WRC

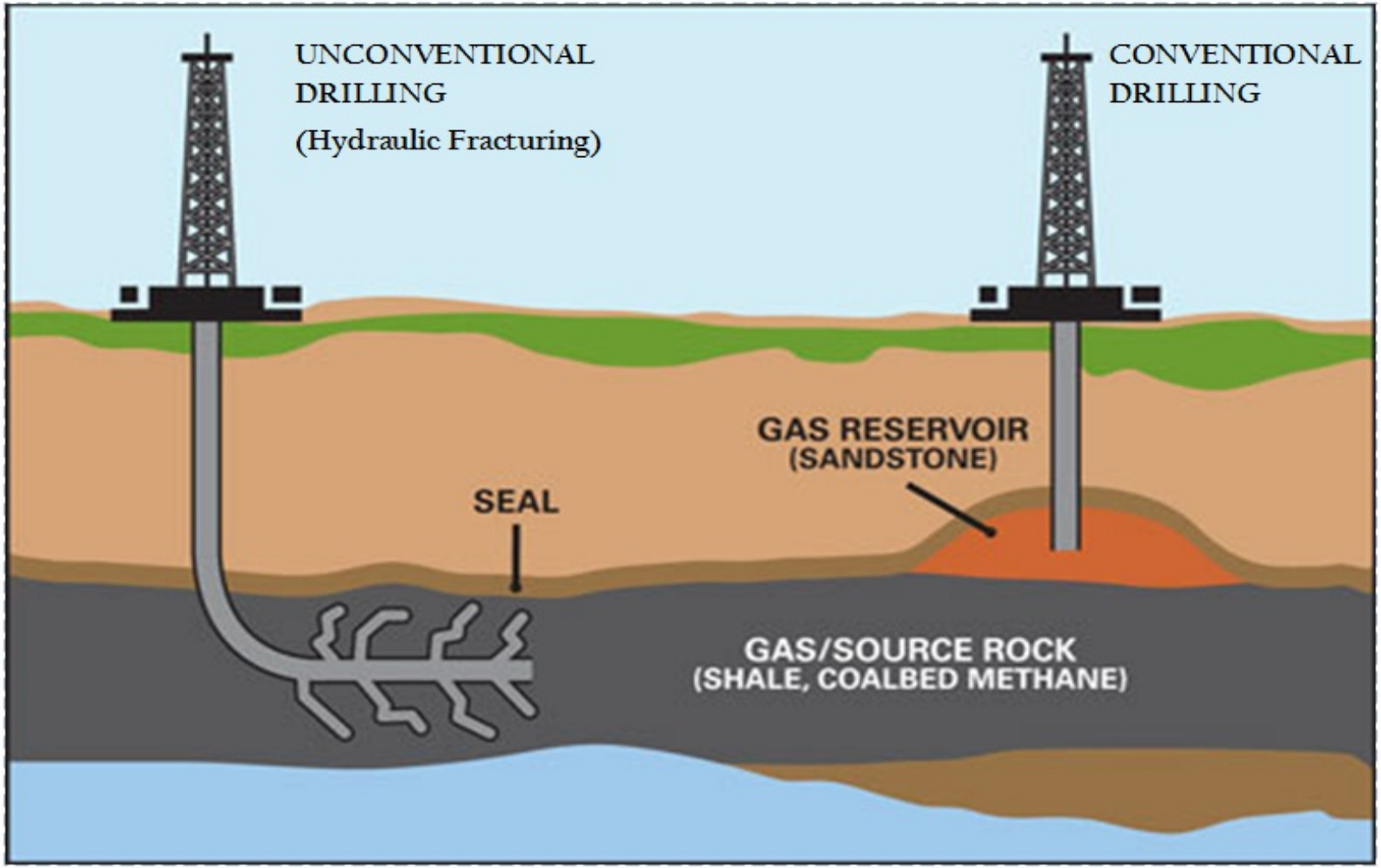
WATER RESOURCES COMMISSIONER

Jim Nash

For more information, visit

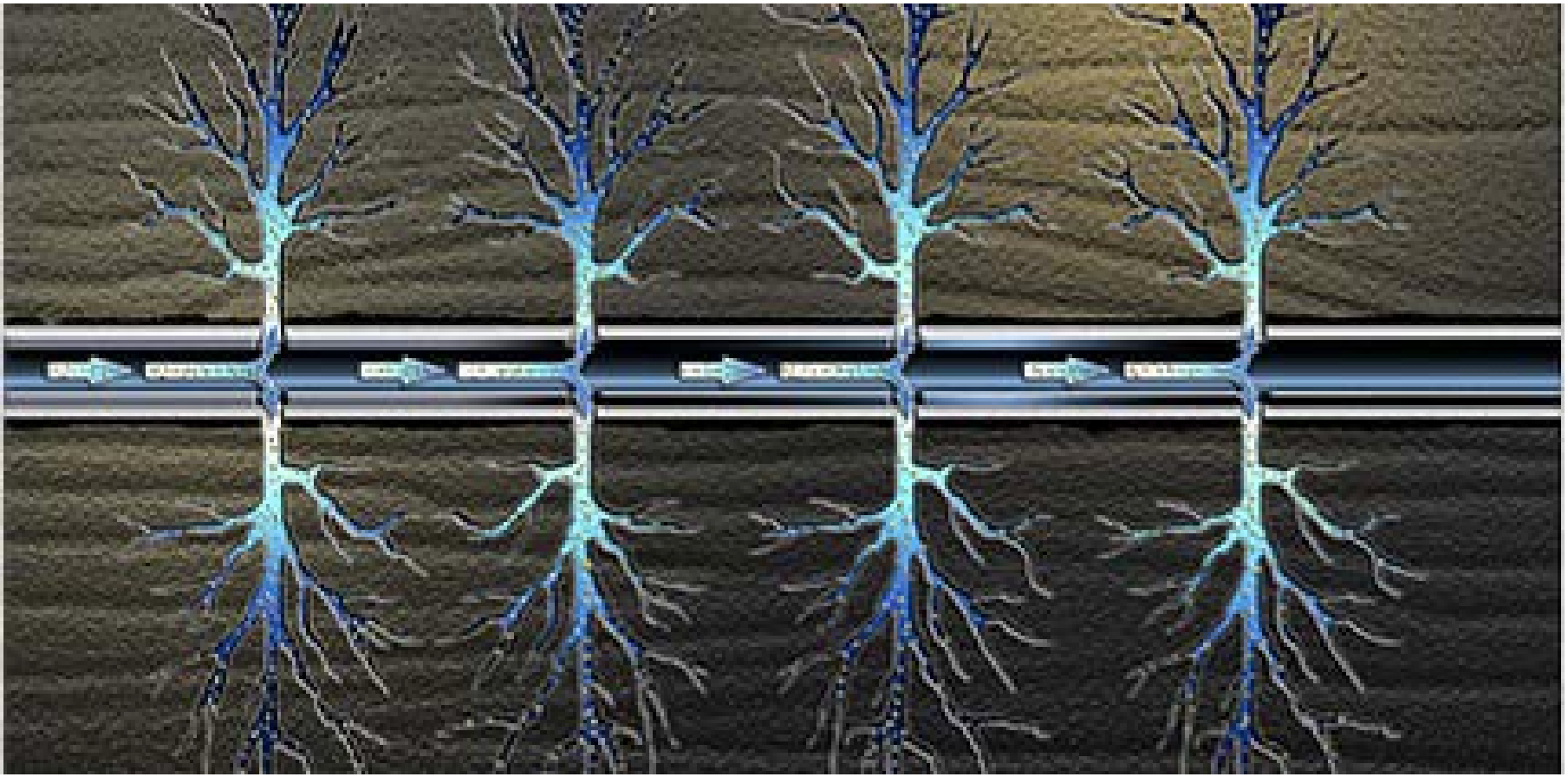
www.oakgov.com/water

The Historical Difference



Unconventional/Conventional Natural Gas Extraction

High frack fluid volumes: needed to stimulate gas release from many existing fractures.



