



Is adaptive risk regulation possible in a contentious political environment? Shale gas regulation in the EU

David M Reiner

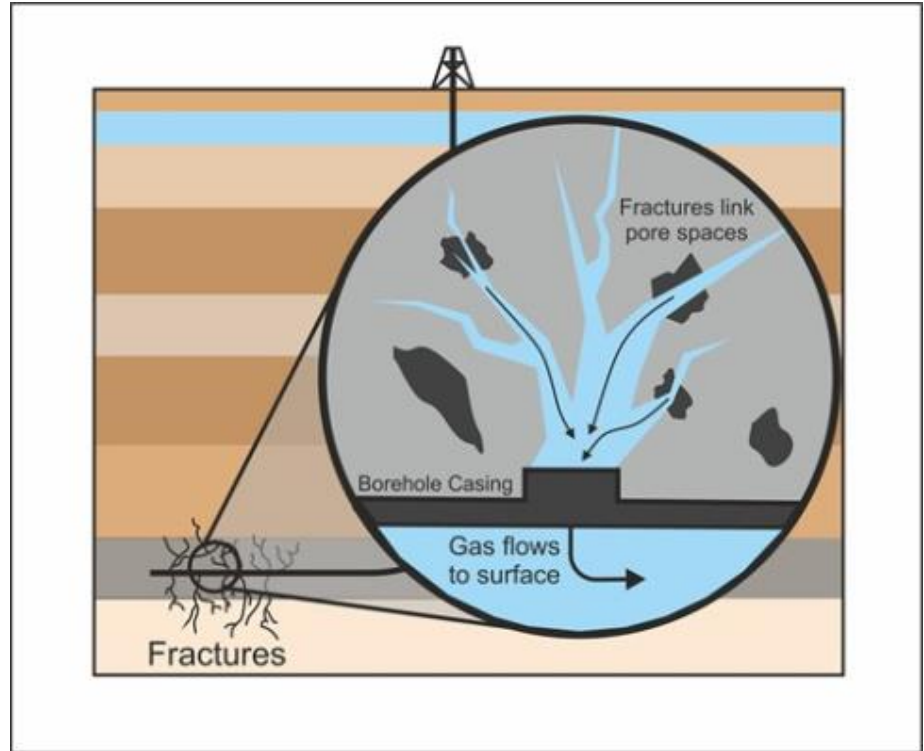
*Assistant Director, EPRG,
Lead, Public Engagement, ReFINE Project
Judge Business School, University of Cambridge*

Conference on Planning Adaptive Risk Regulation
University College London
7 January, 2016

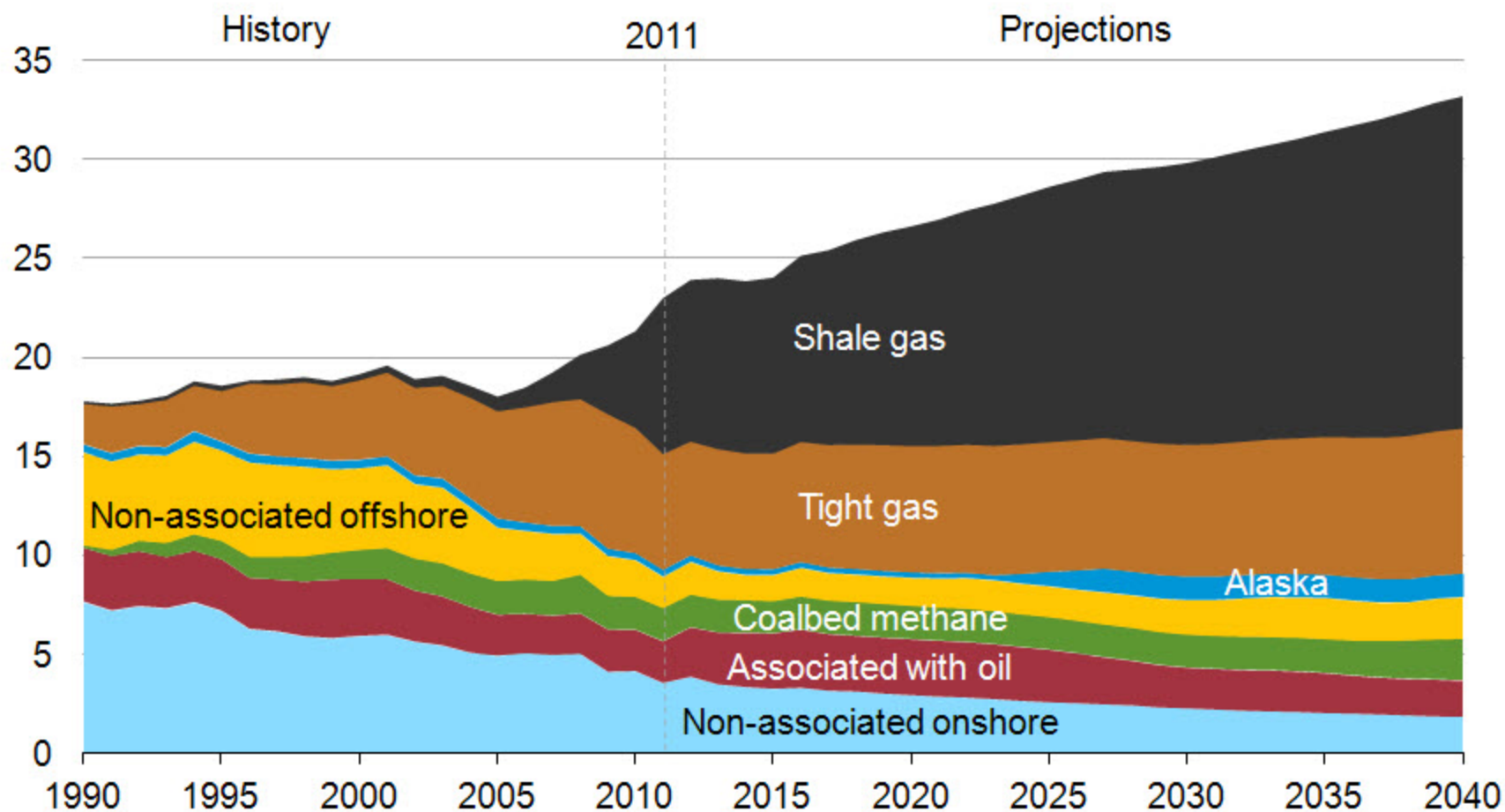


What is Fracking?

- Shales have low permeability, pore spaces not inter-connected
- Rocks must be cracked to increase permeability
- Horizontal drilling is used to extend target area
- Water used to crack the shale, propanant (often sand) holds cracks open
- Process is new to Europe, but well established in USA and attractive on grounds of energy security and competitiveness



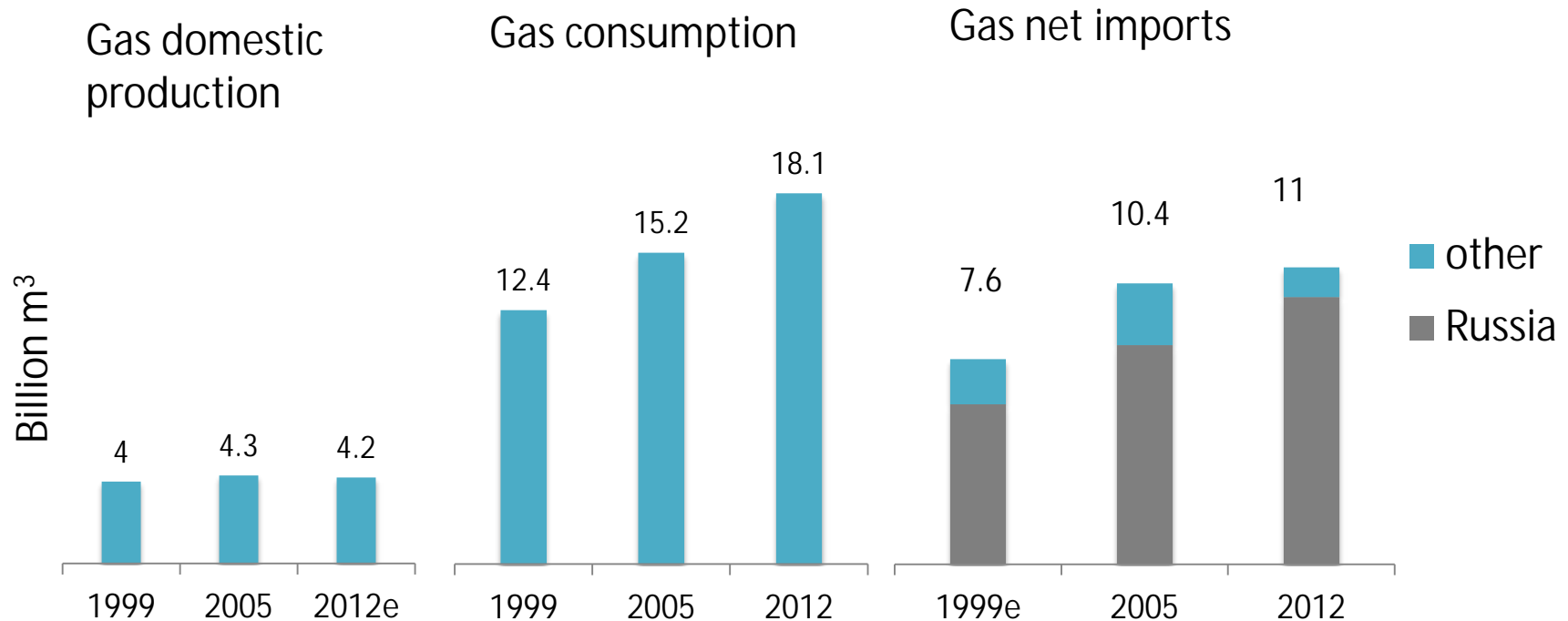
U.S. dry natural gas production trillion cubic feet



Source: U.S. Energy Information Administration, *Annual Energy Outlook 2013 Early Release*

