

Overview of Shale Drilling

Presented at Athens, Ohio, January 28, 2012

Officials, farmers, people who live in rural areas, environmentalists, faculty, students and people from the gas industry:

Imagine driving down the road at 70 miles an hour and passing a drilling platform every 51 seconds, mile after mile. Then turning a corner right or left. Mile after mile the same where ever you go. This is the sight of a mature shale drilling field.

There is far too much you need to know about shale drilling to cover in 45 or 50 minutes. A speaker must keep in mind the old saw, "The mind can absorb only what the seat can endure." I hope to convey a maximum information, so I am trying a little experiment.

Teachers recognize that different people communicate in different ways. Some of us do best with verbal communication, use the telephone, don't read much and ignore our email. Others read a lot, like email, and don't use a cell phone. You will find the text of this talk on the table (describe location), which you can pick up and take for further study.

The spoken material today is in large, easily readable type. With it is background material in smaller type. This includes the background setting for the problems that will be the main topic today and numerous references to allow you to expand on what the mayor and I say.

The internet is a vast library available to everyone, everywhere. It is changing the world. Make use of it. It is a great resource for democracy.

BACKGROUND: Energy drives industrial society. Whoever controls energy is in the driver's seat. This is true on the scale of the economy and it is true on the national scale as well.

At present, as in the past, most of mankind's energy comes from burning carbon. At first it was easy to find the carbon fuels used. Wood, coal, oil and gas. Wood was first depleted by industry, but that problem was fixed by adopting coal, and then petroleum was adopted because it worked in engines.

THE UNITED STATES production of petroleum began to DECLINE around 1970. The response was to go over seas. Shortly after, the great oil companies, known as The Seven Sisters, established huge reserves overseas. The easy oil was found all over the world and it became their supply and their RESERVES. As the decades passed the world changed. People of other lands became more modern and two things happened. They recovered political control of their lands from foreigners

and TOOK CONTROL OF THEIR OWN OIL, and THEY BEGAN TO USE A LOT MORE OIL.

Today the Seven Sisters oil companies are reduced to six and they NO LONGER CONTROL THE MASSIVE RESERVES THEY HELD IN THE PAST. The United States has to buy petroleum from frequently uncertain sources. This is the principal reason for our massive overseas military presence and the fact WE SPEND MORE ON THE MILITARY THAN ALL OTHER COUNTRIES COMBINED.

The vast reserves overseas are gone. We have to compete, pricewise, with some much more populous, rapidly developing nations. The Seven, now Six, great oil companies are forced to look in the deep sea, in the frigid north, and in the tropics to get what they can sell. Technology is increasingly called on to perform greater miracles.

The second thing we need to note is that we have about played out the carbon card. If you don't believe in GLOBAL WARMING, you haven't looked at the facts. It's either because you support burning carbon for a living, or your belief is sort of a religion to you. The evidence for global warming is overwhelming.

A factor driving the shale gas lands is that, when the time comes, it will provide reserves for the great oil companies. Far more than the value of the gas pumped out of the ground, it is the FUTURE WORTH OF THE RESERVES THAT DRIVES the shale gas industry, NOT PRODUCTION. EVEN THOUGH EACH ATOM TAKEN OUT OF THE GROUND GOES INTO THE ATMOSPHERE.

This dual problem with carbon has only one answer - finding an alternative. This is the driving force behind green technology - wind, solar, biomass and nuclear. The later has its own problems, the former is not sufficiently energy intensive for use in cities, where more than half the inhabitants of the earth now live.

Also, there is an exacerbating problem with PROGRESS AWAY FROM CARBON: more than just social inertia. ENTIRELY DIFFERENT COMPANIES WILL DOUBTLESS CONTROL THE SUCCESSOR TO CARBON - and the old bull doesn't want to give up to the new one.

THERE IS A TECHNOLOGICAL SOLUTION, I'll write a little about it in the POSTSCRIPT.

I want to begin by telling a story that goes back to my youth. In 1948, I was 14 years old. My parents were quite poor, but like many families at the time, we subscribed to the old "Life" magazine.

I distinctly remember a picture of older women in Italy out in a forest which had been destroyed by shell fire, picking up wood to cook the family's meals. Other forests had not

been destroyed, but they were not to be cut down for firewood, they had a higher and better use in the future.

There are several lessons that can be drawn from this picture, not the least that WAR DESTROYS RESOURCES.

However the lesson for us today is: It's frequently not wise to rush in and use the easiest resource for one's immediate needs. We need to preserve resources, to CAREFULLY MEASURE OUT THOSE THAT ARE TRULY NEEDED, and to cultivate appropriate ways to use them to get the most benefit.

Fifty years ago this way of thinking was called "conservation," as in Soil Conservation. Some states still have the term "Resources Conservation" in the title of a department of their government. Today, the same emphasis is more often called ENVIRONMENTALISM. In fact, the two are pretty much the same idea, having the same objective. The objective is WISE USE OF WHAT WE HAVE, rather than squandering it. Conservation applies more to renewable resources, environmentalism more to non-renewable resources. Conservation thinks in terms of a few years, environmentalism thinks of the long term.

Recorded human history goes back as much as 10,000 years in places. Do we have any reason to think the present era is the termination of time? Are we like rich people on a sinking ship, gulping down the caviar because we know we will soon drown? Are we to have no thought for the future? We, in the form of our children, will have to face the consequences of our action.

So you see, there is a strong link between conservation, environmentalism and the way land is used.

I grew up on a farm and have farmed all my life. The only years I have not farmed is the three I spent in the army, one getting a masters degree and about four getting a doctorate. I have a very strong attachment to land. Will Roger is supposed to have said, "I never met a man I didn't like." As for myself I don't think I ever met a landscape I didn't like.

My view of the earth is BIBLICAL: it was put here for our use. But we are here as CULTIVATORS, not to be DESECRATORS. Our use is to be PRUDENT, not extravagant. It is to NOT destroy our resources and our selves and the good earth we have been given.

I hope THIS ties together for you three things: conservationism, environmentalism, and a moral approach to use of the earth, given our

INDIVIDUAL - INDEFINITE - TENURE - ON EARTH.

Now, lets "change gears." What kinds of problems do persons with an interest in the surface have to face with shale drilling?

First, Let's define who has an interest in the surface of the earth. Well - farmers, timber men, people living in rural areas and environmentalists, to begin with. And hunters and fisherman, people who get their water from streams, people who enjoy boating, hiking, much of the recreation industry; people who retire to rural areas, people who enjoy looking at the scenery as they drive down the road - all have an interest in the surface. We also recognize those with the strongest interest of all, PEOPLE WHO ENJOY EATING!

This is a lot of people! Their interests are very diverse. These people are VERY disconnected politically. These people know each other at the personal level, but form groups around different issues and develop different leaderships. Some of these groups attempt lobbying of some sort, but never together. THAT is an important part of the present problem. They are ill equipped to stand up to a sufficiently large, well financed, unitary assault on their interests.

In the narrow sense, not all of the COSTS of shale drilling happen to everyone. They all happen to individual people, though. IN A LARGER SENSE THEY AFFECT US ALL.