Chemicals Used

* 99.5% water & sand

* **0.5% additives (equals 400,000 gallons with 8 million gallon frack)**
  * Acid (hydrochloric, acetic or muriatic)
  * Biocide (Glutaraldehyde)
  * Breaker (Ammonium persulfate)
  * Corrosion inhibitor (Formamide)
  * Crosslinker (Borate salts)
  * Friction reducer (Petroleum distillates BTEXs, TMBs, Methanol and PNAs)
  * Gel (Guar gum or hydroxyethyl cellulose)
  * Iron control (Citric acid)
  * Clay stabilizer (Potassium chloride)
  * pH adjuster (salts, Sodium or potassium bicarbonate)
  * Proppant (Sand)
  * Scale inhibitor (Poly- & ethylene glycol mixtures & glycol ethers)
  * Surfactant (Isopropanol)
  * Many chemicals and formulas are protected as "trade secrets."
  * **Acidization (hydrofluoric/hydrocloric acid)**

Acidization

* An alternative to fracking for loosening tight rock formations that contain oil and gas. Drillers dissolve the rock using hydrofluoric (HF) or hydrochloric acid (HCL), or a mix. Uses include pipe washing, matrix and fracture acidizing processes.
* This very powerful acid, in too high a concentration, can eat away the drill casings.
* The National Fire Protection Assoc. rates hydrofluoric acid as the most dangerous category of hazardous materials.
* An average well can use 10 to 500 gallons of acid per linear foot of area acidified. (American Petroleum Institute)

Hydrofluoric Acid

* HF boils at 67.1 degrees Fahrenheit (a spring day) and can produce a cloud of fumes that does not dissipate and hovers near the ground in a dense vapor cloud
* The acid cloud can be clear and odorless and can travel great distances
* Even small doses inhaled or direct skin contact can cause death. http://www.bt.cdc.gov/agent/hydrofluoricacid/basics/facts.asp
* Sept., 2012, South Korea – An 8 ton release of this acid killed 5 workers, severely injured 18 others, and sent 3,000 local residents to the hospital for medical treatment
  Source: http://www.thenextgeneration.org/blog/post/monterey-shale-series-distracted-by-fracking

University of Michigan Study

Graham Sustainability Institute

(with state and industry participation)

* Hydrological connectivity can lead to contamination impact distant from, as well as close to drilling sites.
* Fracking wastewater often contaminated with heavy metals and radioactive materials.
* Compaction of land at site causes change in hydrology.
* Impact of large number of truck & equipment; traffic, light, noise, diesel exhaust, oil/gas fumes…
* Did not distinguish enviro impact between low and high volume wells
* Most common remark in the report: too little Michigan-specific data to make conclusions/risk assessments. This shows the claim of no contamination in Michigan has no data to support it, because it was never collected.

Studies on fracking effects

* **“Hormone-Disrupting Chemicals Found At Fracking Sites Linked To Cancer, Infertility”:** University of Missouri Medical School study published in Endocrinology Society http//medicine.missouri.edu/news/0214.php
* **“Hydraulic Fracturing Fluids Likely Harmed Threatened Kentucky Fish Species”:** United States Geological Survey and National Fish and Wildlife Service report: **"Our study is a precautionary tale of how entire populations could be put at risk even with small-scale fluid spills,"** USGS scientist Diana Papoulias, the study's lead author. www.usgs.gov/newsroom/article.asp?ID=3677#.UvGvbvldUaw
* **National Academy of Science Report Says 'Fracking' Contaminates Water** SustainableBusiness.com “we document systematic evidence for methane contamination of drinking water associated with shale gas extraction," the report states. http://www.sustainablebusiness.com/index.cfm/go/news.display/id/22379
* **American Academy of Pediatrics:** VOC releases at well heads, pipelines and Tanks combine with traffic exhaust (nitrogen oxides) to form ground level ozone, a known contributor to serious respiratory diseases, especially among children. http://aoec.org/pehsu/documents/hydraulic_fracturing_and_children_2011_health_prof.pdf

Near a Well?

* **United States Environmental Protection Agency Region III** (January 19, 2012) – "Methane contamination was detected in private wells thereafter in concentrations exceeding those previously found."
* **"Other chemicals found in produced water** include VOCs, metals and radio nuclides… The Petroleum Institute estimates that nearly eight barrels of water are produced for every barrel of oil… Methane and fracking chemicals can also migrate into shallow aquifers used for drinking water wells…" USHHS, Agency for Toxic Substances and Disease Registry, CO Dept Health & Env.
* **Scientific American** – "High Levels of Arsenic Found in Groundwater Near Fracking Sites"
* Duke University's Daniel Rozell and Sheldon Reaven – an individual fracking well releases at least 200 m^3 of contaminated fluids.
* ***"Greene County shale well continues burning"*** **Pittsburgh Post-Gazette** Feb. 12, 2013

  "The heat from the blaze -- which caused a tanker truck on site full of propane gas to explode -- was so intense that first responders from local fire departments had to pull back rather than risk injury." The fire burned for a week, killing one worker. Read more: http://www.post-gazette.com/local/south/2014/02/11/Gas-well-explodes-in-southeastern-Greene-County/stories/201402110126#ixzz2u769JbXG

Near a Well?

