

# PickensPlan

## T. Boone Pickens Media Coverage 6.26.10-6.28.10

### Total of 12 Placements

- Print: 2
- Blog/Online: 8
- Broadcast: 2

### Coverage Summary:

Several pieces appeared on the MIT study, including a *Forbes Blog* which focuses on the importance of natural gas. The blog mentions Pickens' push to use natural gas as a transportation fuel in trucks.

*The Washington Post* published a letter to the editor by ANGA spokesperson Daniel Whitten arguing that "Gasland" strays from the facts in several key ways and should not be the foundation for meaningful dialogue on energy. The letter says "as a transportation fuel, it is our best shot at easing U.S. dependence on foreign oil among our heaviest and busiest vehicles, such as bus and truck fleets."

### Highlighted Placements (Full Articles Below)

- **MIT: The Future Is A (Natural) Gas** – *Forbes Blog* – 6/25/10

### Notable Natural Gas Coverage (Full Articles Below)

- **The Truth About Natural Gas, Three Mile Island, Soiled Birds** – *Washington Post* – 6/26/10
- **MIT Study Urges US Gas Industry To Back Price On Carbon Emissions** – *Platts* – 6/25/10

**Print Placements** (Full Articles Below)

- **Do Something: Now Is The Time To Develop Alternative Energy** – *Tulsa World* – 6/27/10

**Blog/Online Placements** (Full Articles Below)

- **The Reality of Cutting U.S. Carbon Emissions: Natural Gas** – *Earth2Tech* – 6/25/10
- **Why the Bridge from Oil to Something Else Is Natural Gas** – *The Big Money* – 6/25/10
- **Natural Gas Seen as Key in a Carbon-Constrained Future** – *Greentech Media* – 6/25/10
- **Natural Gas Outlook** ExxonMobil with XTO deal done is firmly committed to natural gas  
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headquartered in Fort Worth, Texas. Nearly all of - *Energy and Capital* – 6/27/10
- **Does Our Energy Future Lie In Natural Gas?** – *ConsumerAffairs.com* – 6/28/10
- **Natural Gas as Panacea: Dubious Path to a Green Future** – *Yale Environment 360* – 6/28/10

## HIGHLIGHTED COVERAGE

**MIT: The Future Is A (Natural) Gas** – *Forbes Blog* – 6/25/10

By Jonathan Fahey

It's hard to argue there is a fuel or energy technology more important to the future economy of United States and maybe the world, than natural gas. There's a lot of it in the U.S., it's cleaner than the two biggest energy sources, coal (for electricity) and oil (for transportation), and it has the potential to at least partially displace both of them.

Its importance is parsed in great detail in a report released today by MIT called "The Future of Natural Gas." It's one of a series of reports by MIT's Energy Initiative, headed by Ernest Moniz, an MIT physics professor and former Under Secretary of the Department of Energy. In the past, the group has produced reports on coal, nuclear power, and geothermal power.

The 83-page report's findings likely won't be a surprise to the likes of ExxonMobil, which agreed to buy the natural gas company XTO Energy late last year for \$40 billion and, in doing so become the world's largest natural gas player. Or Shell, which agreed to buy Australia's Arrow Energy this spring and then in May pay \$5 billion for natural gas assets in Pennsylvania and West Virginia.

Still, the report does a good job of laying out the issues, hopes, and problems surrounding natural gas. Natural gas is already important -- it provides 21% of the country's electricity, it sets the price of electricity in most regions of the country, and is relied upon heavily by industry.

Its share of the electricity market is poised to grow substantially as coal plants are shut down in the face of tightening emissions requirements. If Washington decides to limit carbon either by capping it or taxing it, gas will become even more important. It's far cleaner than coal and it emits 45% less carbon than coal. Natural gas will have a harder time replacing oil as a transportation fuel, but there are movements spearheaded by T. Boone Pickens and by some

lawmakers to promote burning it in the engines of cars and trucks. It will also be able to power cars indirectly, as an electricity source for electric vehicles starting to arrive in showrooms.

Hopes are high for natural gas in part because there is so much of it. The report estimates there are 16,200 trillion cubic feet (Tcf) of recoverable reserves worldwide, that's 150 times current annual global consumption. Gas companies could produce 9,000 Tcf of that and make money with gas priced at \$4 per million British thermal units (MMBtu). (Recent spot prices in the U.S. were just under \$5 per MMBtu.)

So-called unconventional gas, which has been discovered in huge amounts in shale formations in the U.S. and elsewhere, will become a big factor. The report suggests there are 650 Tcf of this gas in the U.S. and 400 Tcf of that is economically recoverable with gas prices at \$6. The report describes the environmental impacts of extracting natural gas from shale formations, which requires injecting sometimes toxic fluids underground to break up the rock, as "manageable but challenging."

