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HEARING BEFORE THE U.S. HOUSE OF REPRESENTATIVES ENERGY AND COMMERCE SUBCOMMITTEE ON ENERGY AND POWER:
"BENEFITS OF AND CHALLENGES TO ENERGY ACCESS IN THE 21ST CENTURY: FUEL SUPPLY AND INFRASTRUCTURE"

March 6, 2014

Good morning, and thank you for the opportunity to contribute to the deliberations of this Subcommittee. My name is Michael Obeiter, and I am a senior associate in the Climate and Energy Program at the World Resources Institute (WRI). WRI is a non-profit, non-partisan think tank that focuses on the intersection of the environment and socio-economic development. We go beyond research to put ideas into action, working globally with governments, business, and civil society to build transformative solutions that protect the earth and improve people's lives. We operate globally because today's problems know no boundaries. We provide innovative paths to a sustainable planet through work that is accurate, fair, and independent.

Summary

I am pleased to be here today to offer WRI's perspective on the United States' natural gas infrastructure, with a focus on the need for reductions in fugitive methane emissions and forward-looking planning that takes into account the realities of a changing climate.[1] The U.S. currently finds itself in the midst of an energy boom, driven by technological advances in the extraction of oil and natural gas. Our domestic energy resources, and the self-sufficiency they can bring, are the envy of much of the world. Yet we must also weigh the consequences of our

[1] While this testimony focuses primarily on methane emissions, WRI is committed to reducing all greenhouse gas emissions to avoid the most dangerous impacts of climate change, and to minimizing the full scope of impacts caused by energy production and use.

actions on the natural environment; the decisions we are making will have long-lasting impacts on air quality, water scarcity, and the climate. We can balance economic growth and reductions in greenhouse gas (GHG) emissions, but to do so we must correct the various market failures that have allowed for unchecked emissions of carbon pollution and other GHGs.

Methane, the primary component of natural gas, is a potent greenhouse gas. Though it is short-lived in the atmosphere, methane is 34 times as powerful as carbon dioxide (CO_2) at trapping heat when averaged over a 100-year timeframe.[2] Although natural gas emits only 50-60% as much CO_2 as coal when burned for electricity generation, fugitive methane emissions throughout the natural gas life cycle undermine the climate advantage of switching from coal to gas. While we don't yet know with precision exactly how much methane is escaping into the atmosphere from wells and pipelines, we know enough to recognize that fugitive methane emissions are a significant environmental problem – one that we know how to fix.

Beyond its environmental impact, methane has economic value, and any cubic foot that is leaked, vented or flared is one less cubic foot that can be put to productive use. Even with today's relatively low natural gas prices, many commercially available technologies can reduce or eliminate methane emissions and pay for themselves in three years or less (see Table 1, below).[3] The fact that these technologies are not often widely utilized is evidence of a market failure that requires policy intervention. To ensure that American energy resources are not

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[2] Over a 20-year timeframe, methane is 86 times as powerful as CO_2 at trapping heat. See http://www.climatechange2013.org/images/report/WG1AR5_Chapter08_FINAL.pdf.

[3] For a detailed, though not necessarily comprehensive, list of technologies and case studies, see http://www.epa.gov/gasstar/tools/recommended.html.

wasted, and to reduce the impact of oil and natural gas production on the climate, Congress can undertake a number of measures, including:

- Provide tax credits or accelerated depreciation for purchases of, or R&D investments in, equipment to mitigate fugitive methane emissions, much like the Section 29 tax credit incentivized the use of new technologies for producing unconventional gas. As the U.S. Department of Energy (DOE) said in evaluating the success of the Section 29 credit, "[e]conomic and tax incentives can greatly accelerate industry's adoption of technology by helping justify capital, by lowering economic risk and by challenging the financial community's imagination."[4] Tax credits could also be provided to companies on the basis of volume of avoided methane emissions.
- Require the use of methane emissions control technologies at all oil and gas operations on public lands, as some Bureau of Land Management Field Offices have begun to do.[5]
- Require gas companies and their service contractors to perform monthly emissions monitoring and repair as a condition for receiving the rights to extract oil and gas from federal lands.
- Authorize and fund the expansion of basic science and applied technology research programs at the U.S. Department of Energy, including R&D performed by the Office of Fossil Energy and the National Labs. Additional research is needed to bring down the cost of emissions monitoring technologies, to accelerate innovations in emissions control technologies that continue to reduce the cost of this equipment, and to bring lab-scale technologies up to pilot scale. Funding to expand these programs can be raised by increasing royalties from drilling on public lands, and by having industry participate in