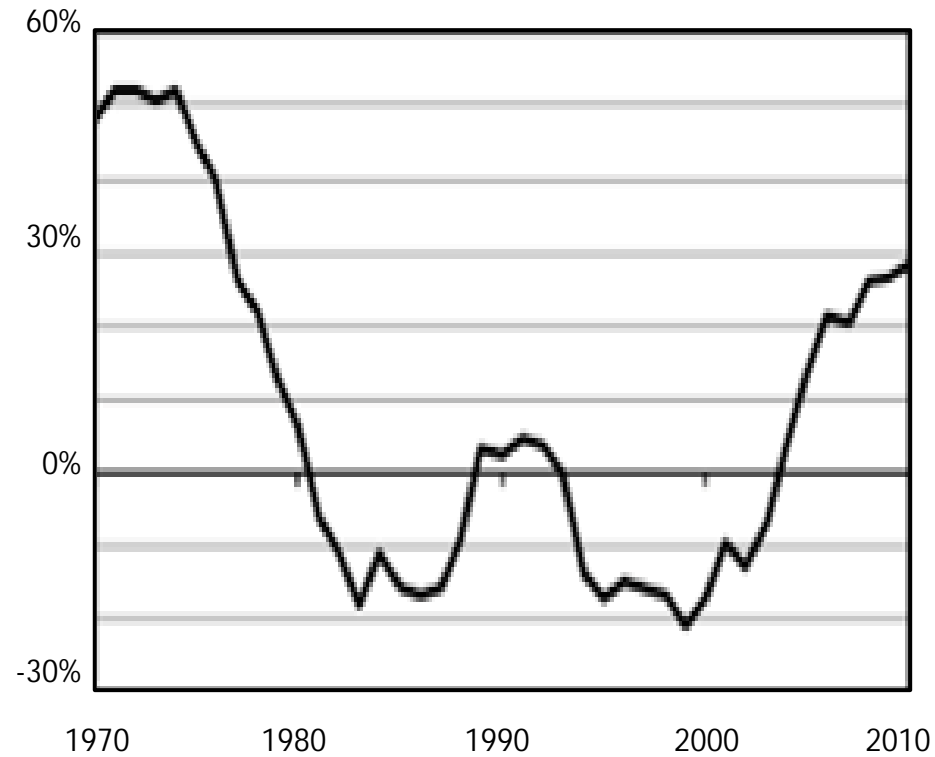


Energy Security: Poland



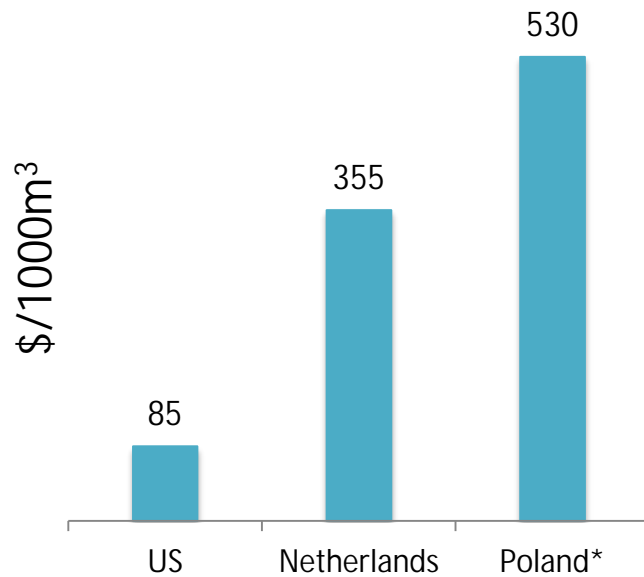
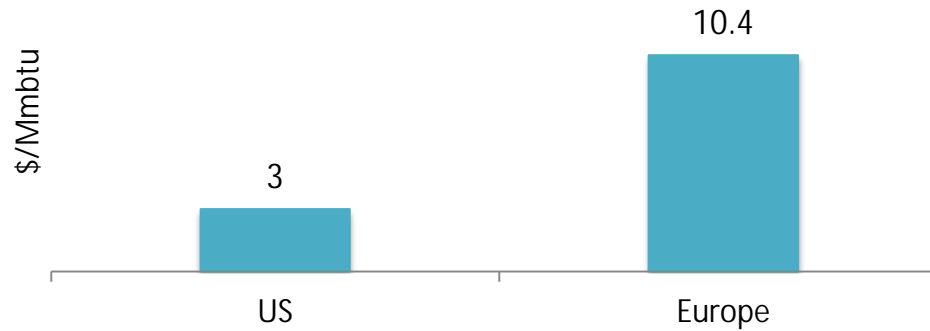
- Historical 'relationship' with Russia
- Recent events:
 - Crimea
 - Detention of Russian spies in Poland

Energy Security: GB

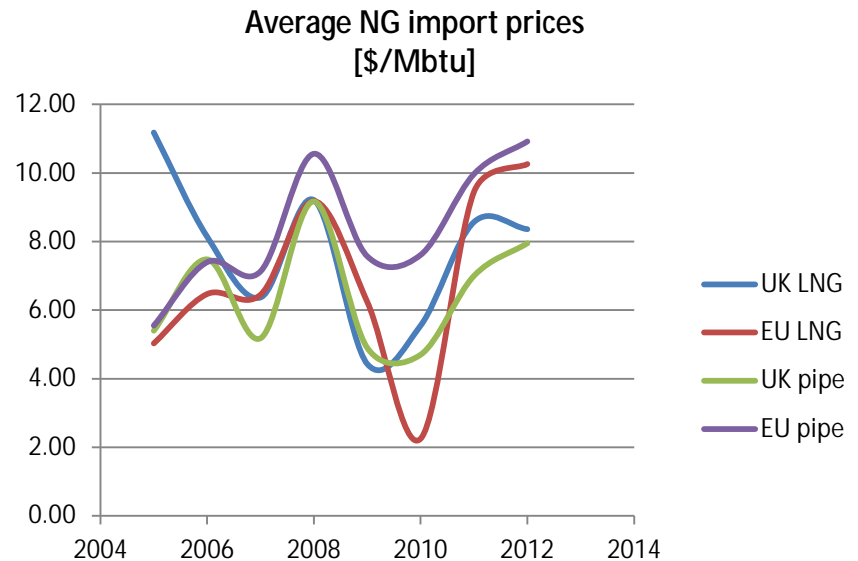


Fossil Fuel imports as proportion of energy supply

Natural Gas Prices

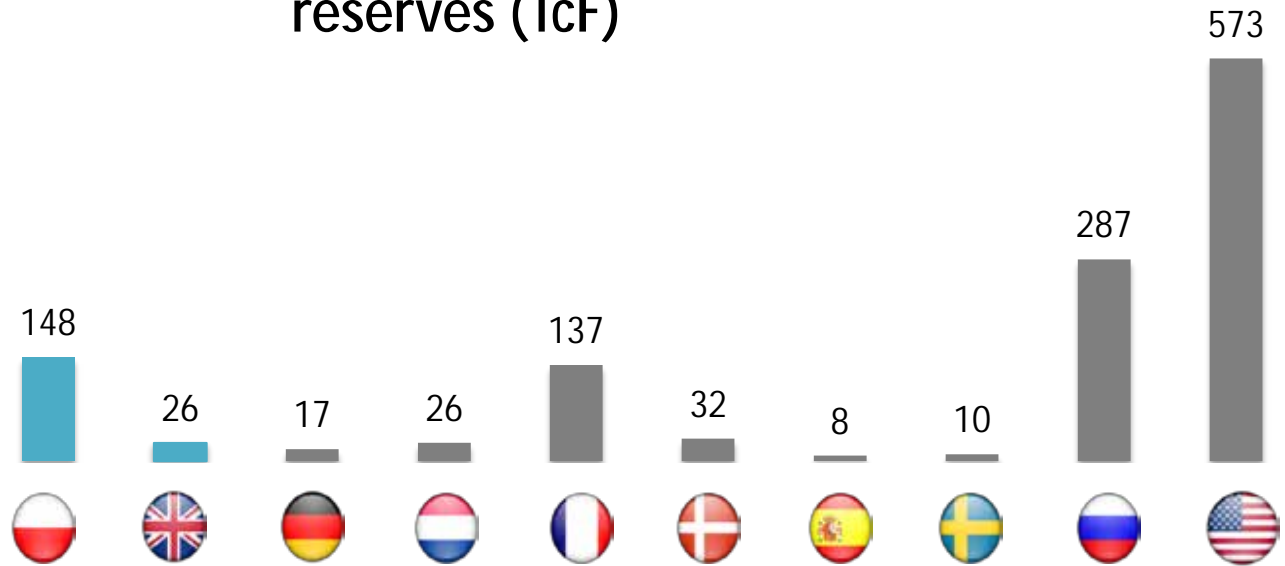


*purchase price from Russia

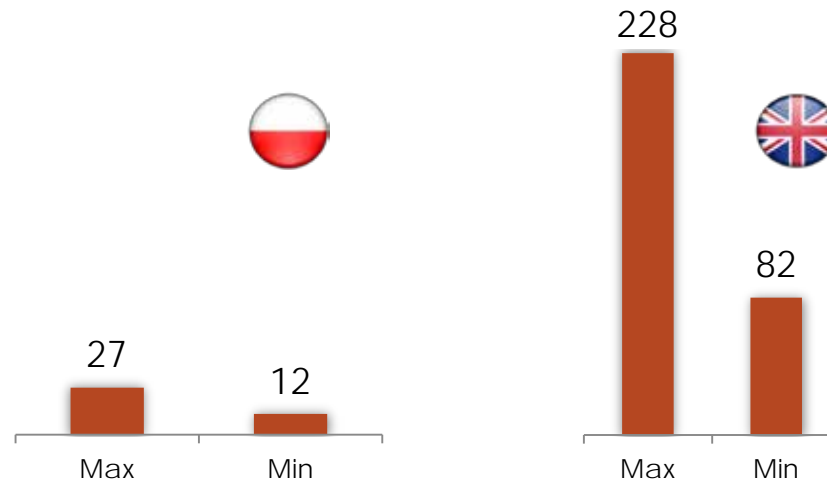


Risked, technically recoverable shale gas reserves (TcF)

EIA 2013



National Estimates





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We cannot afford to miss out on shale gas

Safe fracking will cut energy bills and create wealth without ruining precious countryside, writes David Cameron