You doubtless know the complaints about shale drilling already, but lets review them:

(1) Air pollution comes from storage tanks, huge drilling ponds and compressor stations. There is a problem with treating a group of compressor stations sited close together as individual stations. When the air is still, and sometimes the wind blows right, the effluent is aggregated.

Some AIR POLLUTION arises from the drilling operation itself. At present ponds are used to hold the materials needed for drilling and fracking the shale to produce the gas, and to hold what comes back up the well when fracking pressure goes off, what is called flowback. Vapors come from the drilling mud and later the flowback from the well when pressure is released. Frequently the vapors are heavier than air and stick to the ground. 24 hour contact for families living adjacent to these ponds causes airborne health problems.

Google Lisa Parr, Allison, Texas

or

<http://www.earthworksaction.org/search?cx=005684611712308038642%3Av1dvxjtk1nu&cof=FORID%3A9&ie=UTF-8&q=lisa+Parr&sa=Search>

A common practice is flaring. This is letting the well produce all the gas it will for a certain time, using it to make a huge Bunsen Burner in the atmosphere. This is a source of pollution.

Google Buffalo Pennsylvania, June Chappel

best

<http://www.marcellus-shale.us/June-Chappel.htm>

If the gas is wet, meaning it has "natural gas liquids," these liquids are separated and stored in tanks to be shipped by truck. However, the liquids are highly volatile and evaporate constantly from the tanks where it is stored. They are invisible in ordinary light but are easily photographed in infrared. This is a source of pollution.

Well Site Condensate Tank Discharge

Notice the rocking of the tank that is discharging

<http://www.wcag-wv.org/F/Frac/Flare.htm>

There is a great number of great videos that can be accessed at the "Home" of this site. They cover a range of what we are talking about here today.

Compressor stations are frequently a problem for people living near them. They have fumes from the gas and from the engines that run them.

Google Carmichaels Pennsylvania, Pam Judy

best

<http://www.marcellus-shale.us/Pam-Judy.htm>

Global Gas Flaring Estimates

NOAA National Geophysical Data Center

A lot of gas is burned with no energy capture

http://www.ngdc.noaa.gov/dmsp/interest/gas_flares.html

Gas flaring poisons communities

<http://www.climatelaw.org/cases/case-documents/nigeria/report/section7>

Gas flaring health study shelved

[Mark Lowey](#) 01/24/2002

Insufficient funds and politics in Alberta Province, Canada.

<http://www.businessedge.ca/archives/article.cfm/gas-flaring-health-study-shelved-876>

(2) Water pollution in streams result from spills, seeps, surreptitious dumping and road accidents. storage pond walls sometimes slump down hill draining the contents. Infrequently water pollution comes up from a polluted aquifer.

The most commonly argued problem is WATER POLLUTION. There is no one who denies that "accidents happen." The big question is whether these accidents are frequent enough to be called "systematic errors," that is, a predictable result of the system, like crashes are a predictable result of use of automobiles. If they are, WHAT RULES SHOULD BE ESTABLISHED TO HOLD THEM TO A MINIMUM, AND WHO SHOULD PAY THE COST of the "mistake."

Farmer: Gas driller has invaded property

Chris Dorst, January 22, 2012

Spencer Wooddell of Taylor County says he's frustrated after two spills on his property. His neighbor's land is being drilled for natural gas.

<http://wvgazette.com/News/201107231565>

(3) Far and away the most serious complaint to many people is CONTAMINATION OF AQUIFERS.

Talk to the former mayor of Dish, Texas, Calvin Tillman

Google Dimock PA, Pavillion,WY, contamination of aquifers and drilling (2.6M hits)

Penn State Extension

An excellent source of information on many phases of shale drilling. A lot of work here. go first to "Drinking Water," top center of the page.

<http://extension.psu.edu/water/marcellus-shale>

Even the urbane, ultra-sophisticated New Yorker recognizes wide spread aquifer contamination:

Burning Love, by Elizabeth Kolbert

To the extent that the United States has an energy policy, it is perhaps best summed up as: if you've got it, burn it.

A new term has been invented to describe [the lessors]: "shaleionaires." Meanwhile, some of their neighbors...have watched their tap water turn brown and, on occasion, explode.

http://www.newyorker.com/talk/comment/2011/12/05/111205taco_talk_kolbert

Methane contamination of drinking water accompanying gas-well drilling and

hydraulic fracturing

Stephen G. Osborn, of Duke University, and others

<http://www.pnas.org/content/early/2011/05/02/1100682108>

A Tainted Water Well, and Concern There May Be More

[IAN URBINA](#), August 3, 2011

<http://www.nytimes.com/2011/08/04/us/04natgas.html?pagewanted=all>

See other articles in the series also.

http://topics.nytimes.com/top/reference/timestopics/people/u/ian_urbina/index.html?inline=nyt-per

The Role of Isotopes in Monitoring Water Quality Impacts Associated with Shale Gas Drilling

Likely the clearest distinction between gas that comes up from the deep (thermogenic) and gas that is generated from decomposition near the surface (bacteriogenic). An even-handed discussion of how they are distinguished by isotope analysis. Difficult reading for the untrained.

wri.eas.cornell.edu/index_18_2774977203.pdf

The OPERATING PRINCIPLE here is very simple:

IF YOU HAVE ENJOYED THE USE OF A WELL OR SPRING FOR SOME SUBSTANTIAL TIME AND SOMEBODY COMES ALONG AND DRILLS A WELL, FOLLOWED IN A SHORT TIME BY DISRUPTION OF THE WATER, AND NOTHING ELSE SIGNIFICANT HAPPENED IN THAT TIME SPAN, THE WELL DID IT.

I think you couldn't find one person in a hundred who would deny this proposition.

Ah, "but the devil is in the details," as they say. There are three judgment calls in this sentence: What is a "substantial" time? What is a "short" time for disruption? What else would be "significant?"

The proposition is probabilistic, that is, it is capable of expressing a very high probability (say, 1 in 10,000) but not perfect certainty. The rhetoric of law demands a cause-and-effect trail, clickety clack, down the track, to an "inescapable" conclusion. This is the nature of rhetorical understanding. It favors the accused in a trial, so it's really not bad. Enough people are wrongly convicted, anyway. (And many get away, too).

However, the ultimate cause lies underground. Is it a fracture coming up from the shale containing the gas? Is it a defect in the tubing or cement underground? Is it a crack around the cement caused by the drilling process or the subsequent fracking process? Fortunately, very fortunately for the driller, such information is almost impossible to determine. It is buried

hundreds or thousands of feet underground. Nobody ever goes there. The only evidence is the appearance of chemicals foreign to the aquifer in the water well.

"Presumption of innocence," a pillar of our law, is worked very hard here. "Persons" (INCLUDING CORPORATIONS) are innocent until proved guilty. Thus a proposition that is statistically certain can be gotten around by lack of details of particular steps in the case.

Boone T. Pickens, hedge fund manager and billionaire oilman, a major promoter of shale drilling, went on The Daily Show claiming that he personally has fracked over 3,000 wells and never witnessed any contamination cases." Of course not, he'd get his shoes dirty! It would have been more accurate to say, "Presumption of innocence allows me to say I have..., and the fact it would cost more millions than even the government has to dig these wells out and find what really goes wrong **is savng our you-know-whats.**"

Similar claims have beenmade by Aubry McClendon, Rex Tillerson, and various others.