"EPA Needs to Improve Air Emissions Data for the Oil and Natural Gas Production Sector"

EPA Inspector General:

"Harmful pollutants emitted from this industry… can result in serious health impacts such as cancer, respiratory disease, aggravation of respiratory illnesses and premature death." The article argues for stronger data and study of dangers. http://www.epa.gov/oig/reports/2013/20130220-13-P-0161_glance.pdf

"**The oil and gas industry is a large source of VOC emissions**. Overall, VOCs are released to the air at all stages of oil and gas operations… For example, benzene is released during venting and dehydration..." USHHS, Agency for toxic Substances and Disease Registry Colorado Dept Health & Env.

Colorado becomes first state to regulate methane leaks in drilling/supply chain in 2014. Colorado health officials claim stopping this leakage would be the equivalent of taking all cars off Colorado's roads in terms of heat trapping compounds. http://www.scientificamerican.com/article/colorado-first-state-to-limit-methane-pollution-from-oil-and-gas-wells/

The Fracking process

* **Haliburton Loophole;** National Council of State Legislatures: "Hydraulic fracturing is currently exempt from the underground injection control program requirements applicable to class II oil and gas related wells set forth in the federal Safe Drinking Water Act, except for when diesel fuels are used." http://www.ncsl.org/research/energy/fracking-update-what-states-are-doing.aspx#federal.
* **Fracking by the Numbers;** Key Impacts of Dirty Drilling at the State and National Level www.environmentamerica.org/reports/ame/fracking-numbers

The Fracking process

* **Water withdrawals:** water destruction, removed from water cycle, effect on aquifer, international agreements
* **Lawsuit/MSU study**: DEQ water withdrawal tool problem, shows faulty results, overestimates supply, weak on rapid withdrawals.
* **Cement casings:** Human error/structural faults/Concrete Institute
* **Contamination**: fissures, salt veins, seismic movements
* **Flaring associated natural gas**; noise, odor, incomplete combustion, low price will rise if exports allowed as being lobbied for now
* **Waste water disposal** – toxic, spills, transport, US Geological Survey – fracking is causing large increase in seismic activities in fracking areas http://www.usgs.gov/newsroom/article.asp?ID=4132&from=rss_home#.VO1Cqoo8LCT

The Fracking process

* **Natural gas (methane) leakage** in extraction/supply chain is significant, in current and abandoned wells. Leakage means natural gas (25-75 times as heat retaining as carbon) may be more climate change reactive than coal. http://www.pnas.org/content/111/51/18173.full. Study from National Academy of Sciences: Arial view showed methane leakage 2-3 times as large as EPA estimates in western Pennsylvania.
* **Oil company claim:** no cases of water contamination in MI. Reality: no baseline testing or even post drilling testing on 90% of wells to know if contamination has occurred. UM study said not enough Michigan-specific data.
* **Sustainability** demands 30+ year view in policy analysis, Triple Bottom Line. Fracking and fossil fuels fail those tests, for local pollution and global climate.

Fracking Contaminated Drinking Water Wells in PA

Pennsylvania recently released details of 243 cases in which companies prospecting for oil or gas were found by state regulators to have contaminated private drinking water wells. Many cases involved a single drilling operation impacting multiple water wells. Problems include methane gas contamination, spills of wastewater and other pollutants, and wells that went dry or were otherwise undrinkable.

THE WALL STREET JOURNAL

Exxon CEO Joins Suit Citing Fracking Concerns

By Daniel Gilbert Feb. 20, 2014

Exxon CEO Rex Tillerson "has joined a lawsuit that cites fracking's consequences in order to block the construction of a fracking water tower next to his and his wife's Texas home."

