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ENERGY INVESTMENT BANKING

MUSINGS FROM THE OIL PATCH

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Note*: Musings from the Oil Patch reflects an eclectic collection of stories and analyses dealing with issues and developments within the energy industry that I feel have potentially significant implications for executives operating and planning for the future. The newsletter is published every two weeks, but periodically events and travel may alter that schedule. As always, I welcome your comments and observations.* Allen Brooks

Keystone XL: Did He Or Didn't He? Will He Or Won't He?

To the cynical observer, this charm offensive may be little more than posturing

President Barack Obama has been engaged in a "charm" offensive with the Republican members of the House and Senate during the past week. His intent is to convince them that he is willing to work with them to achieve a "grand bargain" of a financial deal that resolves the nation's spending and debt issues. To the cynical observer, this charm offensive may be little more than posturing to make sure that he is able to paint the Republicans as obstructionists who prevented reaching a deal and forced the President to take draconian actions on his own.

One topic that received considerable attention was the upcoming decision on the permit application for the Keystone XL Pipeline

In his public relations effort, President Obama held separate meetings with Republican House members and Senators. According to media accounts of these meetings, one topic that received considerable attention was the upcoming decision on the permit application for the Keystone XL Pipeline, a project the President rejected a little over a year ago due to concern that a legislatively-dictated timetable (pressure) for him and the State Department to decide did not allow sufficient time to examine all the data and issues.

"My guess is that he will approve it, at least to some extent" What?

Based on the media accounts following the President's meeting with House Republicans last Wednesday, one would think he was leaning in favor of approving the permit and that he would be announcing his decision within weeks. "[He] said that there was going to be a decision made soon, I think he said a couple of weeks," said Rep. Andy Harris (R-Md.). On the other hand, Rep. Lee Terry (R-Neb.) said, "He talked out of both sides of his mouth and gave us no indication of anything." Rep. John Duncan (R-Tenn.) was quoted saying, "My guess is that he will approve it, at least to some extent. That is the impression that I got, but he did not say one way or the other, specifically."

Nancy Pelosi said, "The oil is for export and the jobs are nowhere near that"

All the congressmen commented that the President made the point that the pipeline would not create nearly as many jobs as touted, but the State Department report also pointed out that the pipeline would create much less environmental harm than the environmentalists claim. The lower than expected job creation was a point House Minority Leader Nancy Pelosi (D-Calif.) seized on the next day following the reports that President Obama would be making a decision soon about the pipeline. She also questioned whether the Keystone pipeline would make the country more energy independent. As she said, "The oil is for export and the jobs are nowhere near that." A reporter the interview commented that Ms. Pelosi stopped short of opposing the pipeline outright, saying, "I want to see what the report is from the State Department." The reporter wrote that Ms. Pelosi "hinted that it would do more harm than good." She also said that Canadian politicians she met with recently said they don't want the pipeline going through their country, either.

On Thursday, President Obama met with Senate Republicans. Sen. John Barrasso (R-Wyo.), a proponent for building the pipeline said, "He said it would be a matter of months, not years." Sen. Barrasso noted that President Obama referenced the ongoing review process (45 days for public comment) and some unspecified period for review and consultation with other government agencies. Sen. Barrasso stated that "He said 'You will have an answer by the end of the year.'" The President reiterated the points he had made the day before about the lack of job creation and environmental concerns.

The President pointed out that there is an established legal process for the State Department to complete an environmental impact statement and then to determine whether the pipeline is in the national interest

On Friday, both chambers introduced bipartisan legislation that would approve the Keystone pipeline and remove the decision from the President and State Department. The sponsors claim to have solid support that they expect will grow in order to pass the bills by Memorial Day, possibly three months ahead of a suggested presidential decision time of August. The issue of the approval process for the construction permit was discussed by the President with the congressmen. The President pointed out that there is an established legal process for the State Department to complete an environmental impact statement (EIS) and then to determine whether the pipeline is in the national interest. He will either accept or reject the State Department's recommendation. The President suggested that Congress should allow all the i's to be dotted and t's to be crossed in the review before acting.

In the various media reports of the congressional meetings that we read, we found nuggets from both the House and Senate meetings. Rep. Steve King (R-Iowa) said, "He implied that there might be a resolution in the coming weeks and that we would not be entirely satisfied with the resolution, but it didn't sound either like the environmentalists' interests would be completely satisfied either." The second nugget was from Sen. John Hoeven (R-N.D.) who said, "He also said something as we were talking about energy that I

thought was important, and that is…he said he supports hydraulic fracturing."

The one overarching goal of his presidency, set out in his 2008 acceptance speech of the Democratic presidential nomination, was to impact climate change

In the context of those two comments, we found an article in the *National Post* by Lawrence Solomon, executive director of Toronto-based Energy Probe, an environmental research foundation, quite interesting. In the article, Mr. Solomon argues that because President Obama is now concerned with his legacy, the one overarching goal of his presidency, set out in his 2008 acceptance speech of the Democratic presidential nomination, was to impact climate change. He has yet to do anything in this realm, having failed miserably at the UN-sponsored climate talks in Copenhagen in 2009. This is one area where he could secure his reputation as a transformative figure both here and around the world (enough to get a second Nobel Peace Prize?).

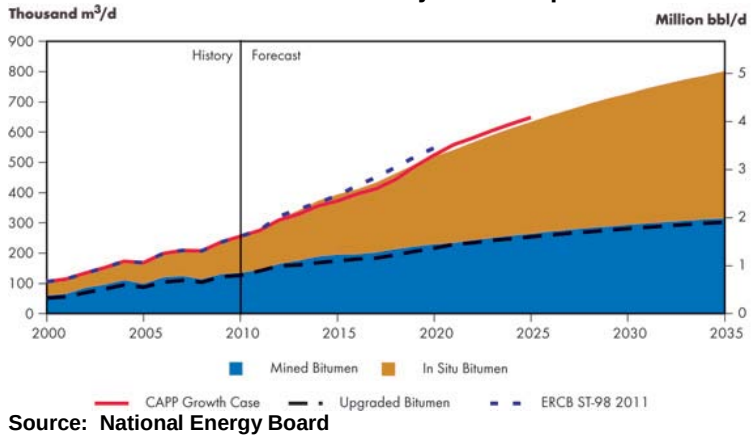
Yes, President Obama owes his union supporters who favor the pipeline, but they already got the jobs from constructing the southern leg of the project

Mr. Solomon's view is supported by a point made by the State Department's EIS. It said the nation can achieve its goal of increased energy self-sufficiency without the pipeline given the growth in domestic production due to the shale revolution and the decline in gasoline consumption. Since the Obama Administration can claim it has set gasoline consumption on a permanent downward trend with the 54.5-miles-per-gallon fuel efficiency standard for vehicles, the President only needs to sustain the current oil and gas output rise. Given all the academic and industry research studies on the job contribution impact of growing oil and gas production, supporting more domestic drilling becomes a more powerful argument against the limited number of jobs Keystone would create as outlined in the EIS. Yes, President Obama owes his union supporters who favor the pipeline, but they already got the jobs from constructing the southern leg of the project. From a legacy viewpoint, the President may not want to be seen sponsoring old, fossil fuel technology (pipelines) when he really wants us to be using renewables – another reason to reject the pipeline.