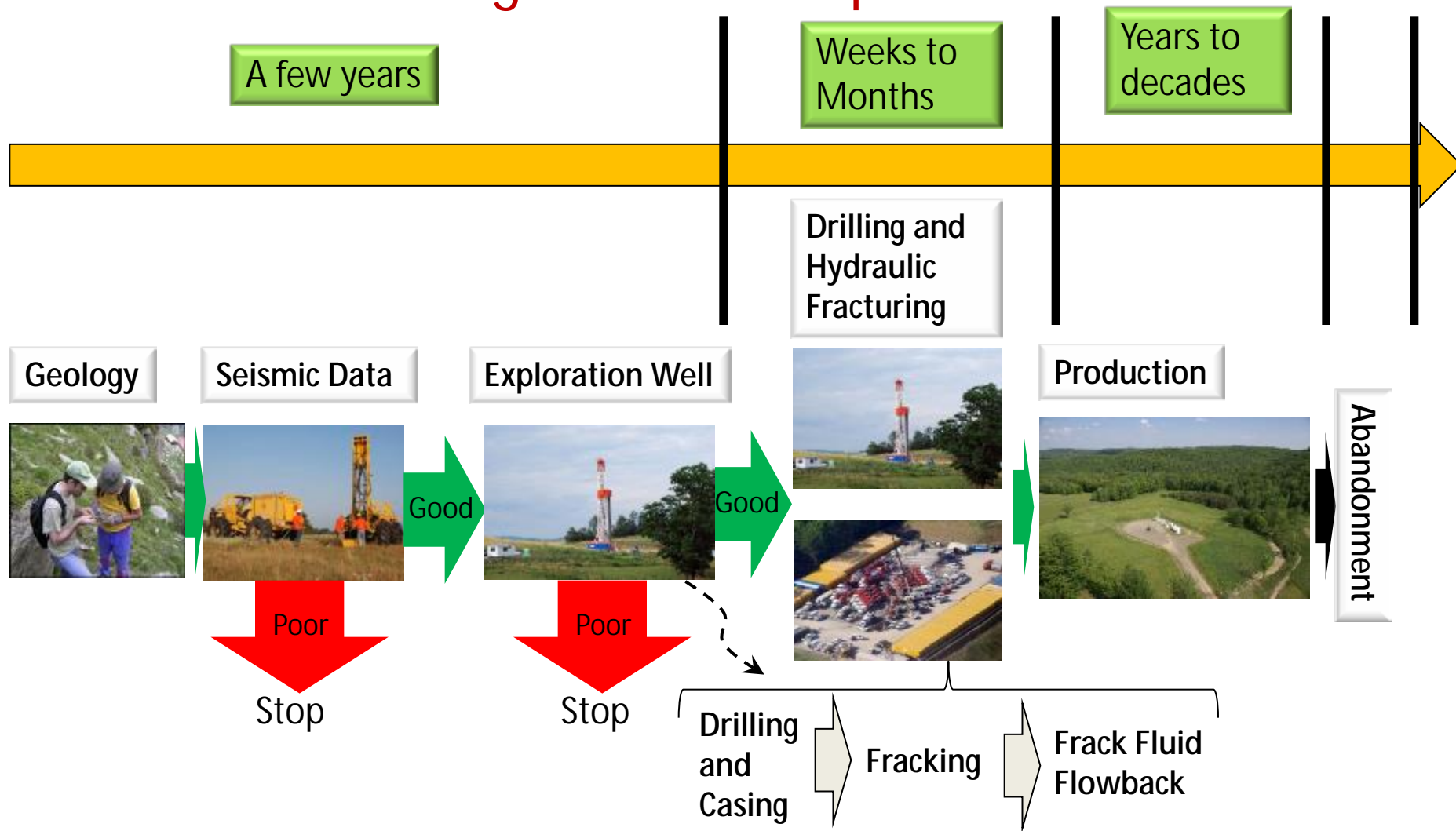
Britain has led the way in technological endeavour: fracking is part of this tradition Photo: AP

By **David Cameron**

10:04PM BST 11 Aug 2013

Print this article

You can't run if you can't walk: Stages of development



But situation in EU is so heated that cannot even begin to drill exploration wells – why?

What the Frack? Natural Gas from Subterranean Shale Promises U.S. Energy Independence--With Environmental Costs

Natural gas cracked out of shale deposits may mean the U.S. has a stable supply for a century or more, but the process of extracting the gas from the rock is controversial and may have environmental costs.

DEIL, Tex.—A shale-boring company bought the rights to rewire this town a few years ago in exchange for a decade of free television, but it is now before the state's natural gas commission. The company, which is now the U.S. Shale Gas Commission, is asking the commission to allow it to drill for shale gas in the town. The company says it has found shale gas in the town, but the commission is skeptical. The company says it has found shale gas in the town, but the commission is skeptical.

It is because of places like DEIL (formerly known as Clark) and similar sites from Colorado to Wyoming, that the U.S. Environmental Protection Agency (EPA) has launched a new review of the practice known as hydraulic fracturing, or "fracking". From underground reservoirs, fracking releases natural gas such as methane in the form of water. While drilling does have some water usage to break apart the rock, the full set of activities needed to produce natural gas may also be a source of potential problems. The EPA study may examine everything from the selection to the ultimate disposal of the fluids used in fracking.

Cancer

Earthquakes

Subsidence

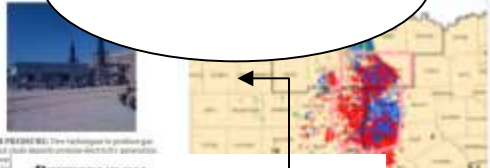
Shale gas

Water contamination

Land contamination

Barnett Shale has highest rates for invasive breast cancer

Available in the County for Cancer Control and Prevention. Invasive breast cancer is the leading cause of death for women in the United States. The incidence of breast cancer is highest in the Barnett Shale region.



PITTSBURGH TRIBUNE-REVIEW DEP says safety issues ignored in Clearfield County gas well blowout

Clearfield County, Pa. — The state's top environmental regulator on Tuesday put the gas industry on notice that drilling companies must adhere to safety standards, which the state says a company ignored before a natural gas blowout at Clearfield County well.

Exploration for natural gas causes consternation in Quebec

By Les Perreault, Frank MacKay's Quebec and Montreal Correspondent

Quebec, Canada (AP) — The province's top environmental regulator on Tuesday put the gas industry on notice that drilling companies must adhere to safety standards, which the state says a company ignored before a natural gas blowout at Clearfield County well.

LANCASHIRE

20 May 2011 Last updated at 15:00

Blackpool Shale Gas drilling suspended after quake

Shale gas test drilling in Lancashire has been suspended following a magnitude 2.5 earthquake.

The quake, the first behind the tests, said drilling had been suspended for a week. The quake was felt in the area.

It will now examine the data collected by the British Geological Survey.

A source linked to the tests on 1 April shared a "Shale gas test drilling in Lancashire has been suspended following a magnitude 2.5 earthquake."

Shale gas drilling, known as "fracking", involves injecting water into the ground under high pressure to release gas.

Mark Miller, chief executive of Coalfield Resources, said: "We have no intention of stopping our operations."

"We cannot let this incident and subsequent investigation affect our operations."

Watershed

Does Gas Fracking Cause Earthquakes?

By Joyce Nelson

It's only a dozen years ago that "slick-water fracking" was introduced and dozens of toxic chemicals like benzene, all of which is up reservoir and release gas trapped in the rock pores. Contaminants major concern, but few communities need to think about the gas.

The US Federal Environmental Protection Agency (EPA) has just begun a "fracking" study in the oil and gas industry, which means that it's

Published on Haldensted Sentinel: Environmental News Magazine from 2

THE WALL STREET JOURNAL

Blowout Occurs at Pennsylvania Gas Well

By MARK LONG AND LUCAS WEBER

A western Pennsylvania natural-gas well owned by EOG Resources Inc. blew out Thursday night, releasing an undisclosed amount of gas and drilling fluids before being contained about 48 hours later.

No injuries were reported from the blowout, which took place at a well in a rural area of Clearfield County, about 10 miles from Pittsburgh. The accident comes at an extremely sensitive time for the energy industry, as thousands of barrels of oil a day continue to pump into the Gulf of Mexico from a mile-deep leak. The incident could also heighten tension between proponents of drilling for gas from deeply buried shale-rock formations and groups that fear the drilling fluids used could contaminate drinking water.

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THE INDEPENDENT BUSINESS ANALYST

Poland's Shale Gas dilemma for Europe

Despite environmental fears, gas fields offer some competition to Poland's coal. Many European reports from Poland.

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Bloomberg Businessweek

FRACKING: The Great Shale Gas Rush

Natural gas derived from the process is lifting the economy, but it's environmentally risky

By Jon Ostrowitz and Kim O'Grady

The Pennsylvania homes of Eliot Spitzer and Arlen Specter both sit atop the Marcellus Shale, a geological formation that stretches from Tennessee to New York and holds vast deposits of natural gas.

They also sit on opposite sides of a national debate over hydraulic fracturing, or fracking. That's the process that makes it economical for energy companies to harvest 5,000 feet below ground and remove the gas—but also poses environmental risks.

Spitzer visited 10 years ago in Illinois, in the state's northeast corner, and was struck by the drilling companies set up dormitory nearby. He already moved away for six weeks last year while an exploratory well was drilled nearby. The noise, muddy water pouring from his taps, and chemical-laden water that turned up in a neighbor's well drove him off, he says. "It moved to a beautiful rural residential area," he says. "It's not a good thing."

La Tourette, whose roots in the area dated almost 100 years of farming, the word said what she's getting. In reality, payments are about \$20 per acre.

President Barack Obama embraced fracking, which involves forcing liquid through layers of rock, near housing, natural gas to crackle to chambers of

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Controversial bid to test drill for shale gas in South Wales rejected by Vale of Glamorgan councillors

By David Davies

A controversial bid to test drill for shale gas in South Wales has been rejected by Vale of Glamorgan councillors.

The bid, which was made by a private company, was rejected by the council's planning committee.

The council's planning committee rejected the bid, citing concerns over the potential for water contamination and land subsidence.

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Pa. Well Blowout Tests Industry on Valuation Disclosure

By David Davies

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No injuries were reported from the blowout, which took place at a well in a rural area of Clearfield County, about 10 miles from Pittsburgh. The accident comes at an extremely sensitive time for the energy industry, as thousands of barrels of oil a day continue to pump into the Gulf of Mexico from a mile-deep leak. The incident could also heighten tension between proponents of drilling for gas from deeply buried shale-rock formations and groups that fear the drilling fluids used could contaminate drinking water.