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[4] Source: http://www.netl.doe.gov/publications/proceedings/01/carbon_seq/1a3.pdf.
[5] See, for example, http://www.westernlaw.org/blog/2013/12/colorado-blm-field-office-takes-critical-action-clean-oil-and-gas-industry-methane-poll.

research while sharing the costs. DOE research and development is a public good that was instrumental in bringing many advanced energy technologies and techniques, including hydraulic fracturing, to market, and can help reduce the hurdles to widespread use of leak-detection, emissions-measurement, and low-emissions technologies. [6,7]

- Exercise Congressional oversight of executive branch agencies – including the Environmental Protection Agency (EPA), the Department of the Interior (DOI), the Federal Energy Regulatory Commission (FERC), and the Department of Transportation (DOT) – to ensure they are using all tools at their disposal to require cost-effective reductions of methane from all components of energy infrastructure on both public and private lands.
    - Congress should direct EPA to regulate methane directly, rather than mandating reductions of volatile organic compounds (VOCs) and achieving methane reductions as a co-benefit. After processing, natural gas is almost entirely methane, so targeting it would achieve deeper reductions than targeting VOCs. EPA, with Congressional oversight, should also ensure that the technologies developed by and in conjunction with DOE research programs are being appropriately utilized.

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[6] For more information on the role of publicly-funded research in accelerating the shale gas revolution, see http://thebreakthrough.org/archive/new_investigation_finds_decade and http://www.netl.doe.gov/publications/proceedings/01/carbon_seq/1a3.pdf.

[7] As other nations, especially those with binding GHG reduction targets, begin to consider their own unconventional gas resources, there will likely be export markets for many of these technologies, yet another economic benefit of increased research and development funding.

- Congress should ensure DOI aggressively pursues all options at its disposal to minimize wasting of energy resources on public lands, the source of nearly 18% of all U.S. natural gas production in FY 2012.[8]
- Congress should work with FERC, DOT, and stakeholders to improve sharing of costs and benefits realized in utilizing emissions control technologies in pipeline and service contracts, to incentivize use of emissions control technologies by all service providers.

- Provide federal assistance to state agencies that are acting to rein in fugitive methane emissions.
- Fully fund offices and programs at EPA, including Natural Gas STAR, that encourage the voluntary use of emissions reduction technologies and recognize industry leaders that commit to implementing best practices throughout their operations.[9]

Beyond these relatively narrow, but important, measures to reduce fugitive methane emissions from U.S. energy infrastructure, there is much that Congress can do to correct the broader market failure that has allowed the buildup of greenhouse gases in our atmosphere and which threatens to be an increasingly disruptive force in the coming years. Rising sea levels, changing weather patterns, reduced agricultural yields, and more extreme storms will change our way of life and dampen prospects for economic growth. The private sector needs to take climate into account

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[8] Source: http://energycommerce.house.gov/sites/republicans.energycommerce.house.gov/files/20130228CRSreport.pdf.
[9] For additional policies to address fugitive methane emissions, see http://www.wri.org/publication/clearing-air.

when it makes investment decisions and infrastructure choices; indeed, many companies already are.[10]

Regulatory and policy certainty would be a welcome development for many companies that acknowledge the inevitability of a comprehensive national climate policy. President Obama, to his credit, has started the U.S. down the path of smart emissions reductions with his multi-sector Climate Action Plan. Congress should support these efforts, while simultaneously working on ways to drive even deeper reductions by setting an implicit or explicit price on carbon pollution and other GHG emissions.[11]

We are living in a new era of domestic energy abundance. But we must tread carefully if we are to safeguard the climate while fostering economic growth. There is much that we can do now to reduce methane emissions, eliminate waste, and save money, and government can play a role in assuring that these opportunities are recognized. Yet we cannot lose sight of the need to put the country on a path toward a low-carbon future, and should not allow near-term profits to jeopardize long-term prosperity. The infrastructure choices we make today will reverberate for the next 40-50 years; ignoring the climate when making these decisions risks stranding valuable assets, or locking in dangerous levels of GHG emissions and potentially catastrophic climate change. We owe it to ourselves and future generations to make sure we get those choices right.