Occasionally, a company will get cought in a bind when someone sues them. If it looks like they are going to loose, they settle out-of-court, and pay big bucks for the claimant to refrain from comment on on the price or conditions of their settlement.

The case of Stephanie and Chris Hallowich is particularly interesting. They sued Range Resources for contamination of their air and water. Range Resources settled, binding them not to reveal the settlement. Two newspapers sued to have the settlement made public. The judge denied their request, saying they should have filed before the case was settled. The Hollowich's are now suing Range again, saying Raange turned in to the Internal Revenue Service a value for their property of \$500,000, when the settlement actually called for a value of \$100. (At this point I presume the rest was for keeping their mouth shut, and both parties knew tax advantages of this arrangement, almost certainly suggested by Range Resources and not known to simple country folk.)

References for Hallwich incident, dozens more if you Google

<http://www.post-gazette.com/pg/11237/1169736-58.stm>

<http://shale.sites.post-gazette.com/index.php/news/archives/24176-hallowich-family-files-court-action-against-range-resources>

The FLOWBACK, the water that comes back up the well after pressure is taken off, contains a whole zoo of chemicals dissolved from the shale itself, in addition to the chemicals the drillers put down the well. At the high temperatures and pressures below, many compounds are soluble in the drilling mud and frack solutions. What comes up is SEVERAL times as salty as sea water.

Certain poisonous elements including but not limited to Barium, Strontium, and radioactive Radium 226 and Uranium are present in flowback at some locations.

Bromide is characteristic of water from shale wells. It distinguishes pollution coming from

shale wells, compared to pollution coming from coal mines. Unfortunately, bromide reacts with the chemicals used in ordinary water purification to produce compounds called TRIHALOMETHANES, which are detrimental to health in infinitesimal quantities. This is a continuing problem in Western Pennsylvania.

Well Cementing

Second Edition – Erik B. Nelson, Dominique Guillot

This text book blurb gives some indication of the complexity of "getting it right." "Well cementing draws on several disciplines, including chemistry, mechanical engineering, fluid mechanics, mathematics, and geology."

http://www.slb.com/resources/publications/books/well_cementing.aspx

Cementing, Mainstay of Oil Drilling, Is Prone to Failure

By [RUSSELL GOLD](#) and [BEN CASSELMAN](#), OCTOBER 30, 2010

http://online.wsj.com/article/SB100014240527023048796045755826939_51448732.htm

1

DEP inspections show more shale well cement problems

By Laura Legere September 18, 2011

In state where there is a glorious inadequacy to properly check wells being drilled.

<http://thetimes-tribune.com/news/dep-inspections-show-more-shale-well-cement-problems-1.1205108#ixzz1kVHDLwfp>

Some of contamination of aquifers MAY be caused by cracks in rocks that run all the way down to the drilling level, but PROBABLY MOST RESULTS FROM FAILED CASING WORK. The industry culpability here is double - they have reflexively denied it happens, and the failure of casing work, if established, is a huge error in the technology.

Governor Earl Ray Tomblin of West Virginia must take a hit here also. While the bill he sponsored contains some minimum casing and cementing standards, it removes more than 20 pages of standards included in the Select Committee bill, and authorizes DEP to promulgate additional standards by rule. This shows what the industry wants.

Worse still is the fact CASING LEAKS CAN ONLY GET WORSE WITH AGE. The water in MANY aquifers is known to move slowly. In some cases the contaminated water from the leaking gas well will get to the water well years or decades later. Also CONCRETE AGES and STEEL CORRODES. - Ten years, one hundred years - when do you think the clean water WON'T be needed?

There is great interest in water testing now, both streams and wells. The idea is to establish a

BASELINE, the condition of the water BEFORE drilling takes place. There is no governmental agency which has this information, the work has never been done. Environmental groups are now forming and equipping to test streams.

Your own well is YOUR responsibility. If your water is ruined, you need proof of what it was like BEFORE drilling. There is no end of sophisticated arguments that can be used against you if you do NOT have proof it was good in the past. You need professional help, which may be expensive. You need more information on this, but there simply isn't time to go into it properly today.

Suggested tests for well. This is an extended list to pinpoint specific expected contaminants. Most would find this set and someone to sample very expensive. If you test it yourself, they'll claim you cheated. Stared items constitute a quickie test to determine something has happened.

arsenic

barium

benzene, toluene, ethylbenzene, and xylenes (BTEX)

calcium

chlorides

hardness

lead

manganese

methylene blue active substances (MBAS)

oil and grease

sodium

strontium

*total dissolved solids (TDS)

total suspended solids (TSS) * alternate, observe color, cloudiness

*add pH for quickie

from <http://www.mtwatershed.com/marcellus.html>

(4) Heavy trucks DESTROY inadequate roads. Accidents are caused by drivers who are stressed out. There are problems with school busses on rural roads. Wetzel County, West Virginia is a horrible example of this, but it is a common complaint elsewhere in the East. Huge equipment must go to the site. Each well requires a lot of big truck traffic, 5000 TRUCKLOADS of water per well and the DIESEL FURL and the PIPE must be carried in. The

WASTE must be carried away. There is also an endless string of pickup traffic, consisting of workers, overseers, and so on, which can cause serious overload on farm-to-market roads.

I visited a Marcellus site on a farm owned by a forester friend in Northeastern Harrison County where they had even hired a woman who used a CB radio to direct truck traffic through a particularly congested spot! In another location the big eighteen wheelers had bumped into a bridge abutment so much it failed and gave away. I know of a doctor who was kept from all of her appointments one day.

Try the first reference for pictures, then the others, which are articles.

Wetzel County Action Group

http://www.wcag-wv.org/A/Accidents/10-0407_SandTruck/index.html

<http://www.wcag-wv.org/B/BrockRidge/Blocked/index.html> http://www.wcag-wv.org/A/Accidents/10-0104_Rig241_Loose/index.html

http://www.wcag-wv.org/A/Accidents/09-1210_KK_TorqueTesting/index.html

http://www.wcag-wv.org/A/Accidents/09-1210_KK_TorqueTesting/index.html

and more from the same site

Marcellus Shale industry obliged to repair state roads

Wednesday, June 22, 2011

By Jon Schmitz, Pittsburgh Post-Gazette

State police Maj. Harvey Cole Jr. said that in response to significant increases in truck traffic, the department had conducted 5,800 roadside inspections of industry trucks since January 2010 and found 13,000 driver and vehicle safety violations, including 2,800 serious enough to put the driver or truck out of service. In all, 42 percent of the inspections resulted in pulling drivers or vehicles out of service, he said. The national average for all truck inspections is 24 percent.

<http://www.post-gazette.com/pg/11173/1155319-503.stm>

EQT official says Friday's fire result of pipe erosion

Christie Campbell 10/19/2011

<http://www.topix.com/forum/city/marianna-pa/T8LMA5UUMALTFULUQ>

Google Operation FracNET many articles on outlaw trucks and drivers in Pennsylvania.