Low natural gas prices cut two ways. For homeowners who heat with gas, for industrial users and for electricity customers, they are great. For power producers like Exelon and NextEra Energy, they mean sharply lower profits. Natural gas producers like Exxon and Chesapeake Energy will of course benefit from higher demand for the fuel, but profits might be held down with increased supply. As a way to reduce carbon dioxide emissions in the short and medium term, there is nothing cheaper or faster. But low electricity prices make it more difficult for truly low carbon energy sources, like nuclear, solar, and wind, to compete.

This is conundrum the report addresses: "It would be a significant error of policy to crowd out the development of other, currently more costly technologies because of the new assessment of gas supply. Conversely, it would also be a mistake to encourage, via policy and long-term subsidy, more costly technologies to crowd out natural gas in the short to medium term, as this could significantly increase the cost of CO2 reduction."

While substituting natural gas for coal could help quickly reduce the nation's carbon dioxide emissions, eventually even the carbon dioxide produced by natural gas power plants may need to be captured somehow, a proposition that is sure to be extraordinarily expensive. It is seen, therefore, as a bridge fuel, one that takes us from coal and oil to some mix of carbon-free energy in the future. And given the huge supplies of the fuel and its versatility, it looks like natural gas could be a long and sturdy bridge, and one that might not break the bank.

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## NOTABLE NATURAL GAS COVERAGE

**The Truth About Natural Gas, Three Mile Island, Soiled Birds** – *Washington Post* – 6/26/10

Facts matter in the energy debate. The film "Gasland" strays from the facts in several key ways and should not be the foundation for meaningful dialogue on energy. TV critic Hank Stuever's statement that it "could push a certain sort of viewer -- me, for example -- into the realm of panic attack" precisely illustrates the problem ["Beyond BP: Documentary Sees a Crisis in Natural Gas," *Style*, June 21].

In the film's signature scene, a man sets his tap water on fire. Yet Colorado regulators specifically investigated the individual's water well and found "no indications of oil & gas related impacts." Contrary to the film's claims, natural gas production is subject to federal, state and local regulations that cover everything from initial permits to well construction to water disposal.

Used for power generation, natural gas, compared with coal, has 80 percent fewer emissions of nitrogen oxides, half the carbon emissions and virtually no sulfur dioxide, particulate matter or mercury.

As a transportation fuel, it is our best shot at easing U.S. dependence on foreign oil among our heaviest and busiest vehicles, such as bus and truck fleets.

Daniel Whitten, Washington

The writer is vice president of strategic communications at America's Natural Gas Alliance.

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## **MIT Study Urges US Gas Industry To Back Price On Carbon Emissions – *Platts* – 6/25/10**

By Bill Holland

The natural gas industry should start backing a price on carbon emissions, the head of a Massachusetts Institute of Technology study on the future of natural gas said Friday.

While the two-year study found that US gas consumption will nearly double to 40% by 2050 without a carbon policy, to capitalize on the US's resurgent gas reserves while lowering CO2 emissions will require a price on carbon, the study said.

The study found that with both a carbon price and a goal to reduce CO2 emission 50%, gas' share of the market will peak at 40% in 2040, before declining gently as it is replaced by wind, solar and other alternatives.

"A carbon dioxide price for all fuels without long-term subsidies or other preferential policy treatment is the most effective way to achieve" the result of leveraging US gas supplies to lower US carbon emissions, the MIT study said.

"It's the biggest issue in energy," study chairman Ernest Moniz, of MIT's Energy Initiative said at the report's rollout in Washington, as he challenged the gas industry to support either a cap-and-trade scheme or a carbon tax.

Moniz noted that his group's report, which took two years and the efforts of 30 MIT faculty and graduate students to complete, doesn't study the impacts of one pricing scheme over another. Nor does the report examine specific carbon prices, only low, medium, and high emissions scenarios.

In addition to confirming that the US has roughly 100 years of recoverable gas reserves in the ground, mainly because of new shale discoveries, it found the rest of the world has about 160

years' worth of gas, all from conventional sources because unconventional extraction techniques haven't migrated far beyond North America.

Even without a price on carbon, gas use will increase, particularly in power generation, as newer gas plants replace older coal-fired plants, as industrialized nations strive to cut their carbon dioxide output 50%.

While gas industry trade groups praised the study, few took a position on the study's primary recommendation -- that carbon emissions need to be priced.

"As the report notes, greater use of our nation's vast domestic supplies of natural gas for power generation can cut carbon dioxide emissions from the power sector by 10% in the near term and lead to reductions in other pollutants such as mercury," America's Natural Gas Alliance CEO Regina Hopper said Friday. After the study's release, her spokesman declined to discuss

the report's finding on carbon pricing.

But American Clean Skies Foundation CEO Gregory Stales said in an interview that his group believes "putting a price on carbon will let gas achieve its promise."

Clean Skies helped fund the MIT study. The foundation's chairman, Aubrey McClendon, is also chairman of the board and CEO of the US' top gas producer, Oklahoma City-based Chesapeake Energy.