Certainly supporting more fracking would be a disappointment for the environmentalists, but they, and Hollywood, would rejoice in the rejection of the Keystone pipeline

Mr. Solomon also questions why the President would want to be seen supporting the economic health of the Canadian oil industry over that of the U.S. Given his comment about support for fracking, one wonders whether President Obama is going to push for more natural gas with tighter regulation over fracking as the alternative to approving the Keystone pipeline. Certainly supporting more fracking would be a disappointment for the environmentalists, but they, and Hollywood, would rejoice in the rejection of the Keystone pipeline. The promise of tighter regulation of fracking would be a sop to the environmentalists, but it would provide the opportunity for continued regulatory and legal challenges that could impact drilling. It remains a mystery to us why this scenario hasn't received more attention, as we heard a Democratic strategist essentially lay out this same argument several weeks ago.

Exhibit 1. Canada Oil Sands Projected Output Growth



Source: National Energy Board

TransCanada said if Keystone is approved before mid-year, a late 2014 start-up for the line is possible makes us wonder just how long the company can wait before acting on its backup plan

We know TransCanada Corp. (TRP-NYSE) has its Plan B in the works, but a comment from Alex Pourbaix, president of energy and oil pipelines at the company, last week that if Keystone is approved before mid-year, a late 2014 start-up for the line is possible makes us wonder just how long the company can wait before acting on its backup plan. Projections for oil sands future output are based on existing production and the startup dates for other projects under construction. Given the uncertainty of getting future oil sands output to market and the impact of possible climate change legislation on bitumen demand, some operators have postponed new projects. Expansion of existing pipelines from the Western Canadian Sedimentary Basin (WCSB) and planned additions to railway capacity could force TransCanada to have to move on Plan B before President Obama makes his decision. We were intrigued by the President's comment that there would be a decision before the end of 2013. The next several months will provide as much political drama about the Keystone pipeline as most of us can stand.

Natural Gas: The Debate Over Whether To Export LNG

The idea of having a debate over exporting LNG was "pooh-poohed" as premature since the full extent of the American gas shale revolution was unknown

For most people, the issue over whether to export natural gas or not is an exercise in classical economics (free trade) versus industrial policy (government picking winners). Starting several years ago, when Cheniere Energy (LNG-NYSE) proposed building a natural gas liquefaction plant at its liquefied natural gas (LNG) receiving terminal in Sabine Pass in order to export it to world markets, the issue of whether the country could afford to export became a topic of debate within the overarching question of the future role of gas in our nation's energy supply mix. Initially, the idea of having a debate over exporting LNG was "pooh-poohed" as premature since the full extent of the American gas shale revolution was unknown.

Growing domestic gas production emerged during the worst economic downturn and slowest recovery on record for the nation,

limiting energy demand growth and severely depressing natural gas prices. Cheniere's management took the view that the shale gas output, coupled with increasing estimates for shale gas resources in the United States, assured there would be sufficient gas volumes available for export – the key was to find customers to agree to take the gas volumes in a long-term arrangement. As international LNG buyers began discussing contracts, Cheniere's management developed the confidence to move forward with their plant approval application.

Cheniere commissioned a study to show that the impact of exporting LNG would not materially boost natural gas prices in the U.S.

As a part of its application, Cheniere commissioned a study to show that the impact of exporting LNG would not materially boost natural gas prices in the U.S., an issue of prime importance for industrial gas users who were benefitting from cheap gas prices. The study, prepared by Navigant Consulting, Inc., and based on an earlier forecast prepared by the Energy Information Administration (EIA), showed that by exporting 1 billion cubic feet per day (Bcf/d) of LNG starting in 2015, the projected real price of natural gas would only increase by $0.20 per thousand cubic feet (Mcf), or 6.1% of the projected real gas price in 2009 dollars. By 2035, the export volume would only boost the real gas price by $0.23/Mcf, or 3.3%. If LNG export volumes were doubled to 2 Bcf/d, then the price impact would be greater - $0.35/Mcf in 2015 and $0.49/Mcf in 2035. The study's concluded that Cheniere LNG export volumes would have a minimal impact on natural gas prices.

Exhibit 2. LNG Exports Will Not Boost Gas Prices Much

Year	Metric	GHG As-Is Base	GHG As-Is *Moderate*	GHG As-Is *High*	GHG Plus Base	GHG Plus *High*
2015	*Price (MMBtu)*	$3.29	$3.49	$3.64	$4.50	$5.02
	Diff. from Base		$0.20	$0.35		$0.52
	% Increase		6.1%	10.6%		4.0%
2035	*Price (MMBtu)*	$6.97	$7.20	$7.46	$11.43	$12.33
	Diff. from Base		$$0.23	$0.49		$0.90
	% Increase		3.3%	7.0%		7.9%

Source: Cheniere Energy

American petrochemical companies perceived the domestic energy market undergoing a sea-change that offered them the prospect of abundant long-term gas supplies at low cost

The minimal impact on national gas prices from modest LNG export volumes seemed to be a catalyst for others to move forward with LNG export terminal applications. As natural gas prices dropped to multi-year lows, gas consumption climbed, primarily in the electric generation market where cheap and environmentally-friendly natural gas took share away from dirty coal. American petrochemical companies perceived the domestic energy market undergoing a sea-change that offered them the prospect of abundant long-term gas supplies at low cost. This belief convinced them to consider building new, or expand existing, plants with natural gas as the feedstock. A wave of petrochemical investment announcements based on the American energy industry revival swept over the country. This strategy shift is akin to one that occurred in the late 1970s and early

1980s when the American petrochemical industry abandoned the U.S. for Middle Eastern natural gas supplies that were plentiful and virtually free.

As industrial America embraced cheap, plentiful gas, producers saw LNG exports as the key to higher domestic gas prices. While natural gas has historically been a regional market due to the high cost of transportation, the growth in gas consumption in Western Europe and Asia, partly due to environmental concerns and also the Japanese nuclear plant disaster, drove demand up and opened the door to an expanding global LNG business. Internationally, LNG has been priced off a formula linked to the price of crude oil. As world oil prices soared above $100 per barrel range, LNG contracted prices in Europe and Asia were multiples of domestic gas prices. Even with the high cost of LNG transportation, producers saw the prospect of doubling or tripling the wellhead price they were receiving in the U.S. if they could ship gas overseas. Even with higher prices, producers could deliver LNG significantly cheaper to foreign markets.

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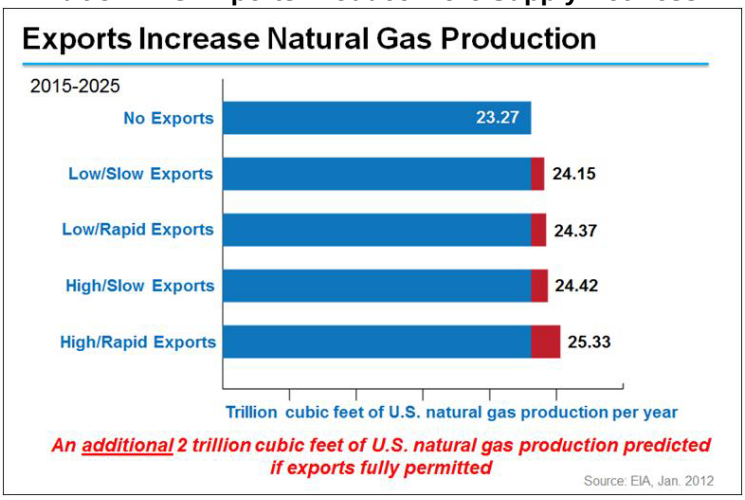
The question of allowing exports of LNG became a political issue during the last presidential election campaign. While a much more complicated topic, the debate degenerated into a battle over who should benefit from LNG exports: greedy oil and gas companies (who were already making record profits) or the American economy (lower consumer prices and more jobs). To try to reach an answer about the impact of exports, the EIA produced a study early last year that addressed four scenarios for natural gas exports to reflect their impact on the agency's base case forecast for natural gas production and prices. Later in 2012, the Department of Energy (DOE) commissioned a report by NERA Economic Consultants on the impact LNG exports might have on the American economy.