(5) Another complaint is the form of leases, and lease men who pit one neighbor against another. Some mineral owners have signed leases for "dry" gas, thinking this meant the water was taken out, when in fact it means taking out the gas liquids, the most valuable part. These lessors GAVE AWAY the "CREAM" of what they were selling. Like many sales jobs, a lease man receives a minimal amount plus a sum which depends on the leases he takes.

This results in a "race to the bottom" ethically. "Any which way you can" is the motto.

If you are the first to sign, you get the minimum. The longer you hold out, the more you get.

Companies sell leases without the lessor's consent, making a quick buck off your gas for the first lessee. Claims like "you neighbor has signed" and "I'll keep coming back until you sign it" and "we can't hurt you, state laws are protecting you" are par for the course.

Some suggestions

- Ask for a right of first refusal at the end of the lease. If a lease expires, that gives people the power to seek a better deal from another company.
- Limit the types of formations and mineral rights in the lease. This prevents drillers from getting free or cheap control of other minerals like coal or to hydrocarbons from other formations under the land.
- Ask to block or have final approval on surface use. With the right lease provisions, landowners can have a say where a well pad or access road goes, and maybe even block those impacts from their land altogether.
- All special agreements should go in an addendum to help clarify a lease.

'Talking points' for gas company land agents?

August 8, 2011 by Ken Ward Jr.

<http://blogs.wvgazette.com/watchdog/2011/08/08/talking-points-for-gas-company-land-agents/>

Learning Too Late of Perils in Gas Well Leases

By IAN URBINA and JO CRAVEN MCGINTY, The New York Times, December 02, 2011

<http://www.nytimes.com/2011/12/02/us/drilling-down-fighting-over-oil-and-gas-well-leases.html?pagewanted=all>

Oil giant's shell game nets elderly farmers

Promises made, but not kept, and it's all legal

By Joshua Schneyer and Brian Grow, Reuters

updated 12/28/2011

http://today.msnbc.msn.com/id/45804987/ns/business-us_business/#.TwObg0puEfl

Bonanzas that end badly: Cautionary tales from Marcellus Shale windfalls

Sudden wealth can bring unexpected legal consequences

By Tim Grant, May 30, 2011

Receiving wealth breaks up families and poses estate planning problems.

<http://www.post-gazette.com/pg/11150/1149542-499-0.stm>

Campaign aims to save state parks from drilling

By Don Hopey, Pittsburgh Post-Gazette, September 29, 2011

<http://www.post-gazette.com/pg/11272/1178431-503.stm>

The smart way!

Group Seeks to Lease 40K Acres to Drillers

By CASEY JUNKINS **October 5, 2011**

<http://www.theintelligencer.net/page/content.detail/id/560240.html>

(6) Corruption of the political process. The industry has spent three quarters of a BILLION dollars on lobbying since 2000 according to one source. There are complaints of a lot of "rubber stamp" policing. The industry enjoys low taxation of what appears to be lucrative business. Everything connected with shale drilling is always "looking for a tax break."

Fracking for Support: Natural gas industry Get the cartoon on the second page.
also **Deep drilling, deep pockets** on the same page

<http://www.commoncause.org/site/apps/nlnet/content3.aspx?c=dkLN K1MQIwG&b=4952201&ct=8384931>

The whole series of deep pockets reports may be found at

http://www.commoncause.org/site/apps/s/google_search.asp?q=Shale+Drilling&btnG.x=16&btnG.y=10&entqr=0&sort=date%3AD%3AL%3Ad1&output=xml_no_dtd&c=dkLNK1MQIwG&ie=ISO-8859-1&client=commoncause_frontend&b=3243345&ud=1&site=commoncause&oe=UTF-8&proxystylesheet=commoncause_frontend

<http://marcellusmoney.org>

Lists campaign contributions by Marcellus companies for Pennsylvania politicians.

Corbett quietly turning off the lights on renewable energy

The Corbett administration is de-emphasizing renewable energy and energy conservation, eliminating programs created by previous Democratic and Republican administrations as it focuses on natural gas energy from booming Marcellus Shale.

Sunday, August 14, 2011

By Don Hopey, Pittsburgh Post-Gazette

<http://www.post-gazette.com/pg/11226/1167245-454.stm>

Puny fines, scant enforcement leave drilling violators with little to fear

Mike Soraghan, E&E reporter

Greenwire: Monday, November 14, 2011

<http://www.eenews.net/public/Greenwire/2011/11/14/1>

As hydrofracking decision nears in N.Y., industry spending soars

By Thomas Kaplan, The New York Times

The hydrofracking issue has created a cottage industry for paid lobbyists. The gas drilling industry --

which spent more than \$1 million on lobbying in the first eight months of this year -- previously had little business in the capital. One major gas driller, Chesapeake Energy, has spent more than \$1.6 million on lobbying over the past three years. In the three years before that, it spent barely \$40,000. -

<http://www.post-gazette.com/pg/11330/1192706-84-0.stm?cmpid=news.xml>

Reaping the riches: Corbett's gas advisers give industry control in Pa.

Tuesday, March 15, 2011 Pittsburgh Post-Gazette

<http://www.post-gazette.com/pg/11074/1131966-192.stm>

Changing Priorities: Science Funding Slashed Under Corbett Administration

By [Scott Detrow](#), January 18, 2012

Members of Pennsylvania Gov. [Tom Corbett's](#) administration routinely insist their Marcellus Shale drilling policy is based on science.

But documents obtained by StateImpact Pennsylvania, as well as interviews with more than a dozen people who work both inside and out of state government, high light top-level decisions to diminish or defund drilling-related scientific research in the commonwealth. Scientists say the decline in government-funded research during the first year of the Corbett Administration leaves open questions about how animals, wildlife and the climate are affected by Pennsylvania's drilling boom.

<https://stateimpact.npr.org/pennsylvania/2012/01/18/changing-priorities-science-funding-slashed-under-corbett-administration/>

Puny fines, scant enforcement leave drilling violators with little to fear

Mike Soraghan, E&E reporter

West Virginia, a state with 56,000 wells, issued 19 penalties last year

This is a very good article, covers all drilling states

Greenwire: Monday, November 14, 2011

<http://www.eenews.net/public/Greenwire/2011/11/14/1>

Cheney's Culture of Deregulation and Corruption

How Bush Administration Inaction Created the BP Disaster

What Chaney had to do with shale drilling at the Federal level

By [Joshua Dorner](#) | June 9, 2010

http://www.americanprogress.org/issues/2010/06/cheney_deregulation.html

(7) Loss of surface area due to occupation and subsequent pollution of the site. The huge surface area removes from its present use such things as farming, timber, hunting and fishing, recreation. It simultaneously prevents OTHER KINDS OF DEVELOPMENT. There are four principal footprints.

The first is drilling pads, which are graded, usually into the subsoil, and rocked deep enough with crushed stone to support industrial weight trucks in all weather.

After the well is drilled, the pad is subject to reclamation to reduce erosion. The practice is to drill one well or a few and move on to another pad. Then at some later time (or times) they plan to come back and drill other wells, requiring reopening the pad and revegetation after each new drilling.

This is the practice because the objective is to get and hold reserves, rather than to produce gas.