"Carbon dispatch," a scheme whereby power generators are dispatched in order of increasing emissions as opposed to price, is another area where natural gas can help meet carbon goals, the study said.

Using the Electric Reliability Council of Texas as an example, the study found that CO<sub>2</sub> emissions would fall 22% if ERCOT required the dispatch of lower-carbon gas plants over coal. Nationwide, the study said, carbon dispatch would probably lower carbon emission by 10%.

The study also recommended further government support of research into both shale plays and methane hydrates, noting that the current shale boom was born and nurtured by research funded by the industry and tax incentives.

Further research into shales is needed, study co-chair Tony Meggs, an MIT visiting engineer said, because there is still "a lack of understanding of what is happening in the subsurface."

Shale producers are recovering 25% of the potential gas in shale plays, Meggs said, "but we still don't know if it's being developed optimally."

Around the world, Meggs said, shale resources are still posing the questions: "How much is there? Will it be productive?" Questions that are best answered by sustained research, Meggs said.

"What is the shale gas of the future," Meggs asked an audience of reporters, industry executives and academics. "Hydrates, I'd say. I could be back here in 10 years saying, 'hydrates.'"

Methane hydrates, or methane locked in ice, are believed to be located around the world in sea-floor sediments and permafrost. The US Department of Energy's Oak Ridge National Laboratory said estimates on how much energy is stored in methane hydrates range from 350 to 3,500 years' supply.

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## **PRINT COVERAGE**

**Do Something: Now Is The Time To Develop Alternative Energy** – *Tulsa World* – 6/27/10

By Mike Jones

Americans love their buffets. It will take a buffet of energy solutions to ease the United States' reliance on foreign oil. And it could add a new and very important element to the economy.

Realizing that there is no one solution, no magic bullet, the National Energy Policy Institute, funded by Tulsa's George Kaiser Family Foundation, will soon release a report that will suggest that a combination of taxes, hybrid and natural gas-fueled vehicle subsidies and new efficiency rules will be the best way to ease our reliance on foreign oil.

It seems like such a simple plan that it remains a wonder that it hasn't caught on. The ongoing tragedy in the Gulf of Mexico ought to have awakened someone to the fact that we need a new energy policy. But the White House and Congress remain somewhat silent. And the American people, other than being appalled by the oil in the Gulf, have yet to mount a serious campaign with their congressmen and senators to get moving on policies that would protect the environment, create new jobs, ease energy demands at home and if not sever at least loosen the knot of imported oil.

Ironically, one element that has gone almost unnoticed in the disaster of the BP oil rig is the enormity of the oil produced, although its spewing unchecked into the Gulf.

My first job at the Tulsa World was as the writer of the oil agate. My task was to follow drilling operations in the state and report them daily. If I ran across a well that was producing 200 barrels a day, it was headline news.

The well at the bottom of the Gulf is making as much as 50,000 barrels a day. Even if the well were under control, which would reduce the amount of oil coming out of the ground, it would still be a remarkable amount of oil.

This is no Oklahoma oil well. This is a well, and possibly a field, of Saudi Arabian proportions. Some industry experts estimate that it is a field that could produce from a quarter-million to a half-million barrels a day.

Even that size field, however, will not cut the U.S. loose from its need for imported oil. Americans use more oil per day than anyone else on Earth. And, remember, it's not only going into our gasoline tanks. Oil touches everyone's life. It makes the carton for our milk, the painkillers used by dentists, perfume, toothpaste and the tube in which it comes, hearing aids, heart valves, eyeglasses and ink.

In short, we're always going to need oil, at least for the foreseeable future. But if the U.S. began a concentrated, serious campaign to develop alternative energy the country could some day, maybe even in my lifetime, produce enough oil for the milk cartons and eyeglasses and dramatically reduce our dependence on foreign oil.

T. Boone Pickens continues to promote his ideas for compressed natural gas vehicles and wind power. Skeptics scoff that some alternative energy proposals are too expensive, being oversold and too far into the future.

But, think about this: Presidents Carter and Reagan touted exploring alternate energy sources. If the American people and their political representatives had acted then, we might not be in this mess today. Unfortunately, the energy crisis of the 1970s ended, the oil embargo was lifted, the price of gasoline went down and Americans fell in love with behemoth vehicles for the next 30 years.

The NEPI report emphasizes the need for options, in policy and development. Its goal is to reduce U.S. oil consumption by 5.4 million barrels a day within 20 years. That's 3.4 million more barrels a day than current reduction plans.

Of course, Americans use about 20 million barrels of oil a day and produce domestically about 5 million a day. So, saving 5.4 million a day might not seem like a lot, but it is a start.

The report and most experts agree that it is paramount that the country begin a serious endeavor toward developing alternative energy sources. The spill in the Gulf should be a wake-up call for the White House, Congress and the American people. For now, the production in the Gulf, even in the deep water, might be a necessity. It must be monitored and regulated carefully by both government and the industry. Right now it means the oil we need and the jobs that it supports.