"traffic with heavy trucks on FM 407, creating a noise nuisance and traffic hazards," the suit says.

"A lawyer representing him said his concern is about the devaluation of his property…"

"When he is acting as Exxon CEO, not a homeowner, Tillerson has lashed out at fracking critics and proponents of regulation." Also saying "the risks are very manageable." ***So why not by his house?***

US Bureau of Economic Research: Fracking can have a small to moderate positive property value impact if a home has water department hookup, but it can have a 20-30% negative property value impact if a home has a private well.

Regulate Ancillary Uses and Facilities

Local governments can regulate ancillary uses and facilities

* Water sources, uses, transfers and diversions, flow lines, gathering lines, sweetening facilities.
* Water & chemical mixing stations, treatment & production facilities, pumps, waste treatment, reuse or disposal.
* Air emission equipment (flares, scrubbers), truck transfer and hauling, access roads, wetland impacts.

Addison Township v Gout, 435 Mich 809 (1990)

http://flowforwater.org/

Pipeline/Road Ordinances or Franchise Agreements

* **Application**: Non-MPSC and MPSC Pipelines, but not Federally Approved Pipelines
* **Benefits**: disclosure of site and transportation plan for pipelines or use of roads, emergency response plan, financial assurances, remedies.
* **Authority**: Michigan Constitution, Franchise Agreement, and Police Power Ordinances

http://flowforwater.org/

Recent train/truck/pipeline spills

7/6/13 Canadian train derails outside Quebec, 47 killed, town leveled.

1/16/15 train derailment in West Virginia causes fire and oil spill.

2010 Kalamazoo River (840,000 gallon) spill of Canadian Tar Sands after pipeline rupture, still being cleaned up. Tar sands oil sinks, hard to clean up.

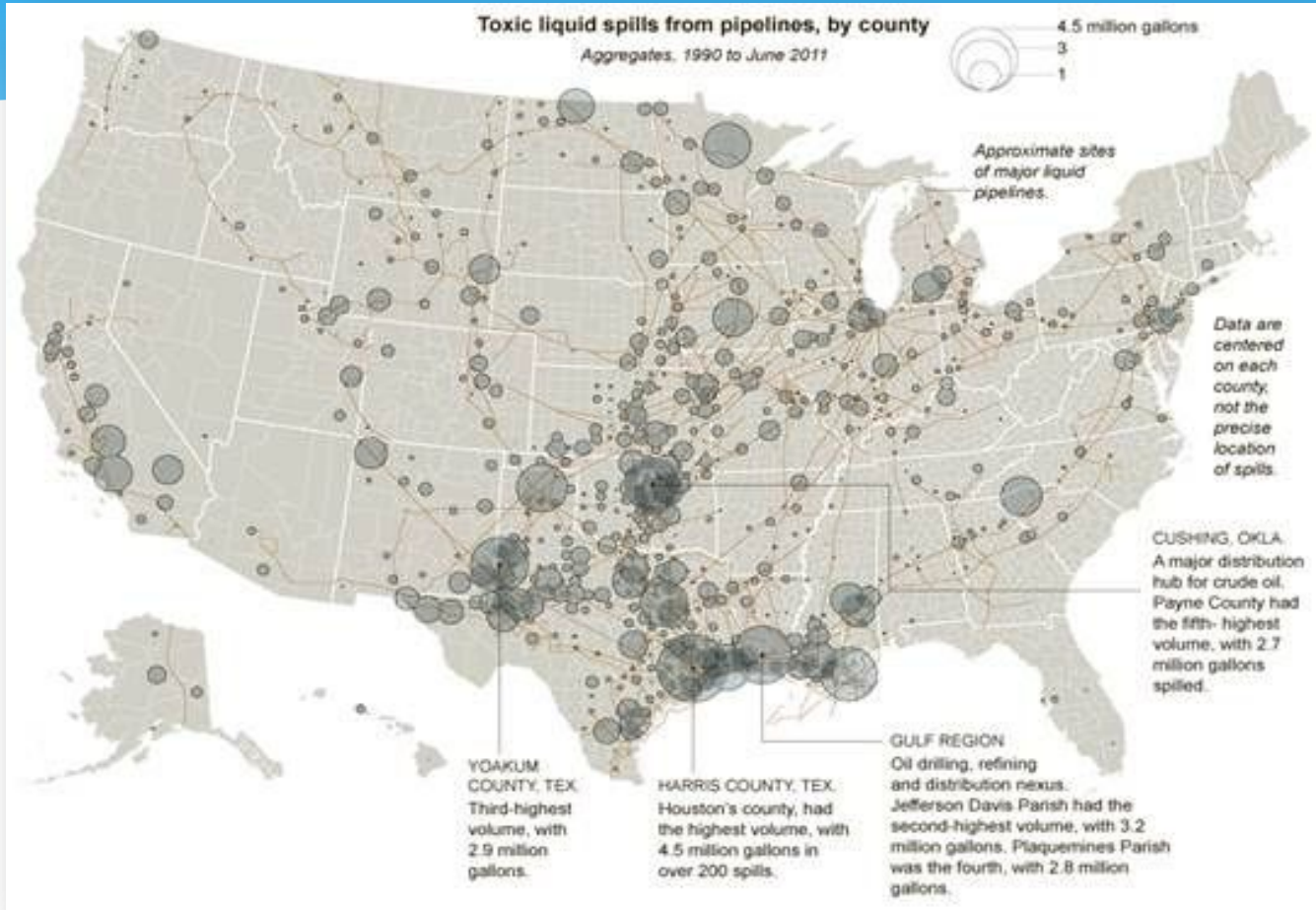
1/17/15 50,000 gallons of crude spilled into the Yellowstone River after pipe rupture.