The many wells now being drilled are being put in **THOUGH THE MARKET IS DEPRESSED WELL BELOW THE ECONOMIC RETURN FROM THE WELL**. At the present time wells are being drilled on the assumption gas prices will rise. It is said some wells are being drilled which will pay off only at eight dollars a thousand for gas, while gas today brings slightly more than two dollars a thousand.

This is the reason for the hurry to export gas overseas. **TO GET RID OF PRESENT EXCESSIVE SUPPLY**. Can you see what competing with China's industry will do for YOUR gas bill? **THE OBJECTIVE IS TO BUILD RESERVES** for the individual company. It's caused by inter-company competition to grab the maximum of this limited resource. It is needed to get a return on this very expensive, very highly speculative investment.

What part does the public interest play in this decision process? What part does fuel security for the U. S. play? What part does reasonable cost fuel for use by homeowners and small business play?

The second footprint is the access roads. They will be heavy rock base roads until the enterprise is completed. There will be no production on the road at all, and at best only a little poor pasture on the pads.

The third footprint is the pipelines from the wells to a collecting line and on to the customer. These are highly susceptible to slips. I've seen some duzeys. By removing the tress, the hillsides are destabilized. They will be kept open to work on the pipe lines until the gas is gone. My personal guess is that will be 40 years.

A lot less than the companies claim.

Trees are harvested at about 70 years of age in Appalachia. By carefully going around the younger trees you can get a cutting about every 35 from a forest. Trees won't be able to get a start on pipelines for more than 40 years and with 70 years to the first crop, pipelines, the

LEAST damaging footprint, the pipelines, will take the land out of production for 110 years or more. - Whether the trees will grow normally on right-of-ways afterwards is another question.

The fourth footprint is compressor stations, which are copious generators of fumes, noise and light. These are regarded "point sources," but in places they are so close together that when the wind does not blow for a while, or when a gentle wind blows in a certain direction, fumes spread out and combine from several sources. Such cases are said to be "aggregated," but at present this condition is not recognized in law.

The area affected by shale drilling is vast, projected to be tens of thousands of square miles, one drilling pad per mile, 10 to 15 acres for the square mile. In a little bit I will estimate how much land will be tied up by shale drilling in Appalachia if present indications work out.

(8) Explosions. When explosions occur on the rig,

they are always big news items. A couple of decades or so ago I saw a old-type Benson well that caught fire on Frog Run, four miles from where I live. It was pretty impressive, but must be very small compared to the blowout of a shale well. This is one of the serious hazards the roustabout well worker faces. Sometimes tanks catch fire on well sites, too. The risk on the well site is primarily to the workers. If a local fire department is called in, fighting the fire may be beyond their training.

Pipeline explosions mostly occur due to poor welds. The pressure in the lines is far below what occurs in wells when fracking. Explosions are rare, but may have severe consequences when they happen.

Problems in distribution lines are not the shale driller's fault. Distribution lines are apt to be old. They are mostly due to pipes that corrode through. They were put in place before modern methods of protecting steel from corrosion were adopted, and they have continued in use past the reasonable life expectancy of the lines.

Three years after drilling, feds say natural gas in Medina County well water is potentially explosive

Houses apt to explode from gas leaked through water wells

<http://www.ohio.com/news/local/three-years-after-drilling-feds-say-natural-gas-in-medina-county-well-water-is-potentially-explosive-1.255525>

Powerful Pipes, Weak Oversight

By Joseph Tanfani and Craig R. McCoy , Dec. 10, 2011

http://www.philly.com/philly/news/special_packages/inquirer/marcellus-shale/20111208_Gas_lines_proliferating_in_Pa_are_lightly_regulated.html?viewAll=y#ixzz1kChxnMvl

Stray gas plagues NE Pa. Marcellus gas wells

Last month *CBS News* reported at least 6,500 spills, leaks, fires or explosions nationwide at wells and pipelines in 2010 alone. <http://www.cbsnews.com/video/watch/?id=7362587n&tag=related;photovideo>

Google well explodes

(9) Health issues. This is one of the most contentious areas of complaint. There are an untold number of cases. They are IGNORED by the drilling companies - hardly even denied, the way destruction of aquifers is. For the industry it is also one of the most devastating complaints, both in terms of public sympathy and in terms of influence on investors. Even the most wild-eyed investor can't ignore human suffering.

The good news is that the Public Health Industry is onto the problem. Many meetings of scientific and governmental organizations have been held in the past year focusing on public health issues of shale drilling. Health issues come both from both polluted water and polluted air. Mayor Tillman has talked extensively about these, so I will go on.

Doctor Wants Study of Drilling's Impact

SHELLEY HANSON, September 28, 2011

The impact of hydraulic fracturing on the public's health still needs to be studied, said Dr. Alan Ducatman.

Ducatman, West Virginia University School of Public Health dean, made the point during a program held Tuesday at Ohio Valley Medical Center in Wheeling. The program, "Marcellus Shale Drilling: A Health Perspective," was hosted by the Ohio County Medical Society, OVMC and the Wheeling Area Chamber of Commerce.

<http://www.theintelligencer.net/page/content.detail/id/559972.html>

Impacts of Gas Drilling on Human and Animal Health

New Solutions, Vol. 22(1) 51-77, 2012 (A scientific Journal)

Conclusion

Animals, especially livestock, are sensitive to the contaminants released into the environment by drilling and by its cumulative impacts. Documentation of cases in six states strongly implicates exposure to gas drilling operations in serious health effects on humans, companion animals, livestock, horses, and wildlife. Although the lack of complete testing of water, air, soil and animal tissues hampers thorough analysis of the connection between gas drilling and health, policy changes could assist in the collection of more complete data sets and also partially mitigate the risk to humans and animals.

Without complete studies, given the many apparent adverse impacts on human and animal health, a ban on shale gas drilling is essential for the protection of public health.

In states that nevertheless allow this process, the use of commonsense measures to reduce the impact on human and animals must be required in addition to full disclosure and testing of air, water, soil, animals, and

humans.

http://ccetompkins.org/sites/all/files/8/Bamberger_Oswald.pdf

Google Shale drilling health effects or specify your interest

(10) Life style issues. What about "QUIET ENJOYMENT OF THE PROPERTY." No quantitative value is put on this, but that is the primary reason many people choose to live in the country. The small owners, in terms of acres, are the worst hit. Who has room for a house and a Marcellus well on a small tract?

Hunting and fishing are big business, and real cash values are assigned to it. Your DNR can tell you what the hunting in each county is worth.

I have paid hunting on my property. I can't shoot straight and don't have the patience to hunt. Paid hunting helps to pay the bills, though, believe me. And it supplies 24 payees with venison, several days of recreation and a lot of good stores.

Would you seek a retirement home among the well pads? Retirement is big business where there is low crime, nice scenery and quiet.

Like to drive down the highway and look at industrial installations? Like to go to camp among the right-of-ways? If you think these interests will be diverted to other areas, look at a map of the shale drilling areas in the U. S. and you'll see what is going to be left. About all that many people will be able to do is to sit in front of the TV and watch glorious pictures of the out-of-doors elsewhere.