The need for oil is not going away anytime soon. But the longer we delay the needed and important task of developing alternative sources, the more we will be dependent on countries that dislike us and the longer we will live with the danger of another Gulf disaster.

To read the full report from the National Energy Policy Institute go to [www.tulsaworld.com/nepisummary](http://www.tulsaworld.com/nepisummary)

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## **BLOG/ONLINE COVERAGE**

### **The Reality of Cutting U.S. Carbon Emissions: Natural Gas – *Earth2Tech* – 6/25/10**

By Katie Fehrenbacher

Despite all of the innovations and investments in solar, wind, energy efficiency, and the smart grid, the reality of cutting carbon emissions out of the U.S. energy portfolio will rely on natural gas. A report released out of MIT today and reported by the New York Times estimates that natural gas will one day grow from 20 percent of the energy market in the U.S. to 40 percent.

That growth in natural gas will be at the expense of coal, and is largely due to recent discoveries that the U.S. has a whole lot more reserves of natural gas in shale deposits. A geophysics professor at Stanford University (and a personal friend of mine) Mark Zoback, told me recently that through better technology and recovery tools, we've discovered that the U.S. now has an estimated resource of over 2,000 trillion cubic feet of natural gas. That's — in a word — massive.

Zoback told me he thinks that the newly discovered natural gas resource will help to stabilize the price for natural gas, making it more attractive for both the gas producers and utilities (fluctuating prices has deterred more use of natural gas for power production). And Zoback pegs that price around \$6 per million BTUs. That could help natural gas beat coal on price, meaning natural gas could actually be an economic replacement for coal power.

Natural gas has significantly fewer carbon (and toxic) emissions than coal. Zoback estimated that by replacing 30 percent of coal-fired generation with gas (without CCS) it would get the U.S. almost to the point of what the current climate bills call for: a 17-20 percent reduction of carbon emissions by 2020. With carbon capture technologies, gas power could cut carbon emissions even more.

The abundant natural gas reserves could also be used for vehicles — something T. Boone Pickens has been advocating for months. While I'm not convinced the natural gas vehicle market will ever take off outside of enterprise fleets, trucks and buses, natural gas vehicles could play a significant role in cutting carbon emissions. Here's how the economics of natural gas vehicles works.

While natural gas is less fun to talk about than buzzy startups like Bloom Energy or EESstor — and yes it still emits CO<sub>2</sub> — it's one of the dominant ways that the U.S. will realistically move away from coal and toward a clean power future. Consider it a “bridge technology,” too a carbon-free future.

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## **Why the Bridge from Oil to Something Else Is Natural Gas – *The Big Money* – 6/25/10**

By Matthew DeBord

Consider two different transportation futures: one in which we are propelled by electricity; another in which we are propelled by fossil fuels. Former sounds better than the latter, but what if it takes us 40 years to get to full electrification? According to Earth2Tech's Katie Fehrenbacher, that's where natural gas comes in:

[A]bundant [domestic] natural gas reserves could also be used for vehicles — something T. Boone Pickens has been advocating for months. While I'm not convinced the natural gas vehicle market will ever take off outside of enterprise fleets, trucks and buses, natural gas vehicles could play a significant role in cutting carbon emissions....

While natural gas is less fun to talk about than buzzy startups like Bloom Energy or EESstor — and yes it still emits CO<sub>2</sub> — it's one of the dominant ways that the U.S. will realistically move away from coal and toward a clean power future. Consider it a “bridge technology,” too a carbon-free future.

I'm glad to see that the concept of a "bridge technology" is entering the forward-looking energy blogosphere. It stresses that we have a way to go before we get rid of fossil fuels entirely, and that we need to figure out the best possible method to negotiate that way.

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### **Natural Gas Seen as Key in a Carbon-Constrained Future – Greentech Media – 6/25/10**

By Katherine Tweed

Natural gas will take a larger role in a carbon-constrained energy and transportation economy, according to a study released today by the Massachusetts Institute of Technology (MIT).

The study found that the extensive natural gas reserves in the U.S., including shale resources, will play a growing role, especially in electricity generation. The fossil fuel could double to comprise 40 percent of the energy market by 2040. The authors expect the role of shale resources, which come with environmental concerns, to drive much of the expansion.

"Gas really is a bridge to the low carbon future," said Ernie Moniz, director of the MIT Energy Initiative. "But we don't know the span of the bridge."

Moniz also told Greentech Media last year that he sees light water nuclear reactors as a larger part of America's energy portfolio in the future.

The growth in natural gas is likely to come at the expense of coal because of its smaller carbon footprint. If legislation were to mandate a 50 percent cut below 2005 levels by 2050, for example, that would level the playing field for natural gas. But the authors of the study also said

that that scenario would not hold true if cuts were eventually deepened to 80 percent below 2005 levels by 2100.

The study also suggested there would be growth in compressed natural gas vehicles, especially for short-haul vehicles like buses and taxis, but did not find the costs to be attractive for liquefied natural gas, especially for long haul vehicles.