While a much more complicated topic, the debate degenerated into a battle over who should benefit from LNG exports: greedy oil and gas companies (who were already making record profits) or the American economy (lower consumer prices and more jobs)

Exhibit 3. LNG Exports Produce More Supply Not Less



Source: EIA

The bottom line of both studies was that LNG exports would benefit the country. The EIA study showed that under various scenarios for export volumes and timing, it is likely that domestic natural gas production will actually increase above what it would otherwise be absent exports. This would act to hold gas prices down. Likewise, the DOE study showed that under all trading scenarios, the economic benefits for the country from LNG exports are significant and exceed any localized impacts. But a coalition of industrial gas users, America's Energy Advantage, continues to argue that the nation needs a more fulsome examination of the benefits and challenges for the economy from exporting LNG. A recent Op-ed in *The Wall Street Journal* by Dow Chemical Company (DOW-NYSE) chairman and CEO Andrew Liveris framed the debate over LNG exports as the need for an examination of "what is in the nation's best interest." To Mr. Liveris, the issue is how best for America to capitalize on what he sees as "a historic opportunity to strengthen the economy, increase national competitiveness and create jobs." He worries that decisions to approve exports of significant volumes of LNG could undercut the benefits households are receiving from low gas prices and it could limit the "re-shoring" of industrial jobs due to increased investment by industrial companies. He points to an American Chemistry Council report showing that domestic industrial jobs are eight times more beneficial to the economy than the gains from simply exporting gas.

The DOE study showed that under all trading scenarios, the economic benefits for the country from LNG exports are significant and exceed any localized impacts

On March 11th, a group of environmentalists weighed in on the LNG export issue in a letter to President Barack Obama calling for "The Need for Careful Study and Sound Strategies on Liquefied Natural Gas Export." The group, led by the Sierra Club, The Wilderness Society and Friends of the Earth, points to the climate change impact of more gas exports. The group wrote, "The huge volumes of proposed LNG exports would not only raise domestic energy prices and disproportionately harm the middle class and US manufacturing, but would also require a significant expansion of unconventional gas production using hydraulic fracturing. This drilling expansion would cause a substantial increase in emissions of methane, which is a powerful climate disrupting pollutant."

The group wrote, "The huge volumes of proposed LNG exports would not only raise domestic energy prices and disproportionately harm the middle class and US manufacturing, but would also require a significant expansion of unconventional gas production using hydraulic fracturing"

The environmental groups argue that three steps should be taken before deciding to allow increased LNG exports. First, they want to see the DOE report redone, which they called a "flawed economic study" since it was based on 2010 data and ignored what has transpired since then. Second, they believe the federal government should develop a full environmental impact statement for LNG exports, including the impact of the unconventional gas production necessary. Lastly, they would like to see greater protection of the nation's natural gas resources by amending the current law allowing unfettered LNG exports to our trade partners even if those exports would harm the public health and the domestic economy.

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But even the optimistic Texas Bureau of Economic Geology's study on the potential productive life of the Barnett Shale formation contains data that raises questions about the long-term viability of the field's output

The letter from the environmentalists summed up their concerns this way: "We owe ourselves an open and informed national conversation to test whether they [LNG exports] are actually in the public interest." This is a debate that Mr. Liveris desires, also. Natural gas producers see the prospect of increased profitability if they can export LNG, and they rely on the growing estimates of unconventional natural gas resources in the country for their confidence in the long-term supply outlook. But even the optimistic Texas Bureau of Economic Geology's study on the potential productive life of the Barnett Shale formation contains data that raises questions about the long-term viability of the field's output. Instead of accepting the "100 years of gas supply" mantra of producers, we need well data in order to ascertain whether the American shale revolution will prove to be the economic success assumed by its participants. (Notice, we did not say the technological success, as the capability of extracting the gas trapped in shale formations is well developed and inherently safe.)

Let's take our time and get it right this time!

An unfettered natural gas market is what we desire. Let the marketplace make the ultimate decision. The history of regulation of the natural gas industry since the famous Phillips case in 1954 that brought federal controls to the price of natural gas sold in interstate commerce has been fraught with zigs when it should have zagged. From surpluses to shortages and back to surpluses marks the history of the gas business over the past 60 years. Let's take our time and get it right this time!

California: Can Green Jobs Create Land Of Milk And Honey?

For decades, California has been the laboratory for leading social and economic trends in the United States. We fondly remember our 1960s East Coast university fraternity brothers venturing to California over the summer holiday and returning to campus to teach us the latest dance craze - the Monkey. From surfing and drugs to Silicon Valley and hippies, California started many of the trends that eventually swept America.

The problem is that this agenda could actually destroy the state's economy if other states and the federal government fail to adopt similar environmental and social mandates

California Governor Jerry Brown (Dem.), elected to office in 2011, some 36 years after he was first elected governor of the state, is pushing an aggressive social and economic agenda he believes will lead to the state's economic revival. The problem is that this agenda could actually destroy the state's economy if other states and the federal government fail to adopt similar environmental and social mandates. It was this agenda that Gov. Brown carried with him to Washington, D.C., a few weeks ago when he attended the nation's governors' annual convention. Gov. Brown pitched his agenda as the way other states should go. Key parts of the California agenda include a significant increase in the state's requirement for power generation from renewable energy sources, the embrace of a cap-and-trade energy policy, and higher taxes on citizens and businesses. Interestingly, this agenda prompted Texas Governor

Rick Perry (Rep.) to pay a visit to the state to lobby business leaders about the attractive benefits of relocating to Texas, a trend well underway.

A report from Environmental Entrepreneurs showed that for 2012, the nation's economy created 110,000 green jobs with California in first place with over 26,000 new positions

A recent series of articles and reports about the California economy brought home the risks to the policies Gov. Brown is pushing on the state's economy and populace. A report from Environmental Entrepreneurs showed that for 2012, the nation's economy created 110,000 green jobs with California in first place with over 26,000 new positions. The green jobs created range from solar and wind power installers to workers building large mass transit projects. The report discussed the positive impact on green job generation that will continue given the state's adoption of an increase in its requirement that one-third of all electricity be generated from renewable sources by 2020. That is up from the prior standard of 20% of power from renewables.