(11) Transient workers. This is a difficult topic to discuss. Many are, doubtless, fine people. BUT THE RECORD SHOWS QUITE A FEW ARE NOT.

These guys work very hard 7 days a week, 12 hours day. It is dirty. It is dangerous. THERE IS NO SAFETY OVERSIGHT. It is like working for the Chinese. - You know, "When you are gone there are plenty more to replace you."

Hourly wages are high, but conditions are so difficult it attracts drifters. Work a few months for this one, work a few months for the next one. get in trouble, just move on.

The income IS attractive, BUT as they used to say about horses, "they are worked hard and put away wet." A few in an area are not too bad, but when the number grows problems develop that are associated with a footloose population: problems in the living area like trash

and congestion, drunkenness, rowdiness, prostitution, STD's and broken families.

They have no union - and no regularity, just "pedal to the metal" all 24 hours.

The 10 Worst Jobs of 2011 From CareerCast.com

From bad to worse: thanks to upheaval in the oil industry, **Roustabout ranks as the Worst Job of 2011** – its second straight year in last place. Twelve-hour shifts, exposure to the elements in hostile environments, low pay, high risk of injury and isolation from loved ones for weeks at a time are just some of the factors that combine to make Roustabout the worst job of 2011.

As the key providers of maintenance for oil rigs and pipelines, Roustabouts routinely perform backbreaking labor at all hours of the day and night in conditions that can range from arctic winters to desert summers to ocean storms. They even face the threat of attack in unstable parts of the world. Braving these inhospitable surroundings, Roustabouts work on the front lines, getting hands-on with dangerous drilling equipment and risking serious injury or worse – as last year's explosion at the Deepwater Horizon facility in the Gulf of Mexico illustrates.

<http://www.careercast.com/jobs-rated/10-worst>

Sheriff: Alien Labor Used

Drilling contractors used illegal immigrant workers, Hoskins says

<http://news-register.net/page/content.detail/id/551672/Sheriff--Alien-Labor-Used.html?nav=515>

Rig Workers Accused of Poaching

By [Scott Detrow](#), January 20, 2012

More from the drilling-relate crime blotter: seven gas rig workers accused of poaching appeared in a Wyoming County courtroom yesterday. <https://stateimpact.npr.org/pennsylvania/2012/01/20/rig-workers-accused-of-poaching/>

(12) Population scale issues. Like (10) this is a problem dispersed over many people with no one having a highly conspicuous cost. Population scale issues include bromides in Pennsylvania and global warming. Displacement of "green energy" efforts. Bromides are well documented in the news. The Pittsburgh papers have had several articles concerning it.

Gas Drillers Invade Hunters' Pennsylvania Paradise

By [KATHARINE Q. SEELYE](#), November 11, 2011

<http://www.nytimes.com/2011/11/12/us/pennsylvania-hunting-and-fracking-vie-for-state-lands.html?pagewanted=all>

Hunting club contends with spring contaminations from drilling

By Don Hopey, Pittsburgh Post-Gazette, June 05, 2011

<http://www.post-gazette.com/pg/11156/1151527-503.stm>

State's laws offer little shale drilling protection to archaeological sites

By David Templeton, Pittsburgh Post-Gazette, May 08, 2011

<http://www.post-gazette.com/pg/11128/1144994-178-0.stm>

Green energy is what we WILL have after all the carbon is burned, but we really need it much sooner. Years ago I took an Organic Chemistry course to Dr. Charles Lazelle at WVU. I well remember him saying, "It is a shame to burn fossil fuels, you can make such wonderful things from them." These things include plastics, detergents, lubricants and medicines, to mention a few.

If you "DON'T BELIEVE IN GLOBAL WARMING," you either work for a fossil fuel company or you accept it like a religion - the belief is a constant, and you have to fit the all rest to it. - The EVIDENCE is ALL for global warming.

As for the fossil fuel company employees, one thinks of the quote from Upton Sinclair: It's hard to get a man to understand something when his salary depends on his not understanding it."

As for the rest of the argument, Google "global warming." The page starts with "Scholarly Articles for Global Warming," an article from Science, one of the two world leading science journals, and an entry leading to the EPA statement. The proof is in pictures, measurements, aerial photos, chemical analysis, etc.

I recently read that 98% of climate scientists accept Global Warming. Many of the hold outs are in Russia, where they are afraid of a glacial return.

New approach to determining human impact on climate gives same answer

By [Scott K. Johnson](#) reprinted from *Nature Geoscience*

http://arstechnica.com/science/news/2011/12/new-approach-to-determining-human-impact-on-climate-gives-same-answer.ars?utm_source=rss&utm_medium=rss&utm_campaign=rss

The twelve above are what I call the "dirty dozen" that you may have heard about. The last I will talk about is the "yet-to-be-discovered-but-sure-to-happen thirteenth:

(13) DEVALUATION OF SURFACE VALUE. Suppose you have a ten acre lot in the country. Nice house, maybe keep a horse or two, or maybe some cattle, have a garden. Boom! Along comes a gas well. Three acres for a drill pad, two for access road pipelines and erosion control.

Now what is the place worth NOW? Can you sell it for the old value? That installation is the size of several football fields. Does it make the place more attractive? do you get as much produce off of it?

Homeowners and Gas Leases: Boom or Bust?

As fracking spreads across 34 shale-rich states, the \$6.7 trillion secondary mortgage market – which holds 90 percent of the nation's home mortgage debt – could get left bearing the liability; American taxpayers are next in line. Westchester is included. *Elisabeth Radow, Esq. is an attorney at Cuddy & Feder LLP in White Plains*

http://www.lwvny.org/advocacy/hydrofracking/NYSBA-Journal_1211.pdf

Dry but authoritative . Google Elizabet Radow for news articles.

Three Bedrooms, Two Baths, and a Gas Lease by Sue Smith- Heavenrich *Broader View Weekly*, March 20, 2009

www.tiogagaslease.org/images/BVW_03_20_09.pdf

This is what you get. (hold up a screw)

EVERYONE OF THE THIRTEEN is a REAL COST of drilling - that is, it wouldn't have happened if the drilling hadn't taken place. Regardless of any legal sophistication otherwise, it is a real cost to society. Your tenure on the "farm" is for your lifetime. The factors which deplete your value of the property also cost the future tenants and future society.

This is what economists call "EXTERNALIZATION OF COST." The drilling company is legally entitled to drill. But the effects of drilling are a COST THEY AVOID. These costs are put off on someone else. The land owner, the rural resident, the person who drinks effected water down stream.

You may think you own your farm, but they have a right to come and take EVERYTHING THAT MAKES IT WORTHWHILE TO OWN. They can take away PRODUCTIVE CAPACITY, making it MORE DIFFICULT TO PAY YOUR DEBTS. They can make it more DIFFICULT TO SELL.

How do you think a rational LENDING AGENCY would act toward property which has drilling, or is likely to HAVE drilling in the foreseeable Future?

Few of us can ante up the full price of a farm or residence.

What do you think insurance for your livestock should be in an environment where they may be exposed to effluent from drilling? or LEAKAGE FROM A MIINI-BROWNFIELD for years? Will the insurance company "swallow" the risk? Should a cost of drilling (that is, the risk) belong to the insurance company?