T. Boone Pickens, however, told The New York Times the study did not focus enough on natural gas for transportation. Pickens is pushing the Natural Gas Act in the hopes of transitioning 18-wheelers to run on natural gas.

Pickens and the study authors are in agreement that any transportation move to natural gas will have to come through government regulation, something to "level the playing field," such as carbon legislation.

And as oil still swirls around the Gulf of Mexico and Gasland, the Michael Moore-style documentary about gas shale drilling, known as fracking, was recently released, the subject of environmental cost was also addressed. "We don't underestimate the risks with any oil and gas activities," said Tony Meggs, Visiting Engineer at the MIT Energy Initiative.

Meggs acknowledged there were risks, although he characterized them as "entirely manageable," while identifying groundwater contamination as the biggest threat. However, as seen with the BP spill, the challenge of ensuring that companies are forthright about risk in the face of profit, and then are held accountable in the case of contamination may not be as "entirely manageable" as proponents of the plan would like to believe -- just ask Obama.

Still, the report does not paint natural gas as a panacea. The authors of the study said repeatedly it was a bridge, although no one could say the length of the bridge or what the off-ramp might look like. As for natural gas as a home-grown (or -drilled) energy security solution, the authors found that the current international market is immature -- but there are huge natural gas reserves in Russia and the Middle East, and the study found it could someday be cheaper to import natural gas than to drill for it here in the U.S.

The authors concluded the report with strong call for carbon dioxide legislation to create a level playing field, the construction of a comprehensive international gas market, and additional government-supported research for gas shale development and environmental assessment.

Drill, baby, drill.

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**Natural Gas Outlook** ExxonMobil with XTO deal done is firmly committed to natural gas  
ExxonMobil with XTO deal done is firmly committed to natural gas ExxonMobil with XTO deal  
done is firmly committed to natural gas subsidiary will be called XTO Energy Inc and will be  
headquartered in Fort Worth, Texas. Nearly all of - *Energy and Capital* – 6/27/10

By Keith Kohl

At times, an investment opportunity is so obvious, we shake our heads in wonder.

More interesting, however, is how the investing herd are oblivious until the last minute.

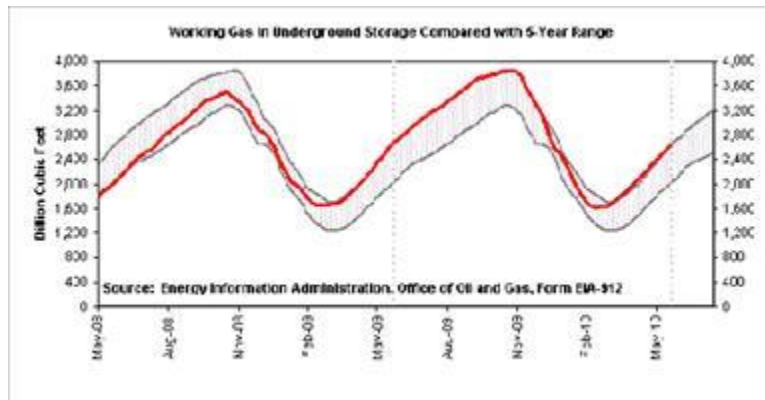
For years, I've told my readers over and over again what will be the world's first step away from oil...

Natural gas.

Of course, it's a bit complicated. Since the financial markets crashed, natural gas prices have fallen into the gutter.

The oversupply in the North American markets — thanks mostly to a surge in shale gas fields across the U.S. and Canada — didn't help much.

Here's the United States' working gas storage for the last two years. See for yourself:



Since February of 2009, we've been riding the top of the 5-year range.

And if you haven't guessed by now, the future of natural gas hinges on developing those huge shale gas deposits like the Marcellus, Eagle Ford, and Haynesville shale formations.

Unfortunately, we're not the only ones that recognize this trend...

Foreign investors are rushing to pick up shale assets:

Back in April, India's Reliance Industries shelled out \$1.7 Billion to Atlas Energy for a 40% stake in Atlas' acreage in the Marcellus shale.

Reliance Industries recently invested \$1.15 billion in Pioneer Natural Resources Co. (NYSE: PXD) to develop approximately 212,000 acres in the Eagle Ford shale.

Expect to see China get a piece of the action. With significant shale deposits of their own, the only problem is that they lack the experience develop those resources. According to the IEA, China is sitting on roughly 26 trillion cubic meters of shale gas.

By 2020, Chinese officials are hoping for natural gas to account for 10% of the nation's energy.

Natural gas bull

Although the long-term future of fossil fuels is inevitably limited, natural gas seems the most likely choice to be our bridge away from oil.

It's not the electricity sector, however, where the problem is — it's the transportation sector. Finding a substitute for gasoline is the key.

According to legendary oilman-turned-natural-gas-spokesman T. Boone Pickens, "You've got plenty of gas to do both."