[10] In December, the Carbon Disclosure Project released a report finding that many major U.S. companies, including Wal-Mart and ExxonMobil, are factoring a "shadow price" of carbon into their strategic plans. For more information, see http://www.reuters.com/article/2013/12/05/usa-energy-carbon-idUSL2N0JK0V220131205.

[11] In February 2013, WRI published a report entitled "Can the U.S. Get There from Here?," which examined the emissions reductions that could be achieved through existing executive authorities. The report's authors found that ambitious action across the suite of greenhouse gases could enable the U.S. to meet its international commitment of reducing GHG emissions by 17% below 2005 levels by 2020. However, by the middle of next decade, additional legislation will be needed to ensure we remain on the trajectory to achieve the scale of reductions by mid-century that scientists tell us will be necessary if we are to avoid the most catastrophic impacts of climate change. For more information, see http://www.wri.org/publication/can-us-get-there-here.

The shale gas boom has changed the picture of the U.S. energy supply

Over the last decade, the U.S. has rather suddenly found itself in an era of resource abundance, as evinced by the fact that the Energy Information Administration (EIA) estimates that we are now the world's largest producer of both oil and natural gas, surpassing Saudi Arabia and Russia.[12] Yet with this great power comes great responsibility – the responsibility to demonstrate to the rest of the world that it can extract these fuels in ways that minimize local environmental impacts and needless venting and flaring of natural gas, while pivoting to investment in and deployment of 21st century renewable energy technologies.

In the near term, the EIA projects that natural gas will remain an important part of our domestic energy mix, with production increasing by 44% between 2011 and 2040 – an increase driven almost entirely by shale gas accessed through horizontal drilling and hydraulic fracturing.[13]

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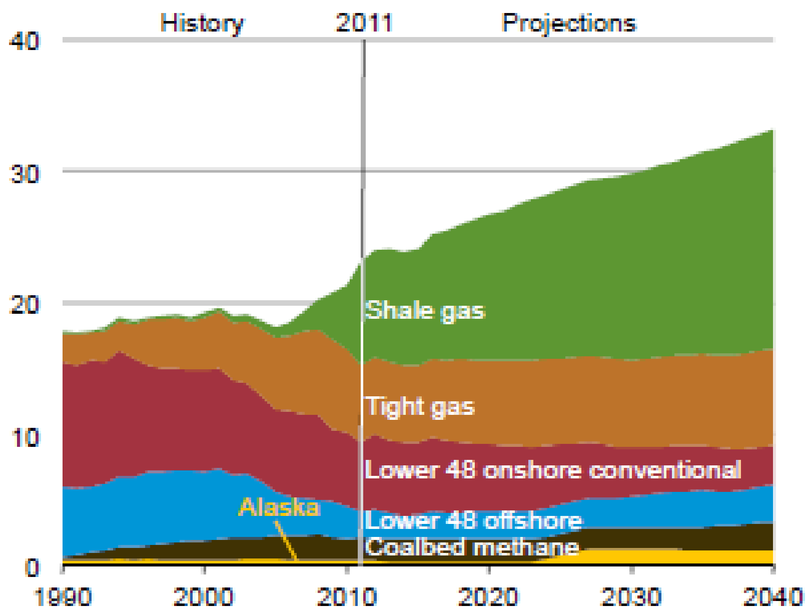
[12] See http://www.eia.gov/todayinenergy/detail.cfm?id=13251.

[13] Source: http://www.eia.gov/forecasts/aeo/MT_naturalgas.cfm.