Suppose everybody's property values go down, as they surely will. Will the assessment go

down when the assessor catches on? If it goes down and the property tax goes down, as it is supposed to, who gets hurt? The primary use for property tax is for education. School children become the victims? Think about it.

Large scale devaluation of property due to massive, MILE AFTER MILE surface disruption is not discussed this far south, but it is a problem that is being recognized in northern Pennsylvania and New York. You can see it a few miles away in Wetzel County, West Virginia, where some of your fellow Athens County people recently took a tour. A drilling pad every square mile for 100,000 square miles of Appalachia alone! Not everyone will be hit by all the "dirty dozen," but every single person in the area drilled will be hit by the thirteenth.

Making reasonable assumptions, that amounts to removing two average size Ohio counties in from Appalachia. This includes Utica Shale, and Marcellus shale.

Shale drilling is perfectly legal. Perfectly consistent with the existing law. These rights have been carefully built into the law for one hundred and fifty years by the oil companies astute lawyers. Lease language doesn't specify the driller gets the one resource the driller wants. It says he gets EVERYTHING down to the CENTER OF THE EARTH, and FOREVER, THROUGH ONE SIGNATURE.

Experience shows they find a way to avoid giving lease up. If one well in a lease is giving off a trickle the lease is still "producing." The lease on the farm where I grew holds over five hundred acres. My grandfather sold part of it, that owner sold part of his, and the well stands on property belonging to the heirs of the third man. It still holds the lease although it hardly gave enough to supply two houses when I was young, 60 year ago. It is at least the fourth company that holds the lease, companies having been sold time after time.

It is not a deal between one person to recover a particular resource and another who owns it. It is a deal between one "person" WHO NEVER DIES (the corporation) and the CURRENT owner of the resource for all the line that follows him - FOREVER.

My predecessor-in-title, the second generation back, 80 years ago, Dr. Fleming Howell, certainly had no intention of signing over the aquifers on the farm, and any more than a slight temporary portion of its production capacity. He was an able man, somewhat of a high-flier. He managed to go bankrupt, and he had NO CONCEPTION of how the lease he gave in the 1930's would be construed today.

There are a lot of other things Dr. Howell could not have foreseen. The world is filling up. How many billion now? How long for the next billion? EVEN THE ATMOSPHERE IS POLLUTED WITH THE WAY WE GET ENERGY. EVERY ATOM of fuel THAT COMES OUT

OF THE GROUND GOES INTO THE ATMOSPHERE. If you think more cheap fuel is going to solve THAT problem, THINK AGAIN. The more expensive fuel is, the quicker we get on to the next energy source. (More about that in the POSTSCRIPT.)

Not only is the world getting filled up, many resources are being used up. I was horrified a few years ago to learn the fertilizer ingredient rock phosphate has less than forty years supply left. I can guarantee there is no substitute for phosphorus.

It is the nature of resource recovery that the "easy pickin's" are taken first. Hubbert's peak oil marked the passing of easy oil in the United States in 1970. The easy oil is gone. We depended on the Middle East for decades, but the natives are taking charge and the Great Oil Companies no longer have the huge reserves they once had - reserves are now in the hands of the National Oil Companies.

This calls for desperate measures. Either we have to accept degradation of other resources to obtain energy or we have to look for a new paradigm, a new source of energy. Shale drilling as it is now constituted is an IMMATURE, VERY DIRTY process, whether allowed by law and covered up by Public Relations (PR) or not. The first shale drilling incorporating all the features of the type expanding so rapidly today was done in 2003, LESS THAN TEN YEARS AGO. Some of the NAMES for part of that process are the same as for the four Benson wells drilled during my years on the farm, but the SCALE and MUCH OF THE TECHNOLOGY is utterly different.

There is no better indicator that the petroleum industry KNEW IN ADVANCE that the process is DIRTY than the "Halliburton Loophole" built into the 2005 Energy Act. Shale drilling is exempt from half a dozen national policies, including the CLEAN AIR ACT, the CLEAN WATER ACT, the SAFE DRINKING WATER ACT and the SUPERFUND ACT, the law which makes a polluter LIABLE TO CLEAN UP HIS OWN MESS.

The industry has spent three-quarters of a BILLION dollars on lobbying alone at the Federal and State levels since 2000. The governor of ONE adjoining state received 1.6 MILLION dollars for his campaign. EXAMINATION OF THE RECORD SHOWS THE INVESTMENT PAID OFF. In ANOTHER adjoining state a Special Committee of the legislature worked weeks putting together a bill for shale drilling, only to have it radically adjusted FOR THE INDUSTRY, BY THE GOVERNOR before presentation for voting.

Present day shale drilling is immature. It leaves a very large part of the resource in the ground, with neither plans nor hope to recover the rest of it. THIS IS THE LAST OF THE GAS. Foolishly, this last gas is being rapidly ripped out of the ground. It is being taken, all at once, without a chance of improving the technology as time passes. Now the plan is to export THIS GAS to the United States ECONOMIC COMPETITORS, China, India, Indonesia and Japan. How SMART is it to sell energy to China and at the same time maintain 11 AIRCRAFT CARRIER BATTLE GROUPS to keep her in place?

We need to move on to a new paradigm, a new energy source. The money invested in Shale drilling is MISS-ALLOCATED. It does not meet the world's long time best interests. (More of that in the written POSTSCRIPT below.)

IN CONCLUSION

Everyone has to fight his own battle in this, as far as his own property is concerned. It is your property against one of the greatest concentrations of wealth ever known. But we have the law, such as it is. And you have your MIND and TIME TO THINK AND TO LEARN. You must be well informed, you must keep your eyes open and you must consult with other people. Stick your head in the sand and they will COVER UP THE OTHER END!

We need to COOPERATE to move the political process, too. It is hard work and difficult for people who have many other responsibilities. Ultimately, it is the only hope.

POSTSCRIPT We humans are entering a period of insufficient resources for our expanding population. Everyone who reads knows about "the exponential curve" of increasing population. We recently passed another billion in population. Every new person commands more resources. Our local problems are a part of a much larger background problem. NOT ONLY MORE PEOPLE, BUT MORE RESOURCES ARE NEEDED PER PERSON. It is said if every Chinese lived like the average American it would take five earths to supply the raw materials! The Chinese are doing something about population, but soon the Indians will have a even larger population than the Chinese.

EACH of the damage points I made previously was expressed as a problem of the persons affected, people who dwell in the rural areas and those who own property there. That is not the whole story, many of these damages involve ENVIRONMENTAL SERVICES. That is, each of these damages may be considered destruction of something the environment provides. Some of them are lost forever, some an indefinite, very long time. WE All have an interest in them.

UNPOLLUTED AIR, UNPOLLUTED WATER, PRODUCTIVE SOIL are ENVIRONMENTAL SERVICES, which can be used over and over FOREVER. Once lost they are not usable.

Let me remark here that this, to some degree, is a RURAL-URBAN PROBLEM, too, like many environmental problems. The urban population doesn't see the problems, doesn't ever go near them, and wants the product. Only the more enlightened urban dweller worries about the source of his goods. Urban dwellers get enthusiastic when their water supply is at risk, though! New York and Buffalo are witness to that.