We couldn't agree more.

And you can bet we'll be on the front lines, finding you the very best natural gas plays in the U.S.

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## **Does Our Energy Future Lie In Natural Gas? – *ConsumerAffairs.com* – 6/28/10**

By Mark Huffman

With a blown deep-water oil well spewing thousands of barrels of crude into the Gulf of Mexico, oil is looking less attractive to some as an energy source. Could natural gas be a potential replacement?

Energy researchers at MIT think it could play a much bigger role in our energy future, especially as a replacement for coal, used to create electricity. In a report, the researchers predict gas-fired generators will eventually replace older, inefficient coal plants.

They aren't alone. Others see gas as a much more desirable energy source that, not only could produce electricity, but also power the nation's cars and trucks.

Natural gas is abundant and, best of all, it's plentiful in the United States. Some business leaders, including T. Boone Pickens, have argued for years in favor of increased reliance on U.S. natural gas, saying it would greatly reduce reliance on foreign oil and keep more U.S. dollars at home.

The MIT researchers like it for another reason. Unlike oil and coal, natural gas is a very clean fuel.

The just-completed two-year study, managed by the MIT Energy Initiative (MITEI), examined the scale of U.S. natural gas reserves and the potential of this fuel to reduce greenhouse-gas emissions. Based on the work of the multidisciplinary team, with advice from a board of 16 leaders from industry, government and environmental groups, the report examines the future of natural gas through 2050 from the perspectives of technology, economics, politics, national security and the environment.

### 92-year energy supply

The researchers note the U.S. has a significant natural gas resource base, enough to equal about 92 years' worth at present domestic consumption rates. Much of this is from unconventional sources, including gas shales.

While there is substantial uncertainty surrounding the producibility of this gas, the researchers said, there is a significant amount of shale gas that can be affordably produced.

Not surprisingly, the natural gas industry hailed the report.

"We hope that policymakers will read and consider the report's recommendation for greater use of natural gas as they develop plans to help our country move to a secure, economically beneficial and cleaner way of using energy," America's Natural Gas Alliance said in a statement.

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**Natural Gas as Panacea: Dubious Path to a Green Future** – *Yale Environment 360* – 6/28/10

By Daniel B. Botkin

For several years, many voices, including Texas energy baron T. Boone Pickens, have been touting natural gas as the best energy source to form a bridge between the current fossil-fuel

economy and a renewable energy future. Proponents contend that not only is natural gas a cleaner-burning fuel than coal, producing lower greenhouse gas emissions, but that reserves of natural gas are far greater than previously believed because of vast reserves trapped throughout the U.S — and around the world — in huge underground formations of shale.

Earlier this month, Britain's New Scientist magazine published an article about shale gas entitled, "Wonderfuel: Welcome to the Age of Unconventional Gas." Last month, the Wall Street Journal ran its own op-ed ode to shale gas: "Shale Gas Will Rock the World." The author, Amy Myers Jaffe — a fellow in energy studies at Rice University — wrote, "I am convinced that shale gas will revolutionize the industry — and change the world — in the coming decades." She even suggested that the abundance of natural gas in shale deposits worldwide will slow the transition to a renewable energy future.

"It may be a lot harder to persuade people to adopt green power that needs heavy subsidies when there's a cheap, plentiful fuel out there that's a lot cleaner than coal, even if gas isn't as politically popular as wind or solar," Jaffe wrote.

But after spending the last few years analyzing all the sources of energy available to the United States, I am convinced that the choice is clear: Based on existing technology, solar and wind are the only practical alternatives that would provide America with abundant, independent energy with few undesirable environmental and human-health effects. While shale gas is estimated to be abundant, and the proponents tell you that it will be easy to extract the gas with few environmental effects, in fact this is a relatively experimental technology that has potentially large environmental risks.

The water pollution concerns alone should be sufficient to make the U.S. and other countries rethink future reliance on shale gas. Separating the gas from the shale, a process known as hydrofracturing, involves forcing a mixture of water, chemicals, and sand at high pressure down a well bore and into rock formations, creating small fractures that release the trapped gas. The process uses a huge amount of water — the New York State Department of Environmental Conservation estimates as much as 1 million gallons per well — at a time when water is already a limiting and precious resource. Second, hydraulic fracturing fluid may come back to the surface, or near enough, to affect groundwater supplies. This fluid is a mixture of chemicals including friction reducers, biocides to prevent the growth of bacteria that would damage the well piping or clog the fractures, a gel to carry materials into the fractures, and various other substances. Returning to the surface, it could also bring other environmentally damaging materials, such as heavy metals.

Advocates for shale gas claim that these effects will be minor. Others, including those in charge of water supplies, are not persuaded. In Pennsylvania, wells claimed to be safe have leaked natural gas into local domestic water supplies, with the gas bubbling out of faucets. Also in Pennsylvania, fracturing fluids have leaked before they have been sent underground and have also contaminated drinking water. These problems suggest that returning fracturing fluids to the surface could cause similar problems on a large scale.