Exhibit 4. 2012 Green Job Additions In Top States

2012 JOB ANNOUNCEMENTS						
RANK*	STATE	PROJECTS ANNOUNCED	PROJECTS IN OPERATION**	PROJECTS IN PROGRESS**	PROJECTS ANNOUNCED**	TOTAL
1	California	38	1,640	21,126	3,588	26,354
2	North Carolina	19	445	2,121	8,301	10,867
3	Florida	11	539	250	7,870	8,659
4	Illinois	16	1,374	614	4,630	6,618
5	Connecticut	4	-	50	4,908	4,958
6	Arizona	14	620	1,950	1,512	4,082
7	New York	15	61	700	3,032	3,793
8	Michigan	19	472	980	2,262	3,714
9	Texas	13	1,127	640	1,700	3,467
10	Oregon	13	445	702	1,757	2,904

* States have been ranked by the total number of jobs announced in media reports over the past year.
** "In Operation" denotes that an energy project has gone live or a manufacturing facility is on line; "In Progress" is used for any project in construction or any program that has been initiated; and "Announced" captures those projects in earlier stages of development.

Source: Environmental Entrepreneur

The adoption of a cap-and-trade energy policy that places a cost on carbon fuel content is also expected to impact green job creation. And can anyone ignore the green job creation impact from the high-speed rail project California has agreed to with the help of federal dollars provided by the Obama Administration?

The second point was that in the fourth quarter of 2012, California fell to tenth place in the state rankings for green job creation with only 390 new positions

There were two interesting points in the Environmental Entrepreneurs' report. First, about 40% of the green jobs created in 2012 were associated with mass transit jobs. In this case, it was 43,000 jobs of the 110,000 total. The second point was that in the fourth quarter of 2012, California fell to tenth place in the state rankings for green job creation with only 390 new positions. This latter point we find very interesting as the results come during the election campaign in which the costs of Gov. Brown's economic and social program were highlighted. Given the retroactive tax hike on wealthy Californians and voters' realization of the cost of the state's agreement to fund its share of the high-speed rail line construction, we think the low number of new green jobs created was a direct reflection of a less than enthusiastic embrace of the program. It reflected the impact this agenda is having on the state's cost of living.

Exhibit 5. 2012 Fourth Quarter Green Jobs Added

FOURTH QUARTER JOB ANNOUNCEMENTS 2012						
RANK*	STATE	PROJECTS ANNOUNCED	PROJECTS IN OPERATION**	PROJECTS IN PROGRESS**	PROJECTS ANNOUNCED**	TOTAL
1	North Carolina	5	225	135	7,250	7,610
2	Arizona	3	300	-	756	1,056
3	Illinois	4	700	-	350	1,050
4	Nevada	2	-	630	420	1,050
5	Texas	2	-	-	900	900
6	Michigan	3	100	500	250	850
7	New York	2	-	-	550	550
8	Florida	3	464	-	-	464
9	New Mexico	1	-	-	450	450
10	California	2	360	-	30	390

* States have been ranked by the total number of jobs announced in media reports over the past 3 months.
** "In Operation" denotes that an energy project has gone live or a manufacturing facility is on line; "In Progress" is used for any project in construction or any program that has been initiated; and "Announced" captures those projects in earlier stages of development.

Source: Environmental Entrepreneur

This cost differential is a direct result of fuel requirements needed to meet the state's environmental standards and the implementation of the cap-and-trade program

California already has the highest gasoline price, which in late February stood at a 40-cent premium over the national average - $4.15 per gallon for regular unleaded fuel versus the national average of $3.74. This cost differential is a direct result of fuel requirements needed to meet the state's environmental standards and the implementation of the cap-and-trade program. California has 14 operating refineries in the state, down from 27 in 1980. How many more will fall victim to the increased fuel mandates and higher oil costs?

The Wall Street Journal recently reported that by 2015, the state will begin to experience rolling blackouts due to the loss of conventional power plants and the introduction of more solar and wind generation into the overall supply with their inherent power variability

For citizens and businesses, California has the highest in the nation electricity costs, some 39% above the national average. Those costs will only go higher as the state's utilities work to meet the higher renewable fuels mandate and comply with cap-and-trade. In the last few years, virtually every new power deal involving renewable fuels has been signed at a higher than current average electricity cost. *The Wall Street Journal* recently reported that by 2015, the state will begin to experience rolling blackouts due to the loss of conventional power plants and the introduction of more solar and wind generation into the overall supply with their inherent power variability. High power costs and blackouts are not positive inducements for attracting new industry and citizens.

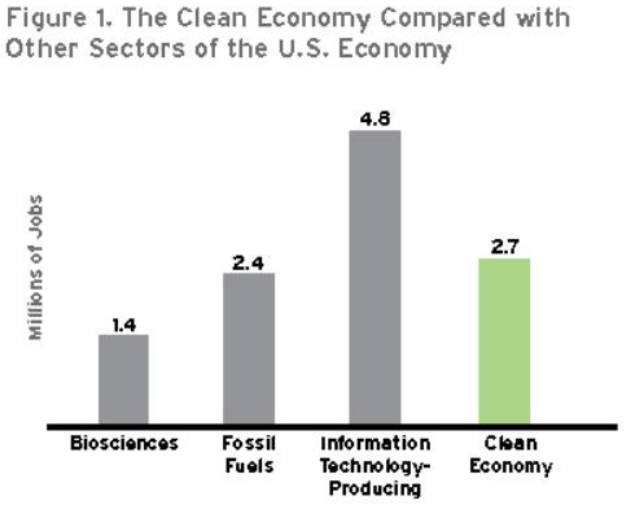
"The emphasis has been on employment related to renewable energy sources, energy efficiency, battery-powered or other alternatively fueled vehicles, and public transportation"

Despite these business and economic conditions, California is trumpeting the positive impact of these policies on green job creation. Relying on the Environmental Entrepreneurs' count of green jobs is defaulting to the Obama Administration's method for counting green jobs. A June 2012 report prepared by the majority staff of the Committee on Energy and Commerce in the U.S. Congress titled Not Very Green, Not Many Jobs: An Assessment of the Obama Administration's Green Jobs Agenda highlighted the challenge of determining and then counting green jobs. The report stated: "The Administration has expressed clear preferences. The emphasis has been on employment related to renewable energy sources, energy efficiency, battery-powered or other alternatively fueled vehicles, and public transportation. Reducing greenhouse gas emissions from fossil fuels is a recurrent theme throughout."

The Administration's method for determining green jobs is quite different from that of the government's own official jobs counter

The Administration's method for determining green jobs is quite different from that of the government's own official jobs counter – the Department of Labor's Bureau of Labor Statistics. Their definition of green jobs is "jobs in businesses that produce goods or provide services that benefit the environment or conserve natural resources," or "jobs in which workers' duties involve making their establishment's production processes more environmentally friendly or use fewer natural resources." These definitions are clearly more restrictive, but certainly lead to an easier-to-determine classification of jobs.

Exhibit 6. More Clean Energy Jobs Than Energy



Source: Brookings Institute

In 2011, the Brookings Institute unveiled a major study on green jobs in which it claimed the nation had 2.7 million green jobs in 2010

In 2011, the Brookings Institute unveiled a major study on green jobs in which it claimed the nation had 2.7 million green jobs in 2010. This was more jobs than in the fossil fuels industry and the figures were used routinely to tout the benefit of, and need for, the renewable fuels tax subsidies. Brookings in its report acknowledged the challenge of assessing green jobs. They stated: "Not only do 'green' or 'clean' activities and jobs related to environmental aims pervade all sectors of the U.S. economy; they also remain tricky to define and isolate—and count." In their 2.7 million job count, they included 350,000 jobs related to mass transit, 386,000 waste management and treatment jobs, 129,000 jobs associated with waste recycling and 142,000 regulatory and compliance jobs. These four categories account for 40% of the green jobs Brookings counted. When the study's details were analyzed, there were questions raised as to whether bus drivers, garbage collectors and

government bureaucrats could legitimately be considered "green" jobs. Counting them for political purposes was needed since the linchpin policy action of the Obama Administration in its first year was the passage of the American Recovery and Reinvestment Act of 2009, aka the stimulus bill, which dedicated $90 billion to various green jobs programs including loan guarantees and outright grants.