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Marcellus Shale gas drilling put under microscope

By David Davies

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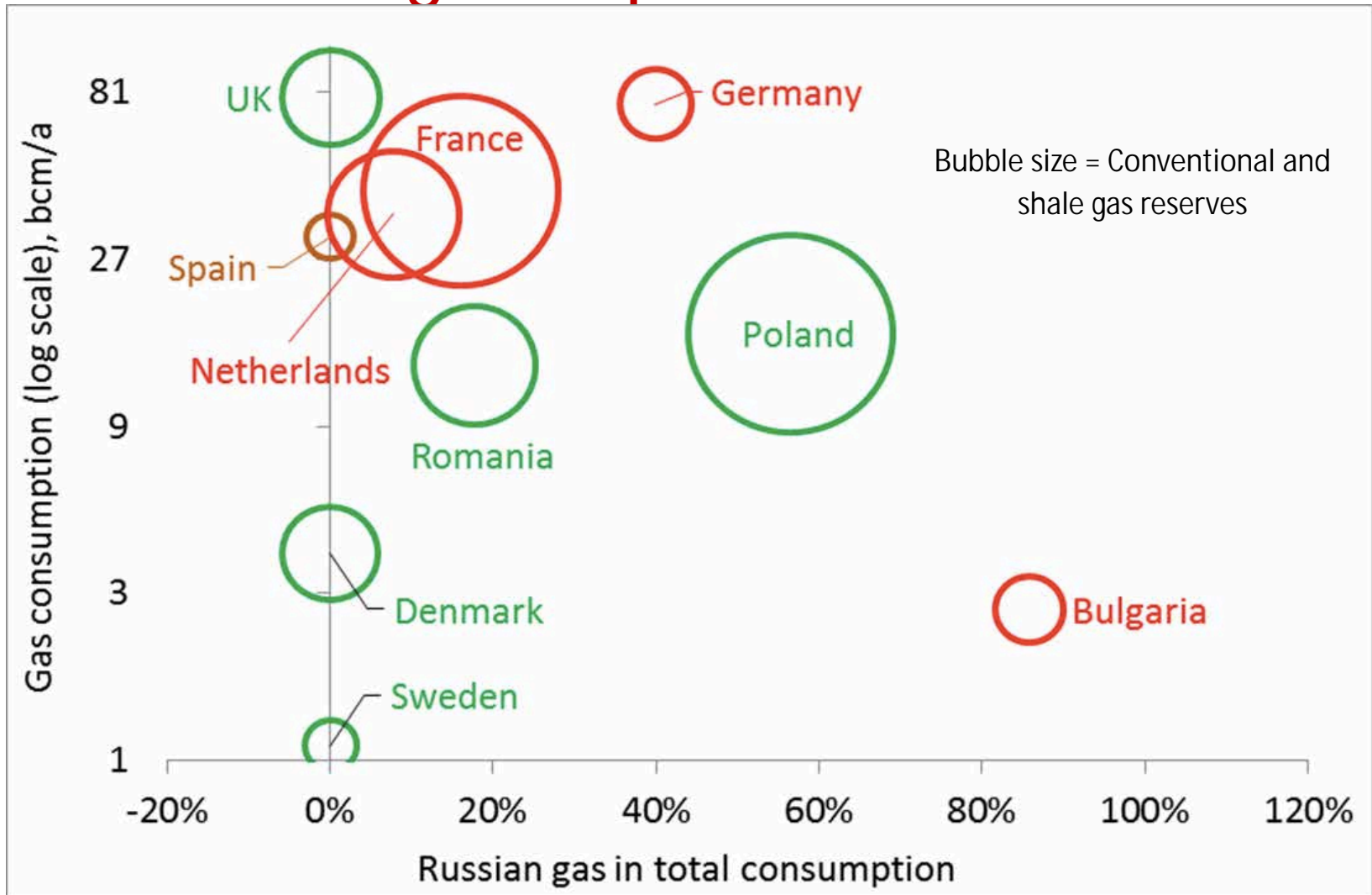
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Members of the Green European parliament group and representatives of Non-Governmental Organizations (NGOs) take part in public action in front of the European Union in Brussels, Belgium on 18 September 2012, as part of a campaign against shale gas and fracking. Photograph: Olivier Hoslet/EPA

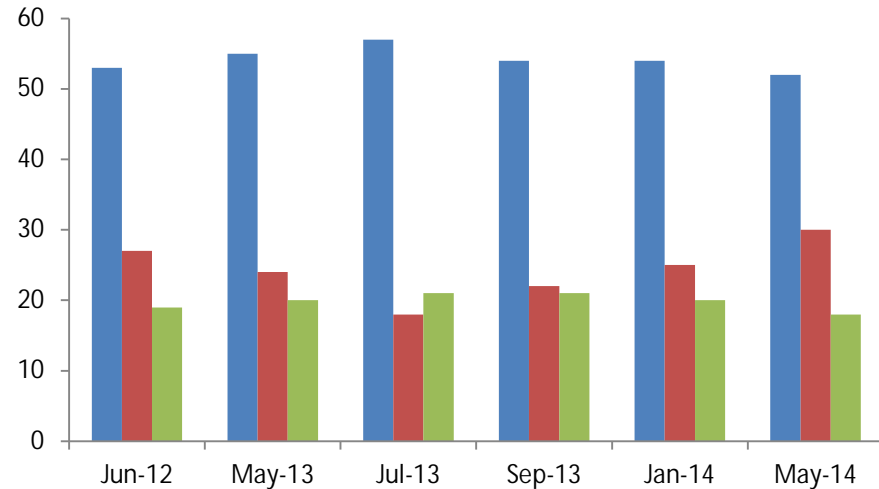
Gas Import dependence and national shale gas exploration status



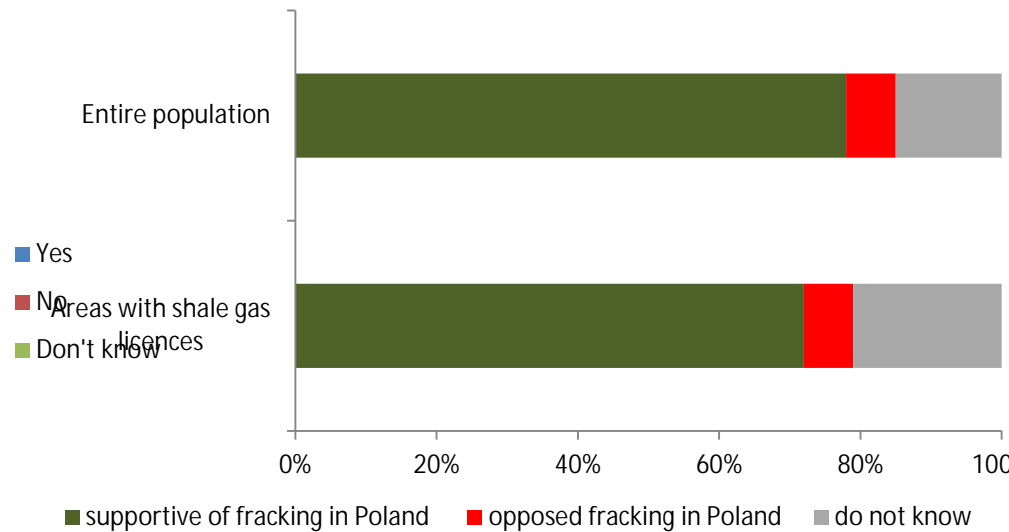
Chyong, CK and Reiner, DM (2015). Economics and Politics of Shale Gas in Europe, *Economics of Energy and Environmental Policy*, 4(1): . DOI: 10.5547/2160-5890.4.1.cchy

Public Support/Scrutiny in Poland v UK

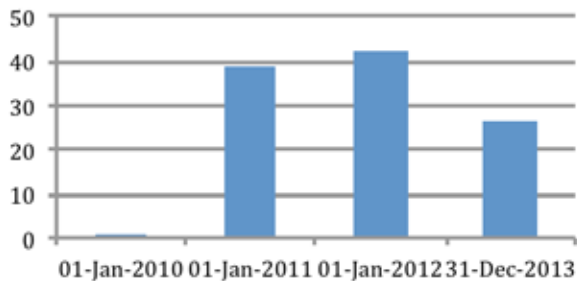
Should fracking be allowed in the UK?
[percentage of respondents]



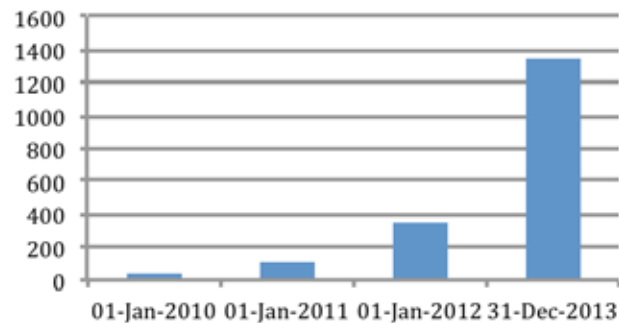
Support for shale gas in Poland [%]



Press coverage of protests in
Poland
[number of articles]

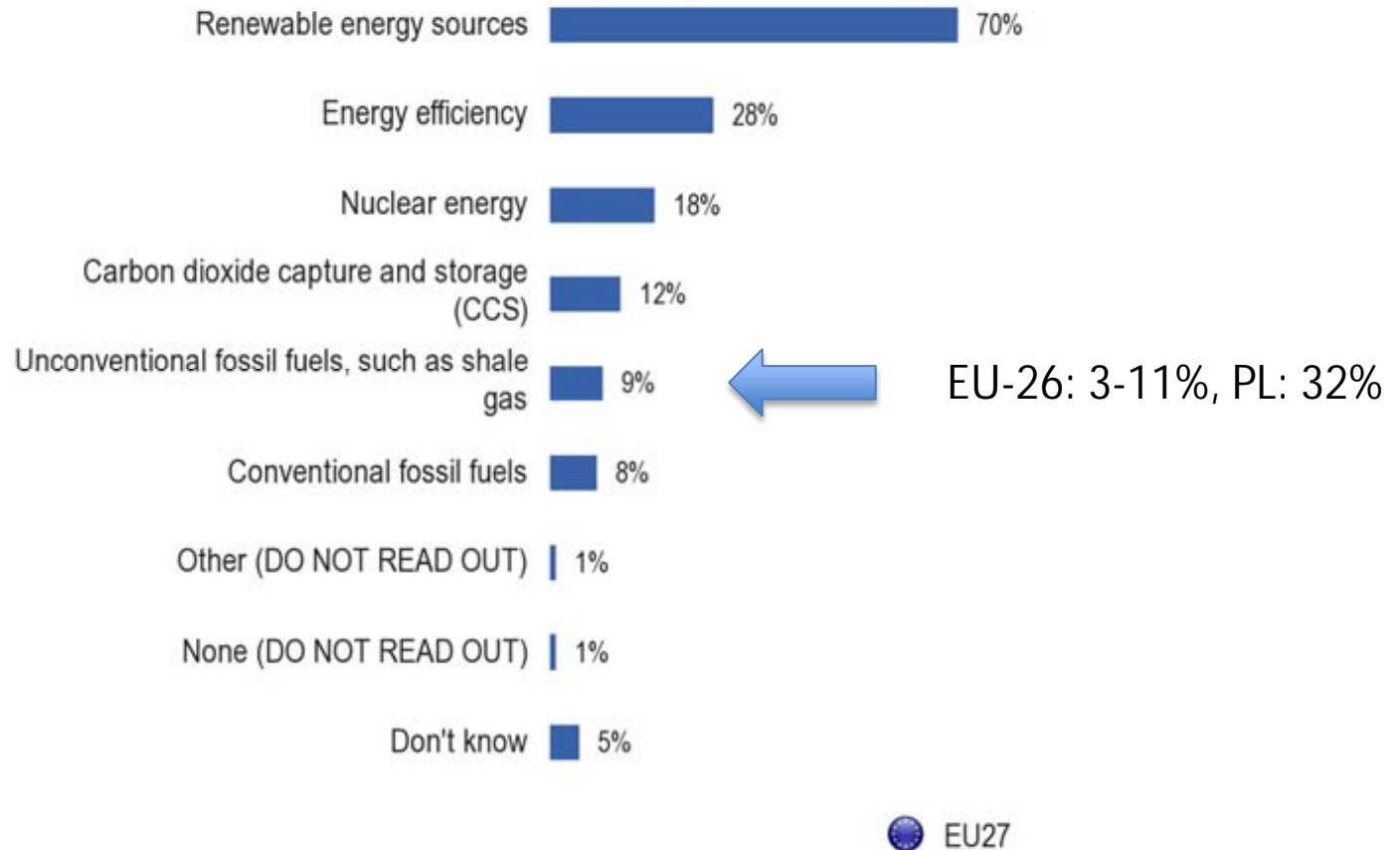


Press coverage of protest in the UK
[number of articles]



Weak Support for Unconventionals in EU-26

Q21. Thinking about the next 30 years, which of the following energy options do you think should be prioritised now in (OUR COUNTRY)?