That shale gas exists in abundance — in the U.S., Europe, Australia, China, South Africa, and other regions — is beyond question. *New Scientist* reported that enough recoverable shale gas exists to meet the world's needs for 60 years. The Marcellus Shale region in the eastern U.S. reportedly contains enough shale gas to meet U.S. natural gas demand for a century. The Massachusetts Institute of Technology released a report last week forecasting that, in part because of the exploitation of abundant shale gas reserves, natural gas will go from making up 20 percent of the U.S.'s energy supply today to 40 percent within several decades.

But what is the reality behind the optimistic claims for shale gas? The U.S. Geological Survey lists natural gas “reserves” — the amount believed to be in the ground — in four categories: readily available with current technologies, which accounts for only 1 percent of the known natural gas in U.S. territorial limits; technically recoverable (5 percent); marginal targets for accelerated technology (6 percent); and unknown but probable (84 percent). Shale gas shares the fourth category with coal gas and methyl hydrates. The latter are a kind of water ice with methane embedded in it and occur only where it is very cold, in Arctic permafrost and below 3,000 feet in the oceans.

In researching how best to make the transition to the green energy future, one of the first calculations I made was to find out how long the natural gas in each of the four categories would last if we obtained it independently — that is, only from U.S. territory. I was shocked by the result: Just using our 2006 rates of use of natural gas consumption — not including any major transition to fueling our cars and trucks — the “readily available” gas within the United States would be exhausted in just one year. That, plus what is called “technically recoverable” gas, would be gone in less than a decade. What is termed “unknown but probable” would last about a century.

This means that any significant increase in our consumption of natural gas will have to come from the “unknown but probable” reserves, much of which will be from formations of shale, a sedimentary rock formed from muds in which bacteria released methane. Most of this gas is so

deep underground or otherwise not very accessible that nobody is really sure that we can get at a lot of it, or of how high an environmental price we must pay to retrieve it.

Currently available wind and solar energy technologies, on the other hand, are up to the job right now. There just aren't enough wind and solar installations, so today they provide less than 1 percent of the nation's energy. We will need to rapidly scale up, so that by 2050 we can receive the majority of our energy from wind and solar power. That's an enormous task: The U.S. Census Bureau forecasts that our population will reach 440 million by 2050 — nearly a 50 percent increase from today. That's 150 million more people, each hoping to live at the standard of living we have grown accustomed to. When that happens, the amount of fossil fuels we use today, and which provide 86 percent of America's energy, would provide those 440 million with less than two-thirds the energy they would need, if per-capita energy use remains the same as today.

Contrary to standard criticisms of solar and wind, providing this much energy in the future would not use up a lot of land. Based on current installations, less than 1 percent of U.S. land area would be required. Right now, 22 percent of U.S. land is in agriculture, not counting grassland pasture and range used by grazing animals.

What about costs? Wind is the cheapest energy source, with installation costs as low or lower than coal's. There's no need to pay for fuel, and no huge costs to repair the environmental damage caused by strip-mining and underground mining, let alone costs involved to try to develop "clean-burning coal."

This leaves two problems: that solar and wind are variable from hour to hour, and that solar is, at present, the most expensive energy source to install, costing about four times as much per unit output as wind.

There are several ways to deal with the variability in solar and wind. First of all, we will not make a sudden leap from fossil fuels to solar and wind. Instead, there will be a slow transition as production and installation of solar and wind increase. During this transition, we will want to use all our energy sources, each for its best purposes. A few years ago there was a day in Spain during which one-third of the electrical energy came from solar, and nothing untoward happened — no grid failures, no blackouts; just business as usual. Fossil fuels and nuclear power plants can compensate for a good while for variations in solar and wind output.

As for solar power, the costs of producing new cells — photovoltaic or otherwise — are moving rapidly down, and increased research and development will inevitably lead to a similar decline in installation costs.

We won't want to get completely away from liquid fuels. Gasoline, kerosene, and diesel fuel are wonderful ways to store, transport, and use energy. A gallon of gasoline contains an amazingly large amount of energy and is relatively safe and very convenient. Rather than expend our technological research and development on ways to get shale gas from deep bedrock, we could develop a kind of reverse refinery, dissociating water to hydrogen and oxygen, combining the hydrogen with carbon to give us methane (natural gas), and combining that with oxygen to give us ethanol. Developing this technology will be a major challenge, but I believe it is not beyond the creative and innovative science and engineering that has typified America.

I'm not proposing that America get 100 percent of its energy from solar and wind, just that we be heavily invested in these forms of energy that do not have the enormous potential environmental and economic costs of developing shale gas reserves.

Maintaining our high standard of living, our creative and innovative civilization, will not come easily. It needs lots of energy. It's the great challenge of the future that must be approached openly, beyond special interests and ideologies. We can do it — there is a safe, sustainable, abundant-energy future. The question is, will we do it? Do we have the political will, the funding for inventiveness, and a government sufficiently independent of special interests for this to happen?