Figure 1: Historical and Projected U.S. Natural Gas Production, by Source



Source: EIA, Annual Energy Outlook 2013

What this tells us is that we have to "get it right" when it comes to minimizing the impact of natural gas development. Natural gas may emit 50-60% the CO_2 of coal at the point of combustion, but any climate advantage natural gas has is reduced by leaks and vents at the wellhead, at processing plants and compressor stations, and along transmission and distribution pipelines.

Yet we must remember that, even if fugitive methane emissions are eliminated altogether, natural gas is, at best, a stepping stone to help the U.S. transition to a low-carbon economy (see "The natural gas stepping stone," below); while we traverse that stepping stone, cutting CO_2 and other GHG emissions from across the economy as we go, we need to take advantage of cost-effective opportunities to reduce methane emissions and soften the impact of peak warming.

We can – and should – reduce methane leakage to 1% or less

Leaking infrastructure should be a key concern to those who would tout the virtues of "clean-burning" natural gas; in addition to contributing to global warming, leaks of VOCs from natural gas systems contribute to local air pollution issues like smog.[14] While the goal for industry and government should be zero leakage across all infrastructure, an important benchmark to keep in mind is a leakage rate of 1% of total production. Keeping fugitive methane emissions below 1% would ensure that natural gas is not only more climate-friendly than coal, but also a net positive when switching from diesel to natural gas in heavy-duty vehicles.[15]

Current estimates of total upstream fugitive methane emissions vary widely, primarily due to the lack of measurement data (to date, most estimates, including those from EPA and industry, are calculated from the bottom up using activity data and engineering calculations).[16] However, a number of studies have been released in the last year, and more are currently underway, that will help shed some light on this issue.

A recent study, led by researchers from Stanford University, synthesized the results of over 200 previous studies (including many that used direct or atmospheric measurements), and concluded that methane emissions in general, and those from natural gas systems in particular, are much greater (as much as 75% greater from all sources) than official estimates from EPA's most recent

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[14] Due to leaks and vents from natural gas operations, Wyoming and other rural states in the West have smog that rivals that seen in Los Angeles. For more details, see http://www.nbcnews.com/id/41971686/ns/us_news-environment/.

[15] To ensure that natural gas' impact on the climate is less than that of coal or diesel fuel over any time horizon, the upstream leakage rate must be capped at roughly 1%. For more information, see http://www.pnas.org/content/109/17/6435.

[16] The fugitive methane leakage rate currently estimated by EPA is roughly 1.4%, a figure which has fallen sharply in recent years in response to estimates reported in an industry-led survey.

Greenhouse Gas Inventory.[17] While EPA has not yet incorporated the results of this study into their annual Inventory, we hope that the agency will acknowledge that its current estimates likely understate the scale of methane emissions from natural gas systems.

A study released late in 2013, led by researchers at Harvard University, reached similar conclusions through different methods. Using atmospheric measurements from aircraft and stationary towers, the researchers found that total methane emissions from all sources were likely 50% greater than previous estimates from the EPA Inventory. However, there were even greater divergences within individual sectors; methane emissions from oil and gas development were approximately five times greater than EPA estimates. Average leakage rates of that magnitude, if applicable across all natural gas systems in the country, would call into question any climate advantage natural gas claims to possess over coal.[18]

Perhaps the most anticipated series of studies are those coordinated by the Environmental Defense Fund, led by university researchers and with participation from a number of large oil and gas companies. Over a dozen studies are underway, measuring leaks throughout the natural gas life cycle, from wellhead to end-use. One such study, led by researchers at the University of Texas at Austin and looking at methane emissions from natural gas production operations, has already been published, and its conclusions are illustrative.[19] With the cooperation of nine oil and gas majors, the study found that EPA's 2012 standards[20] to limit the emissions of volatile organic

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[17] For the full study, see http://www.sciencemag.org/content/343/6172/733.full.