TransCanada's Existing Keystone Pipeline Has Poor Safety Record. TransCanada gave assurances, as they do now, about the existing Keystone pipeline, which spilled 12 times in its first year of operation -- including a major leak of about 21,000 gallons in North Dakota. http://switchboard.nrdc.org/blogs/aswift/yet_another_leak_on_a_new_pipe.html

Pipeline Leaks

"pipelines spill 3-times more (than trucks and trains) per 1 billion barrel-miles of crude oil transported, over the 2004-12 period." – International Energy Agency

Recent History of Pipeline Spills



In 2010 alone pipeline spills and explosions killed 25 people and caused nearly $1 billion in property damage. Since 1990, pipelines in the U.S. have spilled more than 110 million gallons of crude and petroleum products

Aliso Canyon Natural Gas Leak

* **Porter Ranch Gas Leak:** Since last October 89,000 metric tones of methane has escaped from a storage well in Aliso Canyon, California.
* Methane has a heat trapping potential 84 times that of carbon, though it breaks down faster.
* This leak is the equivalent of the carbon released by 160 coal-fired power plants.
* 3,000 homes have been evacuated and a state of emergency has been declared.
* The leak is expected to be stopped by early March.

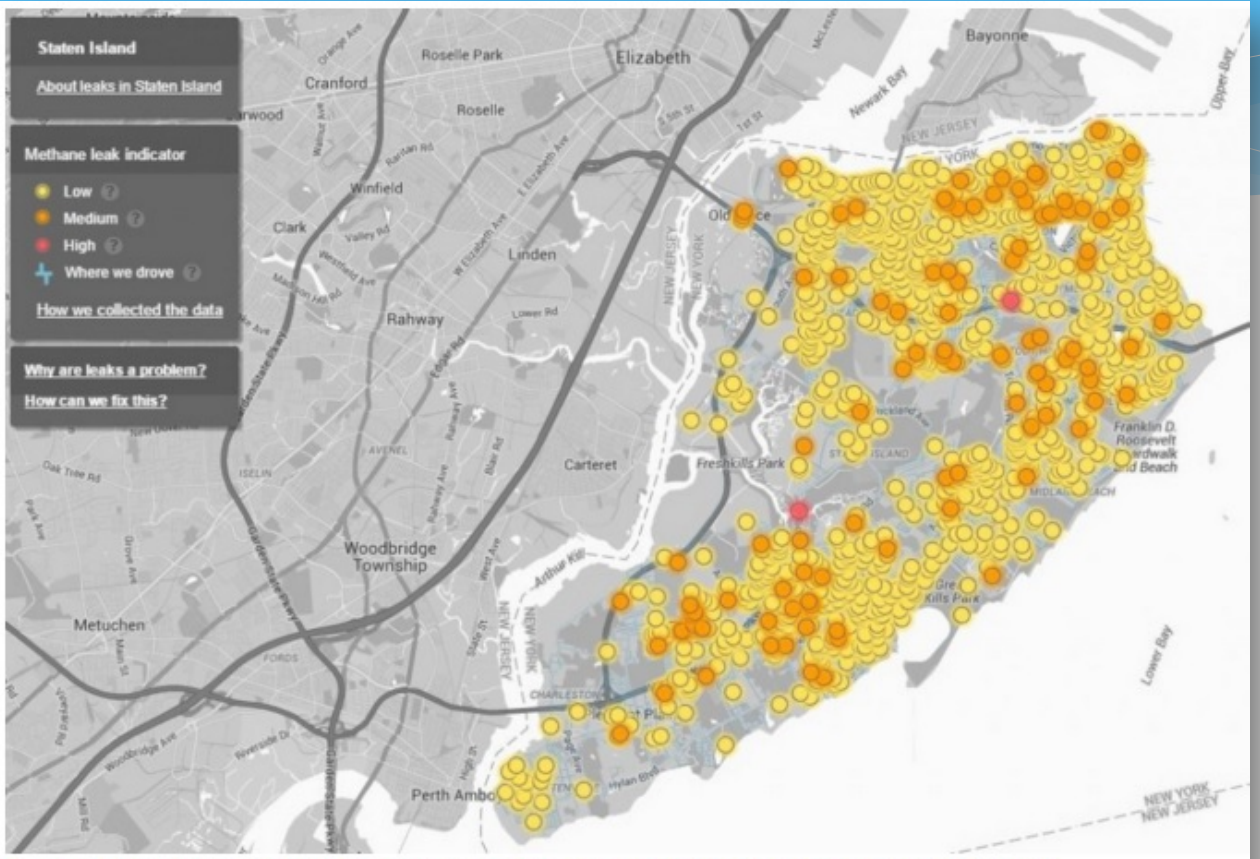
Aliso Canyon Leak Videos

* **"California natural gas leak just one of thousands across country"**
* Stanford Univ. study shows EPA underestimating methane leaks by 50%, other studies show even more unaccounted leaks.

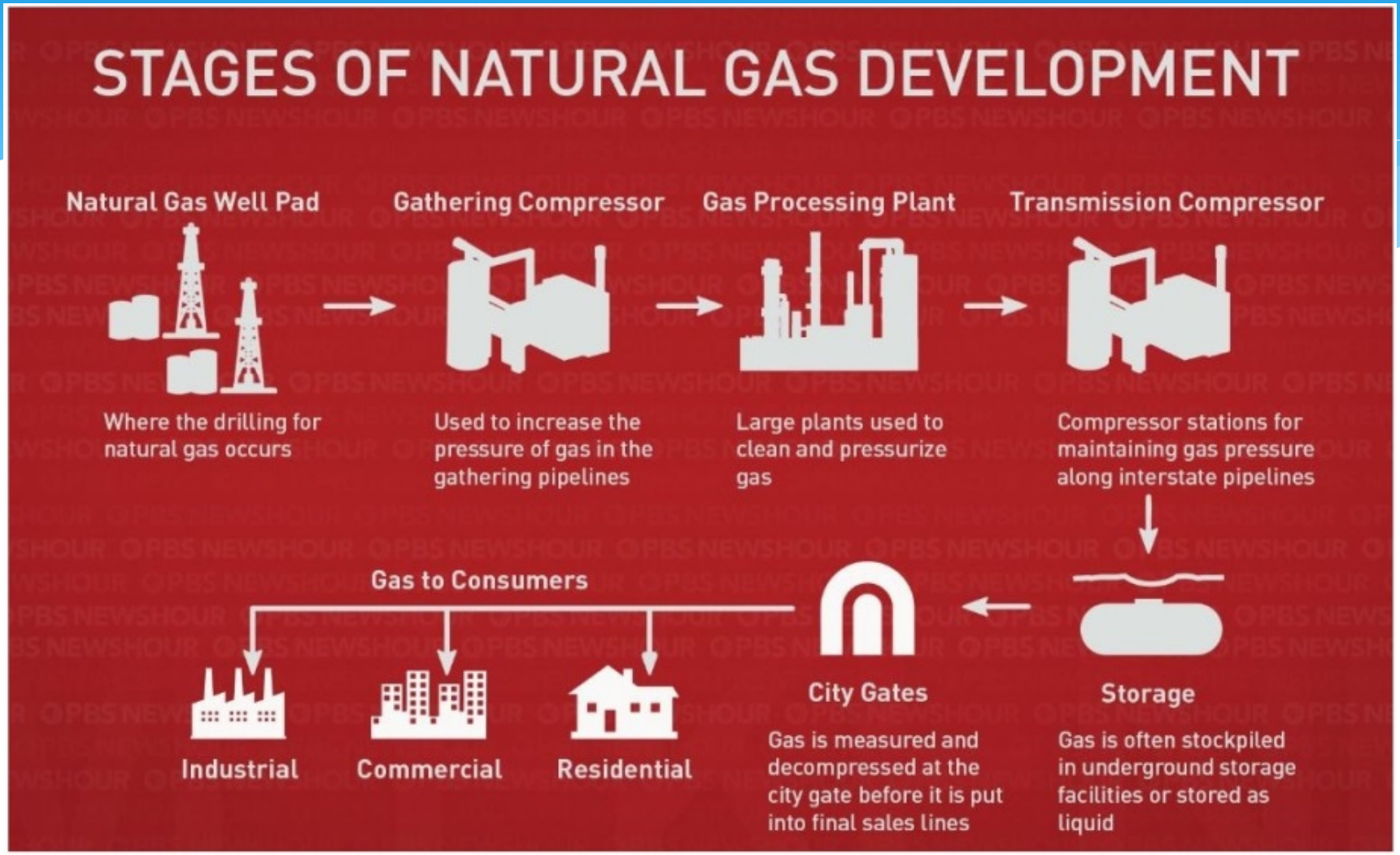
http://www.pbs.org/newshour/updates/california-natural-gas-leak-just-one-of-thousands-across-country/