After one-third of the money had been spent, a total of 8,035 trained workers had secured full-time employment in these trades

One of the green jobs programs was sponsored by the Department of Labor and committed to spend $500 million (notice we didn't use the word invest) to train workers for green jobs such as installing solar panels and insulating homes and buildings. After one-third of the money had been spent, a total of 8,035 trained workers had secured full-time employment in these trades. However, only 1,336 of them were still employed six months later.

Instead of the 26,000 green jobs Environmental Entrepreneurs claims were created in the state in 2012, the Bureau of Labor Statistics says that since June 2009, there have been only 2,600 green jobs added

As for California's track record in creating green jobs, it appears much like the Brookings study suggests – the jobs are tricky to define. Instead of the 26,000 green jobs Environmental Entrepreneurs claims were created in the state in 2012, the Bureau of Labor Statistics says that since June 2009, there have been only 2,600 green jobs added. This compares with the state having created 556,000 total jobs during the period. It seems clear that over the next several years we will learn whether the California experiment of higher renewable fuel mandates and a cap-and-trade program, coupled with higher income taxes and more government spending will produce a vibrant economy. If not, it may take decades for California to recover, much like Detroit.

Get Your Mice Ready – Electric Vehicles Are Not Cutting It

As one auto newswriter put it, that's not such a big deal since Tesla Motor's Model S, with its largest battery pack, already can achieve 300 miles on a charge

At the recent IHS CERAWeek in Houston, General Motors (GM-NYSE) CEO Dan Akerson made a presentation in which he discussed the automaker's efforts to extend the range of electric vehicles (EV) to 100 to 200 miles on a single charge. "There will be breakthroughs in battery technology, they're on the horizon," Mr. Akerson said. "We're actually developing a car today which is really anathema to the way the auto industry works: We're running a dual play on the technology to see which one will succeed. One will result in" a 100-mile range, "the other will be a 200-mile range." As one auto newswriter put it, that's not such a big deal since Tesla Motor's Model S (TSLA-Nasdaq), with its largest battery pack, already can achieve 300 miles on a charge. The performance of the Tesla has been demonstrated despite a negative review of the automobile by a *New York Times* writer, which has been discredited by uncovering some of his deceptive actions during the test drive. The critical part of Mr. Adkerson's comments was implied – his super-performing EV would be cost competitive rather than costing in excess of $100,000, the sticker price for the Tesla model.

Exhibit 7. 2014 Cadillac Electric Vehicle Schematic

Source: GM

Mr. Adkerson reiterated GM's claim that it will have 500,000 vehicles on the road by 2017 with some form of electrification

In his presentation, Mr. Adkerson reiterated GM's claim that it will have 500,000 vehicles on the road by 2017 with some form of electrification including the plug-in electric Chevy Volt, which has a 38-mile range on a single charge. This year, GM will introduce 20 new models in the U.S. in an attempt to regain market share the company has been losing, having fallen to an 88-year low. The company's first all-electric vehicle will be a version of the Chevy Spark, a subcompact that will go 75-80 miles on a single charge. GM will also introduce a diesel version of its popular Chevy Cruze as another effort to boost average fleet fuel-economy and lower overall emissions.

The fuel consumption of the XL1 undercuts that of the 3-cyclinder Up! mini car that is the company's smallest, cheapest and most fuel-efficient production model

Besides working with diesel and compressed natural gas for fueling engines, a goal of GM will be to reduce overall vehicle weight. As Mr. Adkerson pointed out in his presentation, if we can cut the vehicle weight by 10%, we should be able to reduce fuel consumption by about 6.5%. "Our target is to reduce weight by up to 15%," said Mr. Adkerson. The challenges Mr. Adkerson described were further highlighted by new model cars introduced at the Geneva Auto Show two weeks ago. Interesting new models introduced include the Volkswagen (VLKAY-PNK) XL1, a two-seater employing significant aerodynamic design touches and a 0.8 liter, two-cylinder engine that burns less than one liter (0.26 gallons) of gasoline to travel 100 kilometers (62 miles). The fuel consumption of the XL1 undercuts that of the 3-cyclinder Up! mini car that is the company's smallest, cheapest and most fuel-efficient production model. VW plans on building 250 XL1s this year.

Another radical model is the PSA Peugeot Citroen (PEUGY-OTC) compressed-air hybrid that uses a separate hydraulic motor driven by nitrogen compressed by the energy captured during the vehicle's braking. The Peugeot and VW models are reflective of the efforts automakers are making to meet the European Union's new emission standard that average carbon dioxide output cannot exceed 130 grams (4.6 ounces) per kilometer (per mile) driven by 2015. While

Exhibit 8. VW's XL1 Represents Radical New Design

Source: Volkswagen

the auto industry believes it can achieve this standard through modifications to existing vehicle designs, engines and engine technologies, it is not sure it will be able to meet the 95 grams target set for 2020 and possibly tougher emission standards thereafter.

"Battery technology has not been able to resolve the century-old problem of too much weight and limited range capability"

Peugeot's innovation chief, Jean-Marc Finot was quoted at the Geneva show saying, "We can't get the necessary gains we need with traditional technology anymore. We're seeing a real break with the past." That view is probably bad news for EVs, despite the support from GM. As Cornell University automotive expert Arthur Wheaton put it, "Battery technology has not been able to resolve the century-old problem of too much weight and limited range capability." An industry survey by accounting firm KPMG in January showed that optimism about the future of EVs has been "dampened considerably," which is supported by actions such as Toyota (TM-NYSE) dropping plans last fall for broader sale of the battery-powered eQ (based on the Prius design) saying it had misread market demand. Only a handful of this model will be built and then only for distribution to research centers in Japan. GM's Opal division in Europe scrapped plans for a fully-electric Adam subcompact and VW's Audi division cut out its electric R8 coupe and Nissan (NSANY-OTC) slashed the price of its Leaf EV in response to poor sales and recently changed out the senior management of its battery business, despite hefty U.S. government and state subsidies for buyers.

In Europe, efforts to reduce emissions have taken the form of shrinking engines, removing cylinders and adding turbochargers to maintain horsepower. As mentioned above, the XL1 has only two cylinders, reminiscent of outboard boat motors and lawnmowers.

Some of the autobuilders in Europe are pinning their hopes on fuel cells

Maybe buyers will need to add a compartment for mice and a wheel to supplement the power of these shrinking engines. Some of the autobuilders in Europe are pinning their hopes on fuel cells. A number of manufacturers hope to have affordable fuel-cell powered vehicles within five years while Toyota and BMW (BMW.F) are targeting 2020. Most of the efforts are targeting constructing a "stack" of cells that combine hydrogen with oxygen to create electricity.