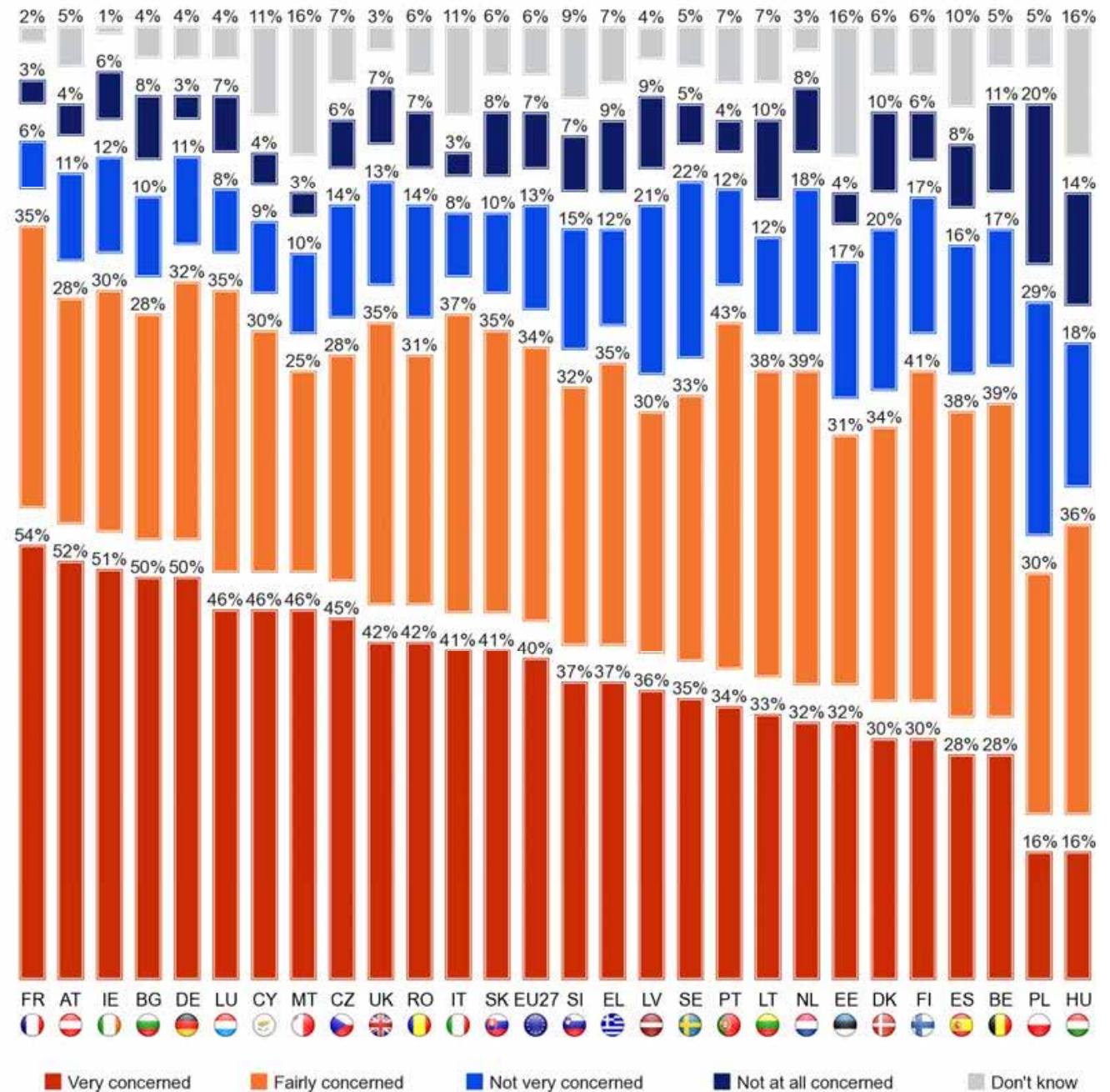


(MAX. 2 ANSWERS)

Source: Flash Eurobarometer 360 "Attitudes of Europeans towards air quality", Jan 2013

Local
opposition
strong
across
Europe

Q22. If a shale gas project were to be located in your neighborhood, do you think that you would be...





Eastern approaches

Ex-communist Europe



[Previous](#) | [Next](#) | [Latest Eastern approaches](#)

[All latest updates](#)

Shale gas in Poland

Mad and messy regulation

Jul 10th 2013, 17:00 BY A.E. | WARSAW



259



POLISH dreams that shale gas would transform the country into a second Norway have been tempered in recent months. The geology is more difficult than anticipated and proposed regulation has been repeatedly delayed. After great initial enthusiasm companies such as ExxonMobil, Talisman and Marathon Oil threw in the towel and quit the country.

In a recent report investors complained that





Poland on road to EU Court over shale gas defiance

30 Jul 2014 - 12:12 updated: 30 Jul 2014 - 17:09

EurActiv.com by Arthur Neslen

Comments 1

f 172



in 14



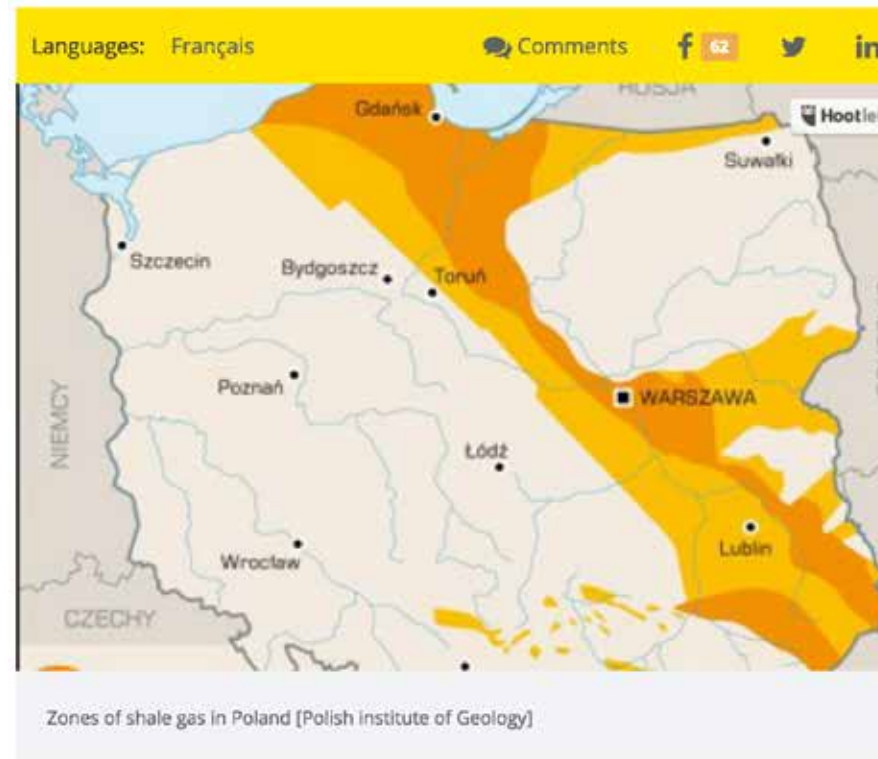
(Photo: Scott Goldsmith, National Geographic/Creative Commons)

Shale gas in Poland - from exploration to exploitation



EurActiv.com by Georgi Gotev, Krzysztof Kokoszczyński

12 Sep 2014 - 08:47 updated: 16 Sep 2014 - 09:38



SPECIAL REPORT: There are 65 shale gas wells and drills in Poland, more than any other European country. The UK, the other EU member state with plans to develop the resource, has only a couple of wells.

Poland plans to build 50 new shale wells every 12 months over the next few years but currently, the focus is more on exploration than exploitation. It has granted 82 concessions to prospect for unconventional hydrocarbons, 72 of those are shale gas related.

Polish shale gas hits a dry well

The exit of the last major global energy firm this month could mean the death knell for the country's industry.

By **ANDREW KURETH** | 6/16/15, 5:30 AM CET | Updated 7/8/15, 3:21 PM CET

WARSAW — Hopes kindled just four years ago that Poland would become a gas exporter — a “second Norway,” in the words of then-foreign minister Radek Sikorski — have been doused by the decision of U.S. energy giant ConocoPhillips’ Polish subsidiary to halt exploration.

The exit this month of the last global player from Poland’s shale gas market, leaving just a few domestic and smaller foreign firms among whom drilling has come to a near halt, further undermines the case for fracking in the European Union, where Poland and the UK have been its strongest backers.

SPONSORED CONTENT

The European Chemical Industry
Backs Strong Global Climate Change
Agreement At COP21 #RoadToParis



Climate deal: only the best will do

“The appetite for drilling
has dried up.”

“The appetite for drilling has dried up,” said Tomasz Chmal, an expert on shale gas with law firm White & Case in Warsaw.

The industry’s fall is hard to swallow for those who had hoped for 300 years worth of energy

independence from Russia, where Poland gets just over half of its gas imports. Such predictions were being made in 2011, after the U.S. Energy Information Administration estimated Poland’s shale gas reserves at 5.3 trillion cubic meters, albeit based on historical data rather than new exploration.