http://www.nbclosangeles.com/news/local/California-Methane-Leak-Aliso-Canyon-Porter-Ranch-Environmentalists-Other-Leaks-365804391.html

Staten Island Natural Gas Leaks



Natural gas leaks found on Staten Island, NYC. *New York City has an older infrastructure that includes corrosion-prone cast iron pipes. The Environmental Defense Fund drove a team of cars outfitted with air sensors for four months in 2014 and found an average of about one natural gas leak for every mile driven in New York City's Staten Island. In Indianapolis: one leak for every 200 miles. Chicago: one leak for every three miles.*



LEAKS ACROSS THE SUPPLY CHAIN — *Methane seepage can occur at all stages of oil and gas production. Graphic by: Lisa Overton/NewsHour Weekend*

We need safer alternatives

* **Water Resources Commissioner's office** The WRC Commerce WWTP uses geothermal (from sewage) in their facility, saving $50,000 in natural gas annually. The WRC is looking at these and other renewable energy projects to reduce our impact on the power grid.
* **Farmington Hills City Hall** installed geothermal heating and solar panels, reducing their gas bill from $30,000 annually to zero, with 70% total energy savings. Other local public and private buildings have also done the same, and more are being converted daily. Net Zero energy buildings, making as much energy as they use, are the future.
* **Nationally**, the US added 835 megawatts of wind generators in first half of 2014 and 1,354 megawatts in new solar installations in just the 4th quarter 2014.

We need safer alternatives

* **Cost of solar panels has fallen 60% since 2010.** Solar leasing/purchasing agreements and new financing plans like PACE, making solar installations more affordable and common for businesses/homeowners.
* **Michigan 4th in nation in green jobs growth**: *Echotech Institute Clean Jobs Index.* Nationally, the solar industry added 50% more US jobs than the oil pipeline and oil/gas extraction industries: *The Solar Foundation*.
* **173,807 US solar jobs in 2014**, 21.8% growth over 2013: *2014 National Solar Jobs Index*. Energy efficiency and energy audits (saving energy for business and homeowners nationally) employing 380,000: *Lawrence Berkeley National Laboratory report*
* **LEED Certification is growing**: Leadership in Energy and Environmental Design is a third party measure of building efficiency and is now the Industry standard for architects, engineers and the construction industry.

For More Information

Visit the Oakland County Water Resources Commissioner's website at:

https://www.oakgov.com/water/Pages/Fracking-Town-Hall.aspx