The technology is being touted as a potential rival to hybrid and battery power for vehicles

A new technological breakthrough involving coal raises the specter of the type of radical transformation the auto industry will need to embrace in order to meet the goal of sharply reducing and eventually eliminating carbon emissions from the operation of vehicles. A *Fox News* report quoted Liang-Shih Fan, a chemical engineer and the director of Ohio State University's Clean Coal Research Laboratory saying, "We found a way to release the heat from coal without burning it. This could be applicable for many industries." The technology is being touted as a potential rival to hybrid and battery power for vehicles. But as one person put it, by the time this technology becomes commercial (and we have no idea what the cost is), hybrids may be getting 60+ miles per gallon and EVs over 300 miles per charge. Additionally, we will have more natural gas-powered vehicles on the road and maybe even fuel-cell powered cars.

While self-driving technology represents utopia, it is symbolic of the nature of technological change required for the auto industry to achieve zero emissions in the vehicle transportation sector

We would also not rule out the impact Google's self-driving technology could have on overall fuel economy. As we already have vehicles with the ability to self-park, self-driving technology would offer the prospect for vehicles that can avoid accidents (yes, we know it will take decades to get all the conventionally-driven vehicles that could cause accidents off the road) by preventing humans from making mistakes. The technology means automobile companies could significantly reduce vehicle weight since most of the material added is to protect passengers in the event of an accident. Eliminating that weight would enable vehicles to achieve significant fuel economies. While self-driving technology represents utopia, it is symbolic of the nature of technological change required for the auto industry to achieve zero emissions in the vehicle transportation sector. Of course, we could also go back to riding horses and mules.

"There's more and more regulation, but customers want to pay less and less. So we have to cut prices and increase technology content – that's the headache we're faced with."

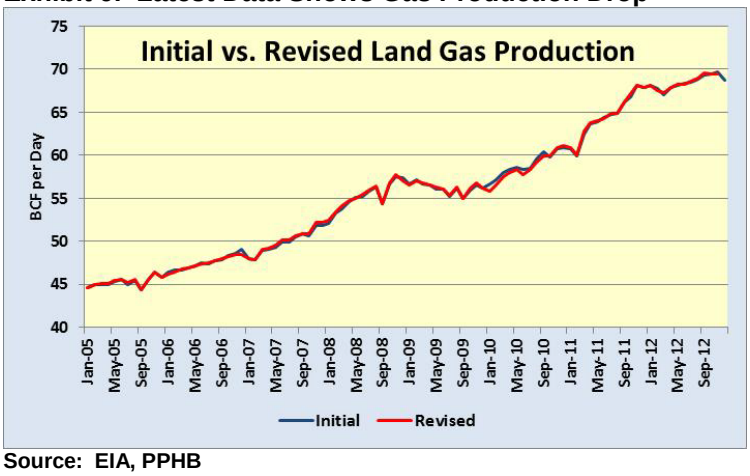
The need for and challenge of achieving a similar type technological breakthrough is best summarized by Nissan's upstream development chief, Francois Bancon, who was quoted saying, "There's more and more regulation, but customers want to pay less and less. So we have to cut prices and increase technology content – that's the headache we're faced with." It is also part of the giant global energy shift underway as more natural gas and renewables are used in North America and Western Europe and more coal is consumed in China and India. We are nowhere close to the vehicles driven by the Jetsons, but some are beginning to look like them.

Natural Gas Output Falls In December; Start Of A Trend?

The slowdown in gas output reinforces the phenomenon the industry may soon be confronting, which is the need to ramp up drilling activity to offset the steep decline in existing well production due to the nature of shale gas wells

The Energy Information Administration's (EIA) survey of natural gas production from the Lower 48 states for the month of December 2012 showed the first decline in output since March of that year. With the continued decline in drilling rigs targeting natural gas formations, analysts are encouraged that possibly we are witnessing the first results of the drilling slowdown. The EIA's commentary associated with the release of the data, however, mentioned weather related factors impacting gas output, especially in the associated gas production from the Bakken where an early and severe winter caused a drilling and well completion slowdown. Additionally, many producers ran out of budget money before the end of the year and were forced to slow activity. If nothing else, however, the slowdown in gas output reinforces the phenomenon the industry may soon be confronting, which is the need to ramp up drilling activity to offset the steep decline in existing well production due to the nature of shale gas wells.

Exhibit 9. Latest Data Shows Gas Production Drop



Source: EIA, PPHB

Virtually the entirety of the production decline occurred in Lower 48 basins

Overall, the initial estimate of gross natural gas production for the entire United States fell just about 1 billion cubic feet (Bcf) in December. Alaskan gas production actually rose about 0.2 Bcf while output in the Gulf of Mexico fell almost as much (-0.14 Bcf), meaning that virtually the entirety of the production decline occurred in Lower 48 basins. If we examine the revision to the prior monthly's initial production estimate, there was a reduction of 0.32 Bcf, which suggests the December production decline may only have been about 0.7 Bcf, but of sufficient size to be meaningful.

Before analysts get too excited about this potential change in trend and what it might mean for natural gas prices, a new report from natural gas research firm, Bentek Energy, suggests that 2013 and 2014 will be a replay of the past several years – growth in production

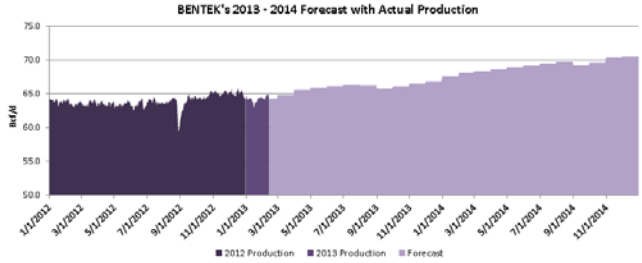
rather than a decline. The firm's forecast, however, calls for a slowing in the rate of increase in gas production during the next two years compared to the rate of growth experienced in the prior two years.

According to Bentek, natural gas production in the U.S. rose 3.6%, or by 1.6 Bcf per day in 2010 and increased by an average of 3.5 Bcf/d in 2011-2012. They are projecting that overall gas output will grow by 2 Bcf/d in 2013, as nine key shale basins will grow by 4.9 Bcf/d, which will be offset by other production falling by 2.9 Bcf/d. In 2014, the firm sees production increasing by 3.4 Bcf/d.

By the end of 2014, Bentek foresees gas output above 70 Bcf/d, up from current production of slightly below 65 Bcf/d

An interesting point in the historical data is that in 2011 offshore gas output fell by 1.2 Bcf/d and then by another 0.9 Bcf/d in 2012. Bentek sees offshore production declining by only about 0.3 Bcf/d in 2013 and reaching steady output in 2014. If we were to exclude the impact of the decline in offshore production in 2011-12, the average annual output increase was about 4.3 Bcf/d, or nearly 0.8 Bcf/d more coming from onshore basins. By the end of 2014, Bentek foresees gas output above 70 Bcf/d, up from current production of slightly below 65 Bcf/d.