Fracking

Polish shale industry collapsing as number of licenses nearly halves

Prospects for fracking boom in Poland look remote as companies including state-owned gas firm ditch shale gas concessions in face of challenging geology

Arthur Neslen

Friday 9 October 2015
16.11 BST



Shares

579

Save for later



A Chevron drilling rig in Poland. Chevron and ConocoPhillips have this year joined Exxon, Talisman and Marathon in pulling out of shale drilling in Poland. Photograph: Stanislaw Wadas/Demotix/Commissioned for The Guardian

Poland's shale gas industry appears to be collapsing, just four years after the US government predicted that its reserves were abundant enough to fuel the country for [the next three centuries](#).

Concessions for exploratory shale drilling have nearly halved in the last year from 58 to just 32, according to [a new Polish government manifest](#) published to little fanfare on the environment ministry's website this week.

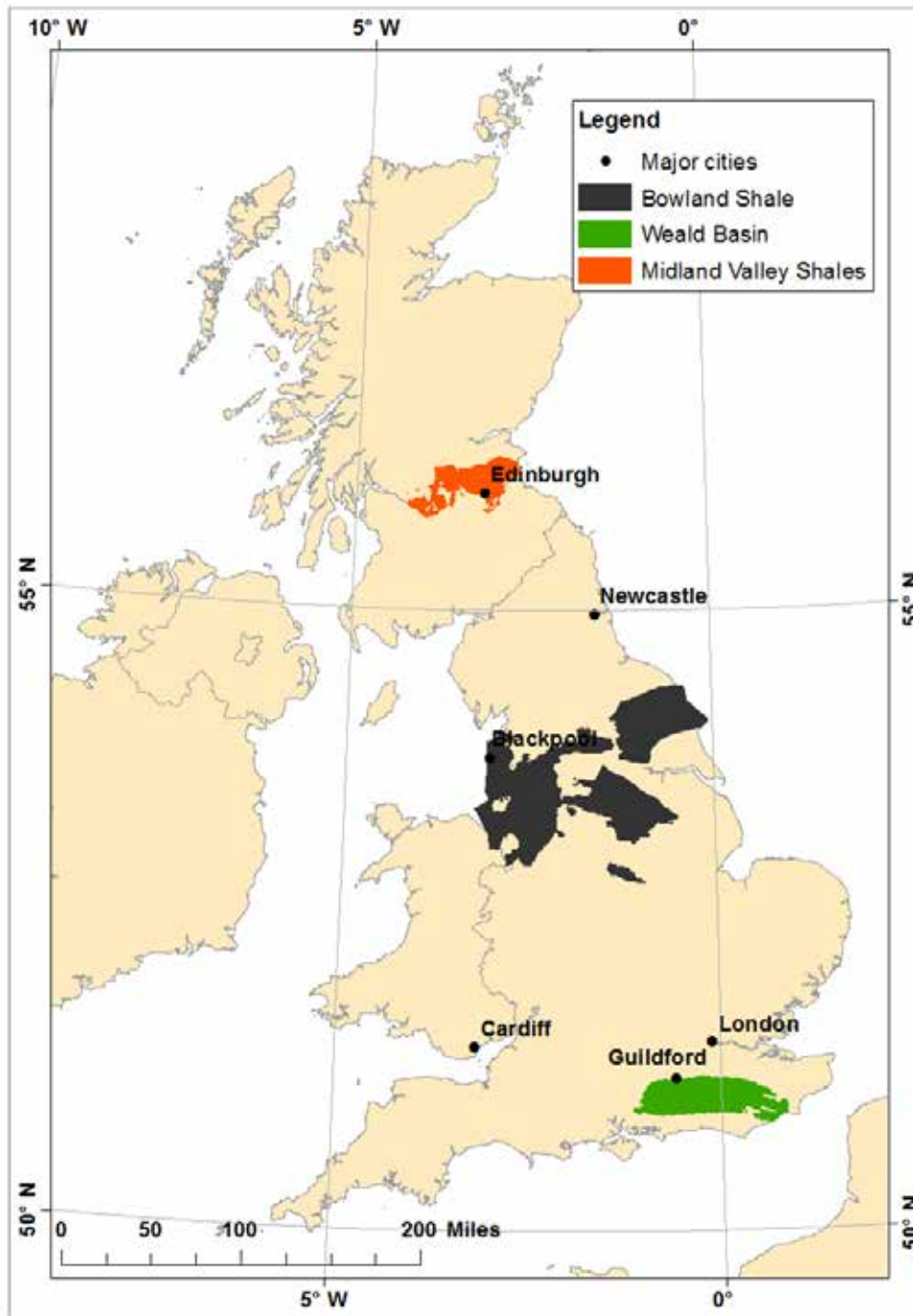
With rockbottom oil prices continuing to erode global fracking hopes, Chevron and ConocoPhillips this year joined Exxon, Talisman and Marathon in pulling out of the east European country.



UK shales

-Carboniferous
N. England

-Jurassic
SE England



Conclusions of Major UK Reviews

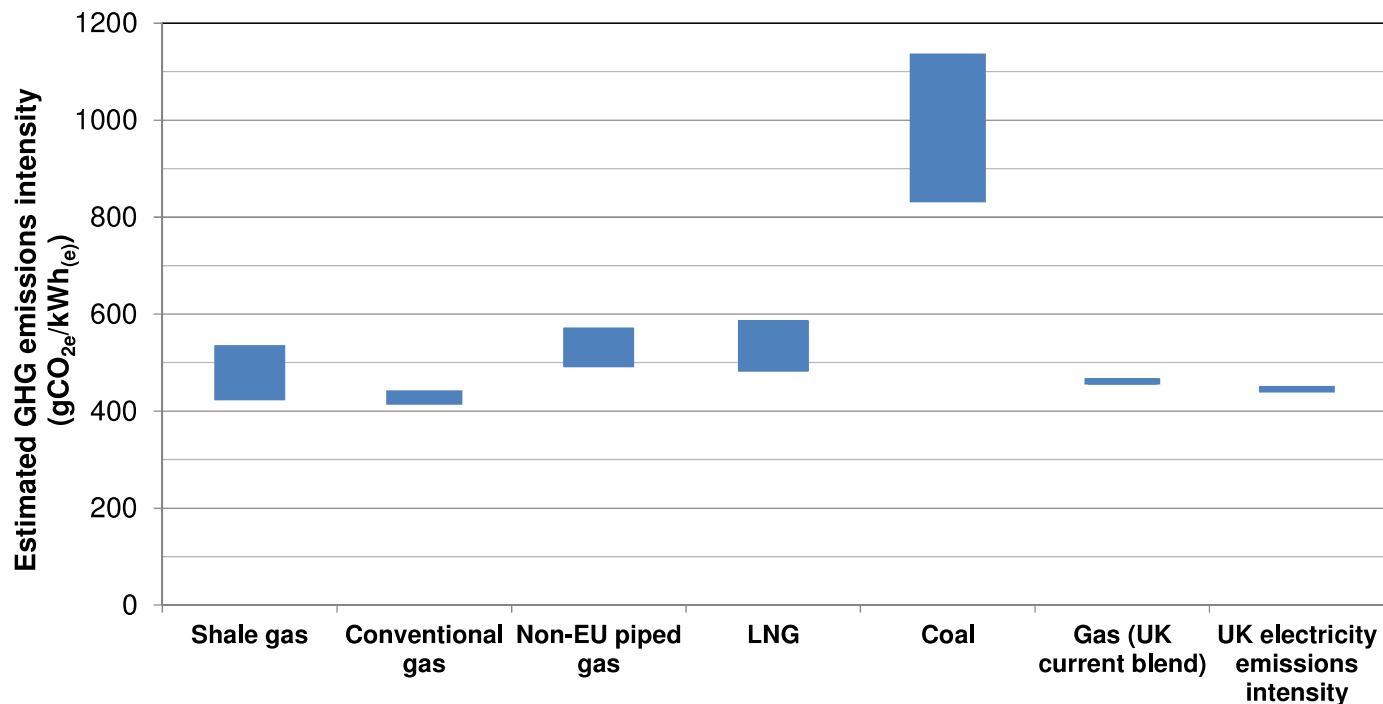


- **Royal Society review of Hydraulic fracturing led by Prof Robert Mair:** “overall effect of UK shale gas production on national emissions is likely, with the right safeguards, to be relatively small. Indeed emissions from the production and transport of UK shale gas would likely be lower than from the imported Liquefied Natural Gas that it could replace.”
- **Public Health England:** “the risks to public health from exposure to emissions from shale gas extraction are low if operations are properly run and regulated.”

MackKay/Stone Report on Carbon Footprint of Shale Gas Extraction



- Emissions intensity of shale gas extraction ~ 200 – 253 g CO₂e per kWh comparable to gas extracted from conventional sources (199 – 207 g CO₂e/kWh(th)), and lower than carbon footprint of LNG (233 - 270g CO₂e/kWh(th)).



Could your home be fracked?

Enter your postcode and find out if your home could be put up For Shale



56,881 people are already part of the Not For Shale legal block



Bad news! Your area could be fracked. Join the 56,880 people who have joined our legal block.



Map Key:



Land government is considering for oil and gas drilling, inc fracking



Land government isn't currently considering

Your home is in one of the areas the government is considering for drilling and possible fracking.

Greenpeace lawyers have revealed it is unlawful for companies to drill under your home without your permission or a statutory right. Doing so would be trespassing.

Residents around the country are refusing permission for drilling and creating a legal block to fracking across the country. Add your name and say no to drilling under your home.

[Find out more](#)

☒ **"I hereby declare that I do not permit fracking companies to drill under my home."**

Email

Join

We'll keep you updated about Greenpeace campaigns.



"My husband and I are joining the legal block because we feel worried about what's going on. We're within our legal rights to refuse permission. Together we can stand up to these big companies. For me, it's not just about my life, it's my children's lives. More effort should be put into safer and longer-term energy sources."

Karen Ditchfield
Singleton, Lancashire



Framing Fracking



- Strong opposition from much of the UK public despite general support for fracking from UK government.
- 6-focus group study by Durham in UK and 4 country study by Cambridge both identified 4 key areas of concern:
 - Lack of understanding
 - Lack of trust/credibility
 - Lack of consultation
 - Lack of scope in assessing impacts



cc-by-sa/2.0 - by Robin Webster - geograph.org.uk/p/3607352

Key Point - Public concern is not limited to risk and feasibility. Trust and confidence in policy makers and other key stakeholders is a key concern.



