 2015 and 1.9% in 2016, reflecting continuing production growth in the Lower 48 states, which more than offsets the long-term declining production in the Gulf of Mexico.

Although natural gas prices have fallen in recent months in 2015, the EIA expects that increases in drilling efficiency and growth in oil production (albeit at a slower rate) will continue to support growing natural gas production in the forecast.

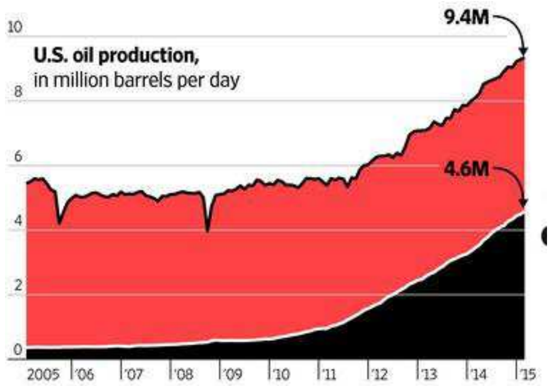


With most growth expected to come from the Marcellus Shale, a backlog of drilled but uncompleted wells will continue to support production growth, as new pipelines come online in the Northeast.

U.S. Shale Production

U.S. Shale Oil Production 2015

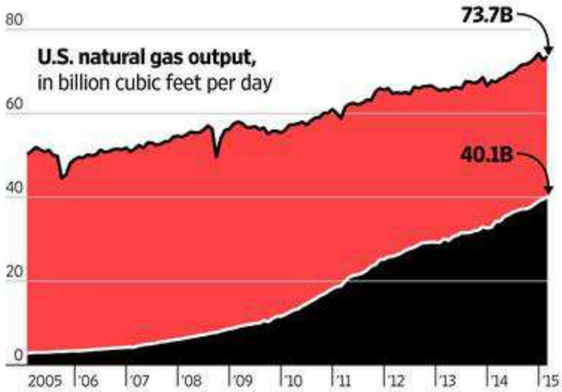
Shale oil production accounted for 49% of total oil production in February 2015. The percentage of fuel flowing from shale-rock compared with traditional oil and gas fields has been steadily rising, but with drilling companies under increasing financial pressure, lacklustre global energy demand driving down prices a slowdown later this year as companies scale back drilling. While specific shale regions, such as North Dakota's Bakken and Texas' Eagle Ford have posted production declines, overall U.S. oil output managed to edge up in recent months.



However, although rig count is down in 2015, production hasn't slowed from existing wells and the output from the five states of North Dakota, Oklahoma, New Mexico, Texas and Louisiana is still forecast to be higher in 2015 than total output from countries such as Kuwait and Venezuela

U.S. Shale Natural Gas Production 2015

Shale gas production has also been steadily rising and accounted for 54% of total natural gas production in February 2015.



8 April 2015 http://watchdog.org/210809/oil-gas-boom
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http://www.eia.gov/forecasts/steo/report/natgas.cfm
6 April 2015 http://www.usatoday.com/story/money/markets/2015/04/06/oil-price-determinants/25357815/
http://blogs.wsj.com/corporate-intelligence/2015/04/01/how-much-u-s-oil-and-gas-comes-from-fracking/

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