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## **BROADCAST COVERAGE**

### **1. Bloomberg News**

**Bloomberg, National | DMA: 0**

**06/25/2010, 02:00 PM - 03:00 PM**

[CC] 00:35:25 Look at the 3% move in the price of crude **oil**. We've seen a lot of fluctuation in currency markets, especially with the dollar and dollar weakness helped out the commodity there. **Gasoline** and **naturalgas** have both seen a real reverse. A big move for **naturalgas**, up more than dollar 2. 5% 3 Drilling for **oil** is getng a lot more scrutiny these days. If a new study is right, the future of **naturalgas** might have brighter prospects. This study says the use of **naturalgas** in the United States is likely to double over the next several decades. What does this mean for the industry? It will certainly make people like **T. BoonePickens** happy. We will bring in Zara Burton Is the bottom line that it will win out over offshore drilling? I want to get into this latest study. This is from MIT, funded, in part, by the **naturalgas** industry. Right now, 20% of our **energy** comes from **naturalgas**. The study says that will double to 40% by 2040. As you just pointed out, **T. BoonePickens** was very vocal on that a couple years ago, talking about the fact that **naturalgas** is abundant. Also, the fact that it is cheap. It's cleaner than carbon dioxide. The problem is that it is very erratic in terms of price. If you look back at 2005, natural gas is about \$50 per million BTU. Right now, we are around \$5. - How are investors responding? > This is not necessarily new. They are not necessarily making changes to their portfolios. An analyst with Clear View Energy partners told me that it is new, but it is true that natural gas will tell were all these utilities in the future for the United States --Will power these utilities in the future for the United States. Hei s not sure about transportation aspect natural gas cars. There's so much more expensive to produce in the U.S. Basically, he says yes on power generation, but not necessarily the transportation sector...lots of concerns about fracking...00:38:55

**Audience: N/A Spot Cost: N/A**

### **2. CSPAN-2 Schedule**

**CSPAN 2, National | DMA: 0**

**06/26/2010, 04:00 PM - 06:00 PM**

[CC] 01:25:54 (speaker is Robert Bryce)... The eia estimates by 2030, U.S. Co2 emissions will be about the same as they are now, about 6. 2 Billion tons, thus even with a 25% renewable electricity standard mandated by 2030, the total carbon dioxide emissions reductions in the U.S. w ould be about 4.9%. That's not much when you think that the Obama administration is saying they wanted 80% reduction in co2 emissions by 2050. So what's the issue? Why aren't we seeing

his reductions in co2 despite this massive embrace and massive subsidies and mandates for **wind**? There are two simple reasons. The **wind** is incurably intermittent and. It must be backed up by conventionally fired generation units does those generations coal-fired, nuclear powered or **gas**-fired must be either kept running or they must continually cycle and that is what is happening is that they're turning up and down coal-fired power plants and **gas** fired power plants in order to augment the intermittency of the **wind** and in doing so they are emitting just as much or more co2 as they were before we had wind. The other reason, **wind** is competing with the wrong fuel at the wrong time. **BoonePickens** spoke to last year. Ask **Pickens** what **windenergy** competes with and he will tell you its **naturalgas**. The shale **gas** revolution in the U.S. **Energy** picture essentially upside down. We've gone from a shortage to surfeit in just two years. A gentleman in the audience, asked me, you only had two pages in your book about natural gas. He said, why didn't you mention shale gas? I didn't know. No one knew. We're replacing the wrong fuel at the wrong time.01:29:41

[CC] 01:37:21 Considering the abundance of shale in the reserve and the marcellus shale, why couldn't **naturalgas**, if used prolifically, replace a lot of imported **oil** thereby addressing to some degree, not totally, **energy** independence phenomenon. I realize totally is probably not even worthwhile, but enough to allow fewer incurs into the middle east to protect fields. Well, this is what one of putting **Pickens**'s idea and I think they are is an way for **naturalgas** in the public sector. The problem were discussing at the table as it you're able to back out a little bit of diesel **fuel** as **Pickens** is proposing or are able to back out **gasoline** for passenger cars or taxis avenue still every piece in the entirety of the crude arrow. We still need asphalt, we still need propane, we saw the jet **fuel**. I mean, I do wantto get too far into the refining process, but clearly **naturalgas** is going to make roads in the transportation sector, particularly if **Pickens** gets a bill passed through the congress. And that can be a good thing. But I would be careful to make any assumption that is going to meet a dramatic reduction in overall **oil** consumption in the U.S. Or the need for U.S. **Oil** imports. Clearly, it's positive on a cleaner basis and some other reason, but the problem of **energy** in the vehicle, **naturalgas** is not nearly as dense as **gasoline** on the vehicle and we have a problem with infrastructure and refueling. It will take decades.01:38:48

**Audience:** N/A **Spot Cost:** N/A