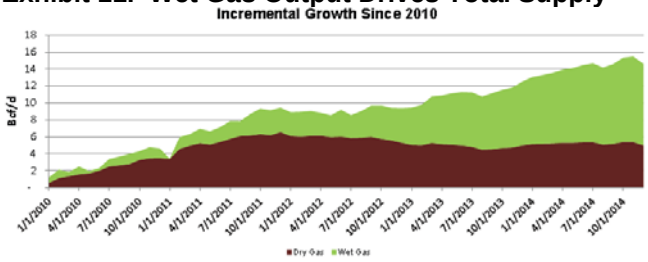
Exhibit 10. Bentek Sees Gas Production Growth



Source: Bentek Energy

Bentek's forecast for output is based on three primary factors. These include: debottlenecking of geographic regions where output has been constrained by a lack of infrastructure; operators continuing to focus on wet gas and associated gas from oil plays; and continued improvement in drilling rig efficiencies. The impact of the last two factors is shown in several charts from the Bentek forecast report that crystalize their views.

Exhibit 11. Wet Gas Output Drives Total Supply



Source: Bentek Energy

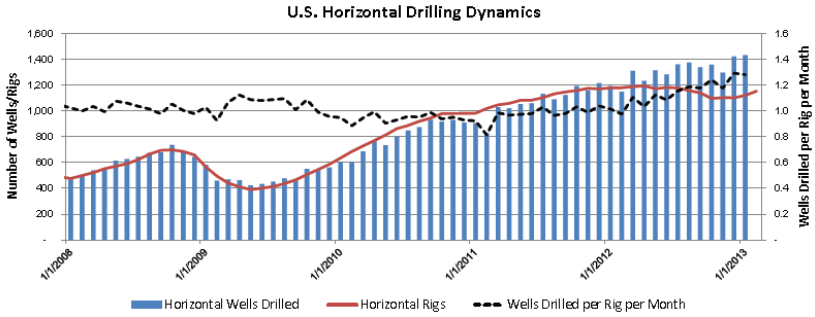
Associated wet gas was only a minor contributor to gas output in 2010 but grew in 2011 as the impact of low natural gas prices drove operators to emphasize oil and wet gas formations

The chart in Exhibit 11 (prior page) shows the impact of wet gas (green) output on total incremental natural gas production beginning in 2010 and continuing through the 2014 forecast period. As the chart shows, associated wet gas was only a minor contributor to gas output in 2010 but grew in 2011 as the impact of low natural gas prices drove operators to emphasize oil and wet gas formations. With natural gas prices continuing to languish in 2012, that trend became more pronounced with expected results. Because of the strong focus on natural gas liquids (NGLs) and crude oil due to high world oil prices and better investment returns for operators, Bentek sees wet gas production growing as we move through 2013 and 2014. Part of the strength in NGL and oil demand and their prices is due to debottlenecking Bentek assumes will occur based on the list of new pipeline and gas processing facilities either being built or planned to be built in the coming months.

This rise in rig performance reflects not only improved knowledge about how and where to drill and the greater use of pad drilling facilities, but also the impact from the growing fleet of new AC (electric) rigs that bring greater capabilities for drilling deeper and longer horizontal wells

The last major trend is the impact on shale gas costs from improvements in drilling. Exhibit 12 contains a chart showing the number of horizontal wells drilled since 2008 (blue columns), the number of horizontal rigs working (red line) and the average number of wells drilled per rig per month (black dotted line). The wells per month line in most impressive showing how after about a three-year downward trend between 2008 and 2010, the number rose in 2011 and remained essentially stable throughout the year but then started a steady upward climb throughout 2012. This rise in rig performance reflects not only improved knowledge about how and where to drill and the greater use of pad drilling facilities, but also the impact from the growing fleet of new AC (electric) rigs that bring greater capabilities for drilling deeper and longer horizontal wells.

Exhibit 12. Drilling Industry Improvements Critical



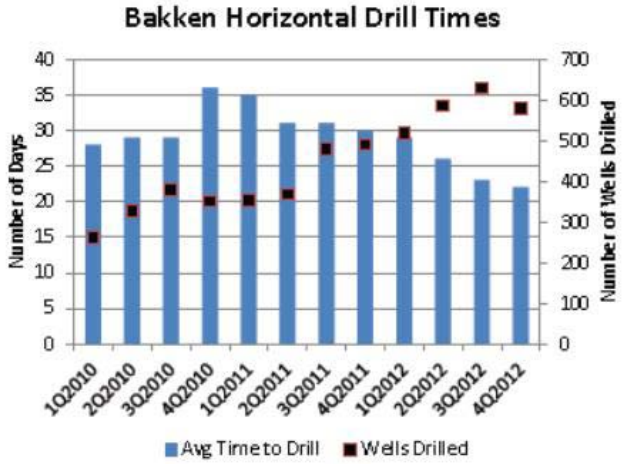
Source: Bentek Energy

Since the first quarter of 2010, the average time to drill a well has declined roughly 15%

Improvements in drilling in the Bakken have been meaningful as shown in Exhibit 13. Since the first quarter of 2010, the average time to drill a well has declined roughly 15%, although from the fourth quarter of 2010 the decline is much more significant – off nearly 40%! As the average rig can drill more wells per year and more rigs are moving into the Bakken, wells drilled have jumped in the past several quarters - from around 375 wells per quarter to 500 wells and then to a 600-wells per quarter rate for the final three

quarters of 2012. The question is can the industry operate more drilling rigs in the region and will those rigs be capable of continuing to drill wells in fewer days in the future?

Exhibit 13. Bakken Drilling Performance Improves

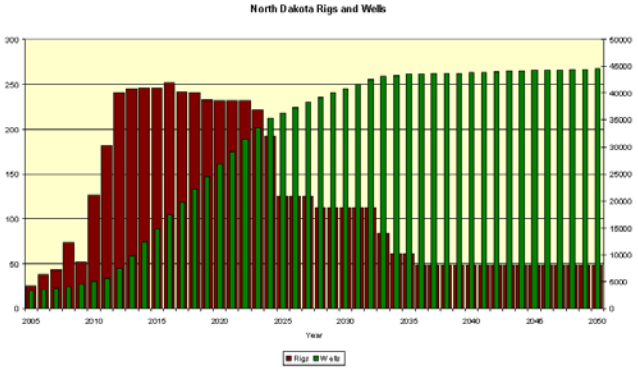


Source: Bentek Energy

The forecast calls for a small increase in the number of drilling rigs for 2013 and again in 2014, with rigs remaining flat in 2015 before spiking to a peak of just over 250 rigs in 2016

Last summer, the North Dakota Department of Mineral Resources presented an expected case for the future number of drilling rigs (red columns) working in the state's Bakken formation and the number of producing wells (green columns). As can be seen in Exhibit 14, the forecast calls for a small increase in the number of drilling rigs for 2013 and again in 2014, with rigs remaining flat in 2015 before spiking to a peak of just over 250 rigs in 2016. From that point the rig count begins a modest downward stepping pattern until it reaches a low point of 50 rigs in 2036 where it remains through the balance of the 2050 forecast period. As a result of the boom in drilling between 2010 and 2024, the total number of Bakken wells rises sharply from 5,000 to about 35,000. Thereafter, due to the decline in the active drilling rig count, the climb in the number of producing wells is modest reaching almost 40,000 wells in 2050.