UK Compensation

- After several iterations, UK government, communities living near fracking sites have been offered £100,000 during exploratory drilling plus a 1% share of revenues from gas found (~£5-10m over 25 years) plus full retention of business rates (~£2m)
- In 2014, DECC offers additional payment of £20,000 for each lateral well at fracking sites (assuming 10 wells per site, each with four lateral wells, makes average total £800,000)
- So inadequate that one of leading firms, Ineos immediately increases minimum offer to 6%
- Cameron has suggested offering homeowners direct compensation but no follow up. Osborne has offered the potential for a sovereign wealth fund for shale regions.
- Infrastructure and Competitiveness Bill proposes changing trespass law to allow shale gas exploration firms to drill beneath private property without needing owners' permission and new proposals to drill under national parks

Versus US ownership of mineral rights and the lure of royalties to individuals

Natural Gas Royalty Estimate

Here is the data that you entered

12.5	Your royalty rate.
\$4.00	Average wellhead gas price.
1.5	Average well production rate in millions of cubic feet per day.
1	Acres you own within the well's production unit.
1	Number of acres in the well's production unit.
\$22,500.00	Your expected royalty payment per MONTH (before expenses).

[Calculate another royalty](#)

Don't assume that you are rich yet. Learn about [natural gas well decline rates](#)

This information is provided by [Geology.com](#) for entertainment purposes. The amount of your actual royalty can differ significantly from what is shown above. The royalty payment above is based upon the information that you provided. It includes assumptions which might not fully represent the conditions of your lease/royalty agreement and market conditions at the time your gas goes to sale.



Lancashire Mini Case Study

- **'Bad luck'**: Cuadrilla Resources drills first exploratory well near Blackpool 2.3 M event (April 2011)
- **'Temporary pause'**: Moratorium on all exploration until HMG review completed (led by BGS) even as PM reaffirms support
- **Take 2?** First post-moratorium projects considered by Lancashire County Council which rejects two proposed exploration wells in June 2015 under intensive pressure and international scrutiny
- **Removing all pretense**: Hearings planned for Feb 2016, but decision taken away from independent planning inspector and 'called in' by Secretary of State

The case against fracking in Europe is overdetermined

1. **Geology is different:** deeper and smaller plays in Europe, data is scarce, most potential shale plays are quite poorly characterised
2. **Stricter Regulation:** US had ‘Cheney-Halliburton Loophole’ in CWA, whereas European countries imposed moratoria and would have stricter regulatory regimes (in part b/c of US experience)
3. **Incentives:** Tax credits in US plus mineral rights are owned by landowners
4. **Industry structure:** Shale revolution in the US driven by small firms, plentiful rigs, close proximity, strong services industry
5. **Market structure:** Many fewer actors in EU market, TPA instead of common carriage pipelines
6. **Public opposition:** Well-organised opposition builds on climate camps, local activist groups, and has become focal or proxy issue for NGOs (comparable to Keystone XL in US?)

Additional nails in shale's coffin

- Add to these serious impediments :
 - Voiced suspicions of the role of Russia in supporting NGOs opposed to fracking in Bulgaria and elsewhere (Rasmussen)
 - One of first exploration wells in UK produced a tremor
 - Poor initial results in Poland the strongest supporter of fracking with the greatest number of exploration wells (65)
 - The low current gas price environment
- In some ways, it is actually surprising that fracking is not completely dead. Stakeholders have found it difficult to worry about the niceties of adaptive regulation when faced with perennial existential crises

What could have been done differently?

- The zeal of high-level government support initially reassured investors but this (a) may have been misleading and (b) undermined gov't credibility (including the potential for adaptive regulation)
- Social license to operate cannot simply be granted by government and the absence of any serious dialogue on compensation has been striking and exploration has been treated as a beach head (camel's nose effect)
- Consultation v 'consultation': Genuine public engagement, though undoubtedly difficult, has been remarkably poor and has merely heightened suspicions
- Only EC-level consultation exercises have been purely technical, which has frustrated many key stakeholders



Thanks!

David Reiner

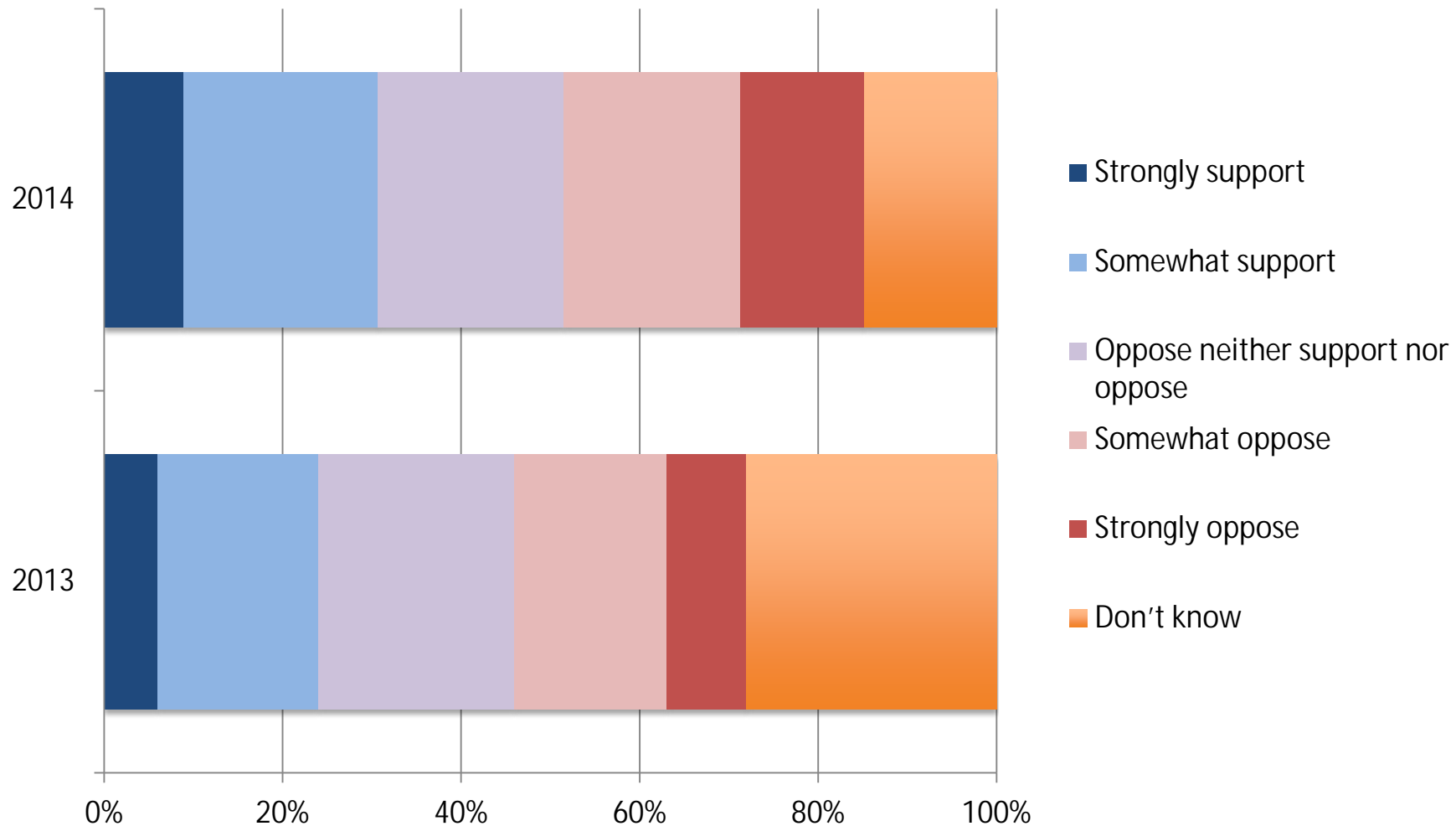
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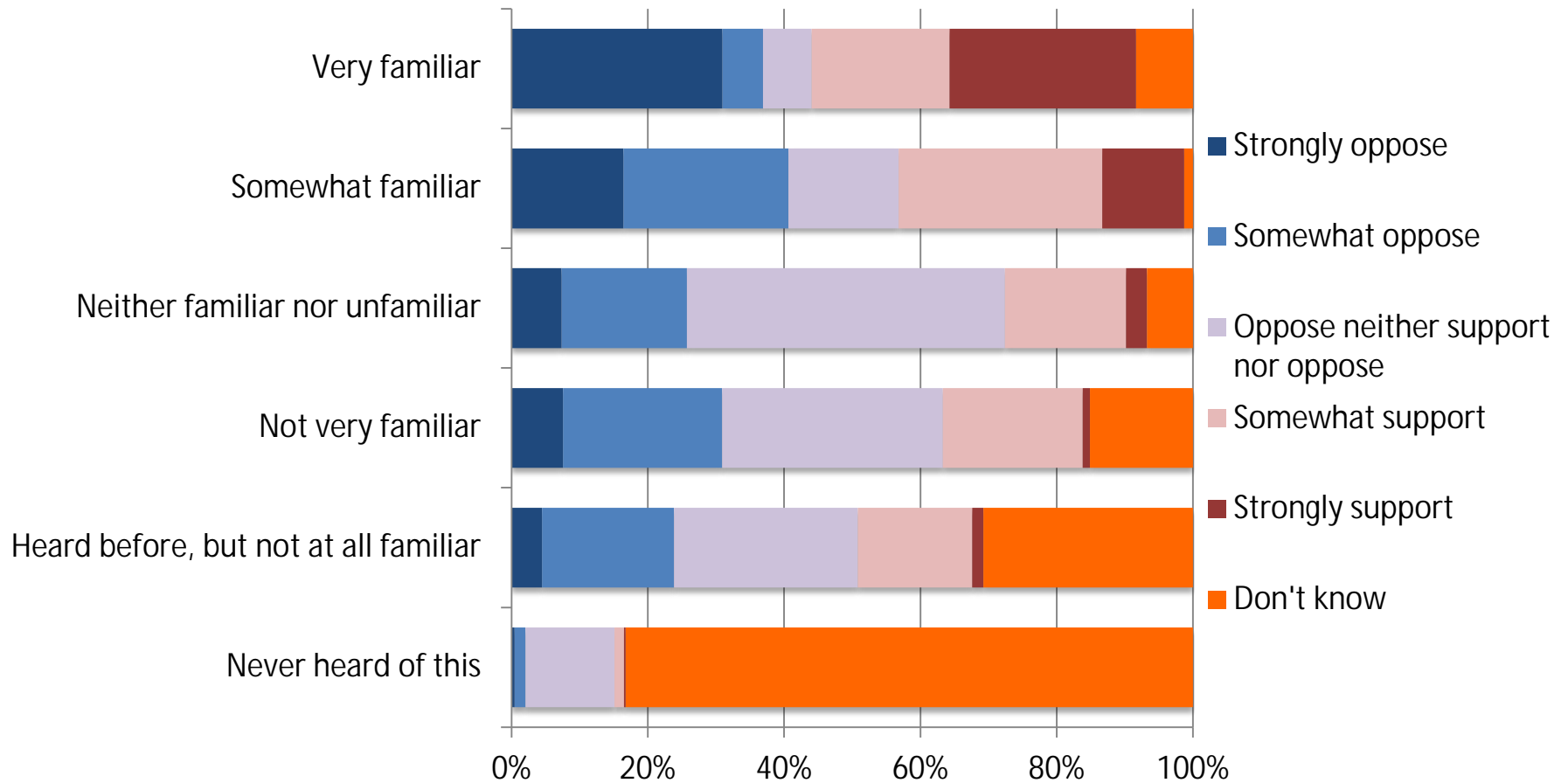
Fracking debate increasingly polarised