Losses to rural people and land owners (and the environment) are a fine example of what economists call EXTERNALIZATION OF COSTS. The industry takes an initiative to produce gas, and it has certain costs which it must pay itself - machinery, labor, fuel and chemicals, to mention a few. But "the neighbors" have to pay for reduction in the value of property, loss of income or health costs, and inconvenience.

The industry does not have to pay for environmental services lost to future generations, nor for the additional difficulty of removing the 90% or so of the gas left in the ground, if it ever can be. HUGE COSTS LAID OFF ON OTHERS. EXTERNALIZED. Drillers win, we all lose, because the energy is not needed immediately. The proof of this is the price they get for it.

THERE IS AN ALTERNATIVE. Since World War II, and among certain scientific circles before that, an almost unlimited source of energy has been known. The fuel can be derived from water, including sea water. A thimble full produces as much energy as an eighteen wheeler load of uranium, or many trainloads of coal. And there is very little residual radioactivity.

The process is FUSION. It requires huge scale reactors because the temperatures involved are so high. But science is working on it. Several different ways to do it are being tried. At least four United States companies are trying to accumulate capital to try the reaction they are working with. A recent assessment is here:

<http://www.guardian.co.uk/environment/2011/aug/23/fusion-power-is-it-getting-closer>

another here:

<http://www.popularmechanics.com/science/energy/next-generation/is-fusion-power-finally-for-real>

As said above, ultimately shale drilling is a misdirection of capital. The world desperately needs a "Manhattan Project Style" approach to develop fusion. This would avoid environmental problems, avoid the problems with fission, including

resource exhaustion, and would make so much energy available things we couldn't dream of now would be undertaken.

Science Vol. 334, p. 1355

These include unlimited hydrogen for fuel, synthesis using carbon dioxide to make hydrocarbons and alcohols (a starting material for about everything else), and, using nitrogen from the air, ammonia (a fertilizer used in large amounts and a starting material for synthesis of still more chemicals).

"Manhattan Project Style" research would require a political approach because only a government has the power to pull together the resources needed. We need public awareness. As I see it, the greatest problem with a political approach is - the old bull doesn't want to give up to the new one. The old concentration of money doesn't want to have a new concentration of money grow.

The old bull has been very successful on managing the law in its favor for 150 years and in offloading its very real cost on rural folk and future generations. It will want to go on and on until the inevitable occurs - exhaustion of the resource.

People and global warming be damned.

GENERAL REFERENCES

Shale Gas: A Boon That Could Stunt Alternatives, Study Says

<http://news.nationalgeographic.com/news/energy/2012/01/120117-shale-gas-boom-impact-on-renewables/>

What You Need to Know About Natural Gas Production"

Chemicals used in Natural Gas Operations

Theo Colborn, Pd. D. one of the top experts in ENDOCRINE DISRUPTERS in the U. S. 47 minute video and associated materials. See especially "Prenatal Origins of Endocrine Disruption." Vertical wells in Colorado, but the same materials used in the East.

<http://www.endocrinedisruption.org/chemicals.video.php>

Individual Wells Slump as Fracking Booms

By Luke Jones - 11/28/2011

Well lifetimes are short, but the flood of investment money keeps the business expanding

<http://www.arkansasbusiness.com/login.aspx?refer=article.aspx%3faid%3d129292.54928.141420>

Cornell scientists split over natural gas impact on climate

Published: 01/19/12

Two groups of scientists at Cornell University are dueling over whether natural gas from shale is better or worse than coal when it comes to global climate change.

http://www.recordonline.com/apps/pbcs.dll/article?AID=/20120119/NEW_S90/120119705

Shale Gas: A Boon That Could Stunt Alternatives, Study Says

January 17, 2012 **Concerns research done at MIT**

Shale gas has transformed the U.S. energy landscape in the past several years—but it may crowd out renewable energy and other ways of cutting greenhouse gas (GHG) emissions, a new study warns.

<http://news.nationalgeographic.com/news/energy/2012/01/120117-shale-gas-boom-impact-on-renewables/>

Super Fracking Goes Deeper to Pump Up Natural Gas Production

By David Wethe - Jan 11, 2011

As regulators and environmentalists study whether hydraulic fracturing can damage the environment, industry scientists are studying ways to create longer, deeper cracks in the earth to release more oil and natural gas.

If critics already think fracking is bad, theoretically, super fracking would be super bad," [Kirk Sherr, president of [Regester Larkin Energy North America](#), an industry consultant.] said.

<http://www.bloomberg.com/news/2012-01-11/super-fracking-goes-deeper-to-pump-up-natural-gas-production.html>

U.S. Shale Bubble Inflates After Near-Record Prices for Untested Fields

By Joe Carroll and Jim Polson - Jan 9, 2012

Surging prices for oil and natural-gas shales, in at least one case rising 10-fold in five weeks, are raising concern of a bubble as valuations of drilling acreage approach the peak set before the collapse of Lehman Brothers Holdings Inc.

<http://www.bloomberg.com/news/2012-01-09/shale-bubble-inflates-on-near-record-prices-for-untested-fields.html>

After founder Aubrey K. McClendon lost his fortune in 2008, the company's board raised his pay and bought his art. Wall Street is enraged

By [Christopher Palmeri](#) , April 29, 2009

http://www.businessweek.com/bwdaily/dnflash/content/apr2009/db_20090428_012209.htm

Drillers using counterinsurgency experts

Marcellus industry taking a page from the military to deal with media, resident opposition

By Don Hopey, November 13, 2011

<http://www.post-gazette.com/pg/11317/1189273-503-0.stm>

I really wanted to talk about this. but not enough time today. Turn the coin over. If we citizens are insurgents, then the drilling industry must be an invading army. The similarities are remarkable. Where the invasion takes place there is destruction of property, disregard for the health and welfare of the local citizens, and corruption of the enabling local politicians. On the other side, huge benefits are anticipated for the individuals running the scheme and the officers running it. The "soldiers" are used hard. - Thought about this, Mr Pitzerella?

Is there really 100 years' worth of natural gas beneath the United States?

By [Chris Nelder](#), Dec. 29, 2011

We don't yet know how much of the estimated gas resources will be economically recoverable or whether the projected production rates for some wells might be off by a factor of 10. We might have a 100-year supply of gas, or we might have an 11-year supply. We might realize economic and environmental benefits by transitioning trucking and coal-fired power generation to natural gas, or we might do so only to

find ourselves out on a limb far more economically dangerous than the current peak and impending decline of world oil supply. We simply don't know, and we may not know for years to come.

http://www.slate.com/articles/health_and_science/future_tense/2011/12/is_there_really_100_years_worth_of_natural_gas_beneath_the_united_states.html

The case for a Moratorium on Drilling the Marcellus Shale in Pa.

40 min video

A first class distinction between shale wells and the older wells, and deconstruction of industry claims. There is also a version 80min long. Can be seen full screen.

<http://go.to/stopmarcellus40>

This reference was sent to me just four days ago. When I saw it, in the busy time of the evening the visual quality was not good. The arguments were very convincing, and the coverage very broad. Arguments I'd never heard before. There is a list of references in each picture of the PowerPoint slides posted below.