Exhibit 14. Drilling And Wells Forecast To Rise

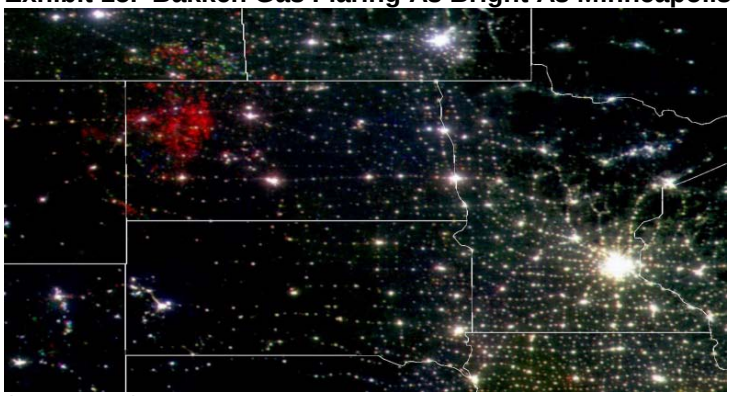


Source: North Dakota Department of Mineral Resources

A big challenge for producers in the Bakken is the lack of pipeline infrastructure to move associated natural gas production from the region

A big challenge for producers in the Bakken is the lack of pipeline infrastructure to move associated natural gas production from the region. Many people are familiar with the NASA photo of the United States at night showing the gas flaring in the Bakken (red) compared to the lights of Minneapolis, Minnesota on the right hand side of the picture. This picture rivals ones from the past showing the huge volumes of gas being burned in Nigeria and Russia that could be seen from space.

Exhibit 15. Bakken Gas Flaring As Bright As Minneapolis

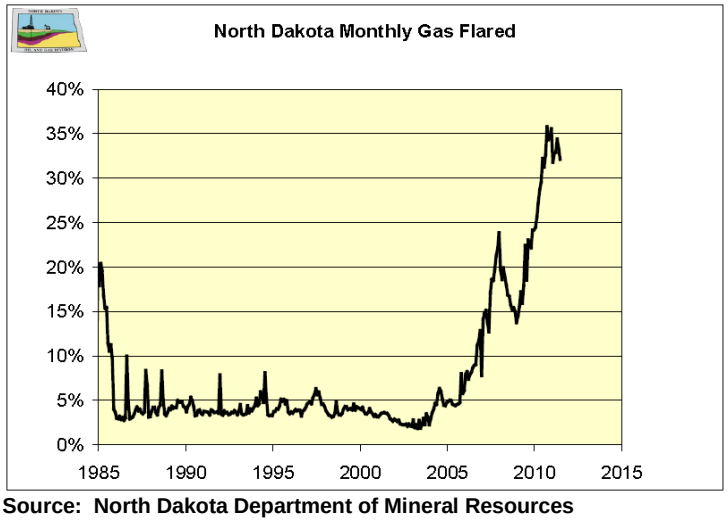


Source: NASA

Gas flaring was relatively minor until about 2005 and then it grew to about 24% in 2008 before falling 10 percentage points as a pipeline was opened up

A chart from the North Dakota Department of Mineral Resources shows how the percentage of natural gas produced in the state is burned. As the chart in Exhibit 16 shows, gas flaring was relatively minor until about 2005 and then it grew to about 24% in 2008 before falling 10 percentage points as a pipeline was opened up. From about 14% in 2009, the percentage of gas burned rose to the 35% area where it remains today awaiting more pipeline capacity and liquids-processing plants being built.

Exhibit 16. Gas Flaring Has Become A Problem



Source: North Dakota Department of Mineral Resources

A continuation of improvements in drilling efficiency appears less secure as it depends on the drilling industry converting the balance of its old, conventional rig fleet into a new, AC-based one

The Bentek natural gas production forecast relies on the continuation of the triumvirate of factors that have made oil shale plays as successful as they have been to date. Debottlenecking of various key producing basins appears a safe bet since it is based on projects already approved and in many cases already under construction with attractive returns. A continuation of improvements in drilling efficiency appears less secure as it depends on the drilling industry converting the balance of its old, conventional rig fleet into a new, AC-based one. That means higher day rates for working rigs in order for contractors to justify the investment in new rigs. What will higher dayrates mean for well economics? What happens to these oil and wet gas plays should oil prices fall from their current lofty levels? These latter considerations could impact the economics of shale drilling and thus gas output that would negatively impact the Bentek forecast since it is based on economic models employing 12-month forward strip pricing for crude oil and NGLs. The one offset to this logic is the dedication of large integrated and independent producers to drill through the period of poor economic returns because they believe in the eventual recovery of oil and natural gas prices that will reward them for their strategy.

The Greed Of Wind Energy Developers, Or Hidden Problems?

The lone supporter agreed with the company's argument that it has spent considerable funds on its application including a $3.2 million landmark study

Deepwater Wind, the company planning to develop a five- or six-turbine wind farm offshore Block Island off the coast of Rhode Island recently received a setback in its request for a waiver of a $700,000 fee. The fee is being levied by Rhode Island's Coastal Resources Management Council (CRMC), the regulatory body that controls all development activity along the coast, in the salt water ponds and in state offshore waters. Deepwater Wind filed its waiver request with a subcommittee of CRMC, which voted to uphold the fee in a 1-4 vote. The lone supporter agreed with the company's argument that it has spent considerable funds on its application including a $3.2 million landmark study, the Ocean Special Area Management Plan, which documented the condition of the state's waters for developing other offshore wind projects. The test for granting a waiver is whether the payment of the fee will create a financial hardship for the applicant.

The cost of the study was to be recovered in the 24-cents per kilowatt-hour fixed rate awarded at the outset of the project, which will ultimately be paid by electricity ratepayers

The four subcommittee members who voted to uphold the fee believed that it did not create a financial hardship for Deepwater Wind. One of the committee members pointed out that the Ocean SAMP was part of the agreement reached between the developer and the state when it was designated as the "preferred developer." The cost of the study was to be recovered in the 24-cents per kilowatt-hour fixed rate awarded at the outset of the project, which will ultimately be paid by electricity ratepayers. Based on the latest price data for December 2012 available from the Energy Information Administration, the average retail electricity cost in Rhode Island was 15.71 cents per kilowatt-hour and the average for all consumers was 13.87 cents. Since all electricity customers will be paying a

share of the high-priced Deepwater Wind electricity under the rate-setting agreement approved by the state's Supreme Court, the cost of this wind energy reflects more than a 10-cent per kilowatt-hour premium.

Deepwater Wind is hopeful it can have its wind farm in operation by the end of 2014. It still needs various approvals, such as for delivering the electricity to the mainland. At a March 5 meeting, the Narragansett Town Council faced considerable opposition to proposed locations for the shore connection to the subsea electricity transmission cable. In commenting on the fee waiver request, Block Island Town Council member Sean McGarry said, "This company stands to make hundreds of million in profits. I can't see how $700,000 is a hardship to this type of revenue-generating (project)." We're sure that Deepwater Wind would like to not have to pay the fee, but it has control over a project that is guaranteed to earn millions for the company, especially if it can be under construction by the end of the year in order to qualify for the 10-year production tax credit of 2.2 cents per kilowatt-hour of power generated. Maybe their request for the fee waiver reflects Deepwater Wind's view that it won't make the year-end date for the tax credit, which would alter its profitability. The full CRMC will decide in either late March or early April whether to accept the subcommittee decision. Given how political this project's approval process has been, we will be curious to see whether the CRMC considers the fee a financial hardship or not.

Maybe their request for the fee waiver reflects Deepwater Wind's view that it won't make the year-end date for the tax credit, which would alter its profitability

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