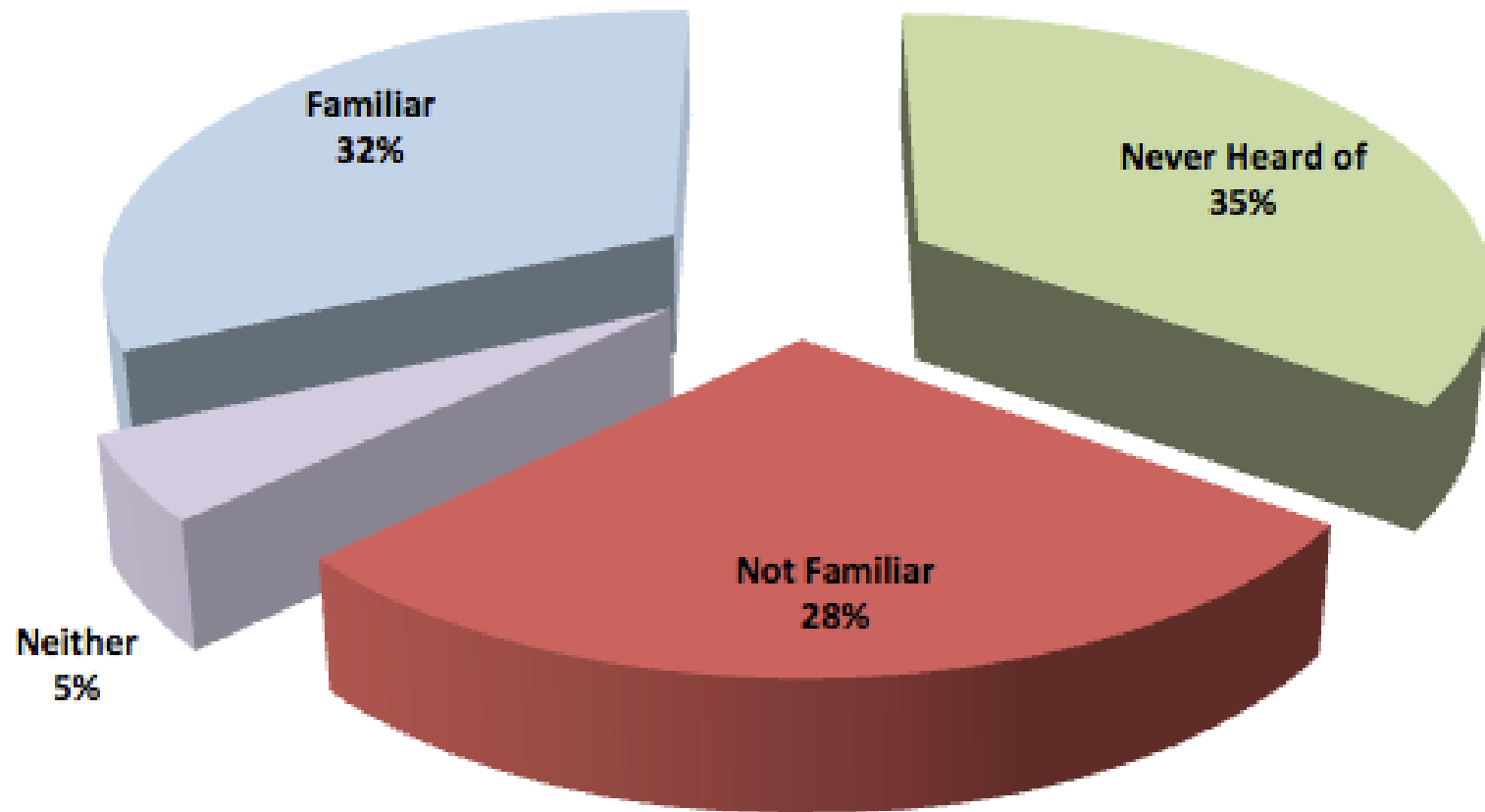


Knowledge does not translate into support:

Relation between familiarity and support for fracking

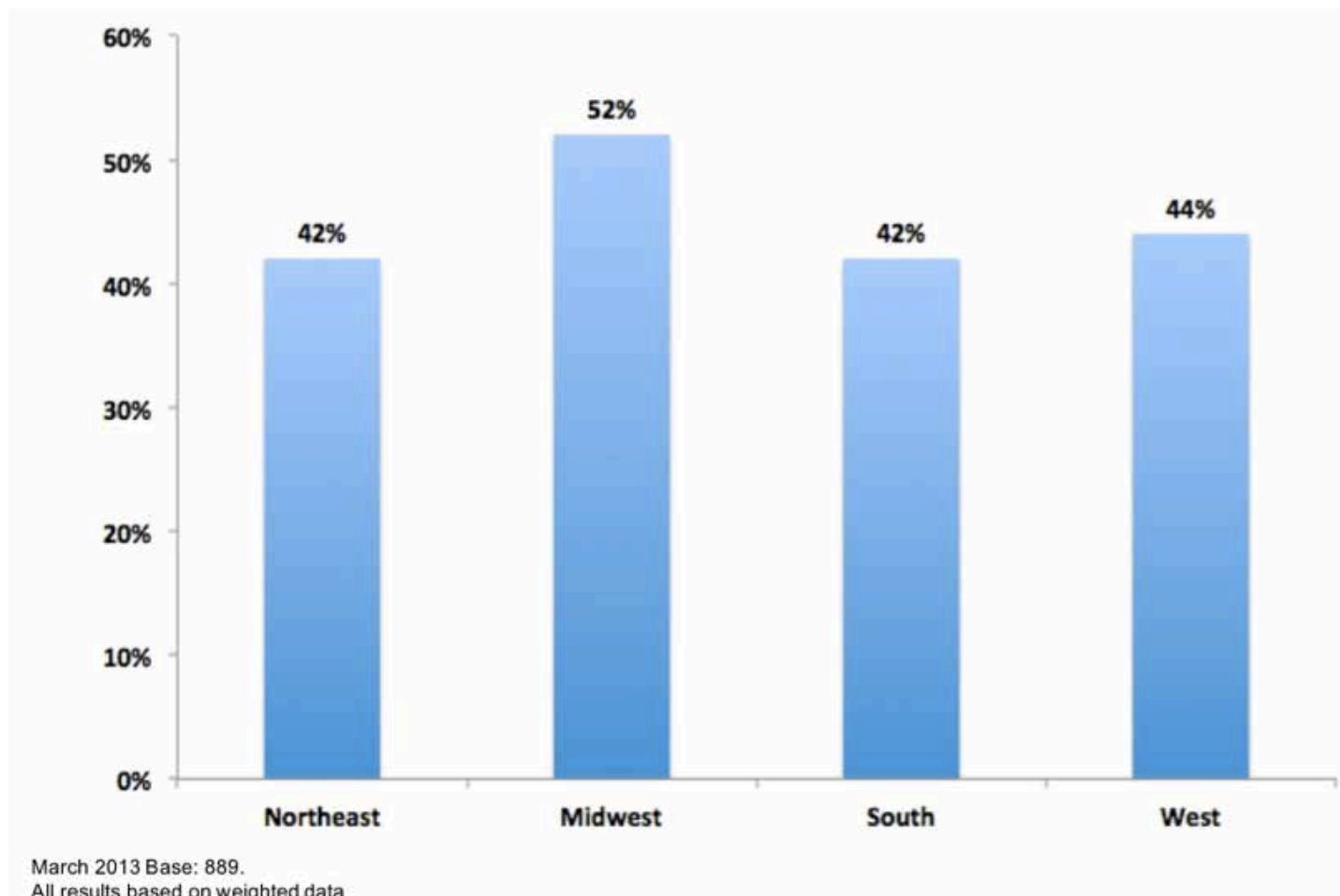


Familiarity with Hydraulic Fracturing (or 'Fracking')



Nationally representative sample, Spring 2012

Public Support for Fracking



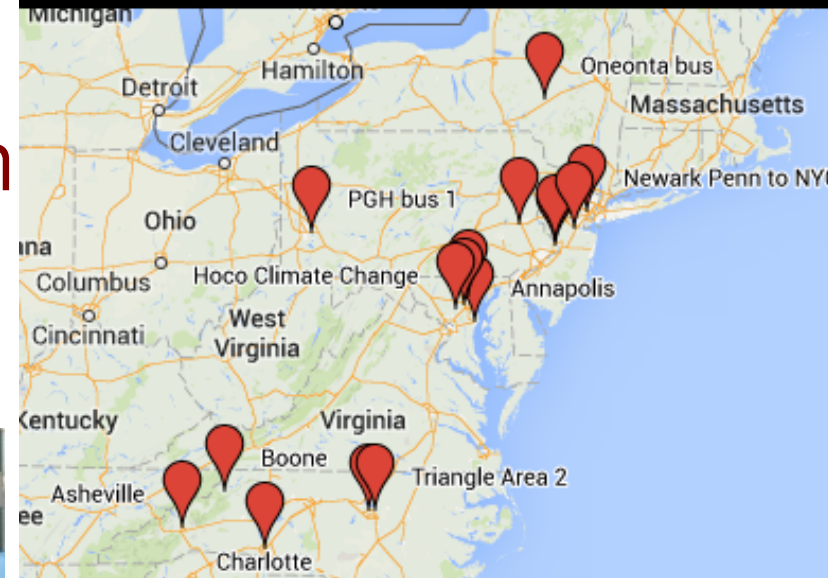
Survey respondents who say they are familiar with the term hydraulic fracturing (42% of total base or 889 individuals).

U.S. Opposition to Fracking

There has also been concern in U.S. about global and local impacts of fracking



By Train and By Bus



Fracktivist will be at the Peoples Climate March Join us?