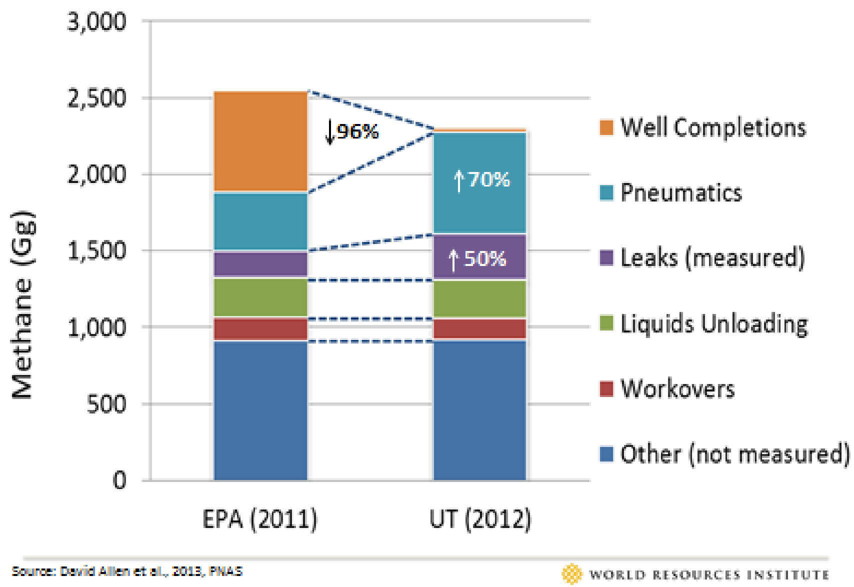
[18] For more information, see http://www.wri.org/blog/new-study-raises-big-questions-us-fugitive-methane-emissions. For the full study, see http://www.pnas.org/content/early/2013/11/20/1314392110.full.pdf+html.

[19] For the full study, see http://www.pnas.org/content/110/44/17768.full.

[20] For more information on EPA's standards, see http://www.epa.gov/airquality/oilandgas/actions.html and http://www.wri.org/blog/how-epa%E2%80%99s-new-oil-and-gas-standards-will-reduce-greenhouse-gas-emissions.

compounds and hazardous air pollutants during well completion were working as intended (and reducing methane as a co-benefit), and that the EPA Inventory was underestimating the emissions from several sources during the production stage.[21]

Figure 2: Summary of Results from UT-Austin Production Stage Study

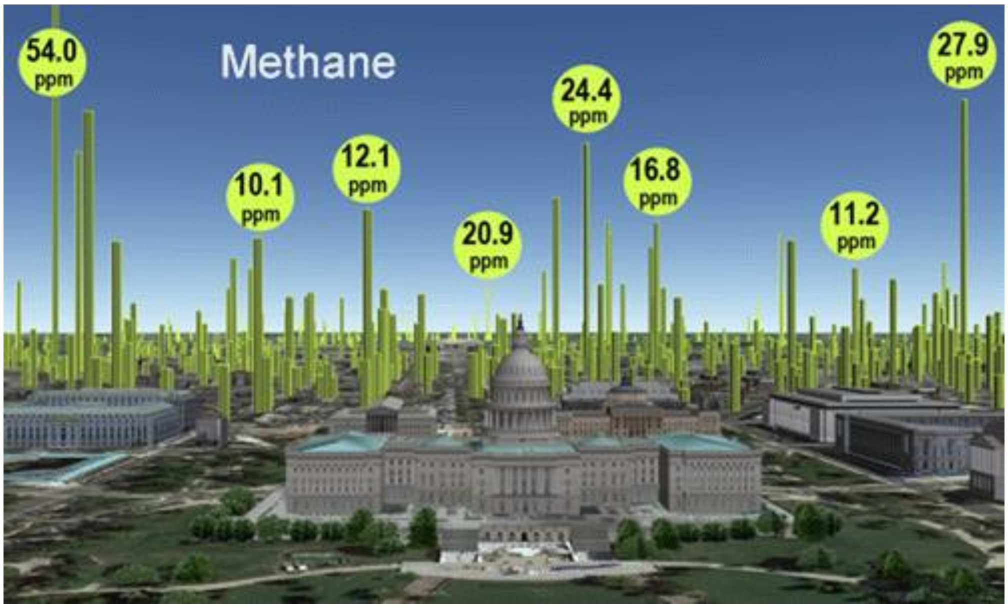


At the far end of the natural gas life cycle, in the distribution network, recent studies led by researchers at Duke University and Boston University have found thousands of leaks in the pipelines underneath Boston and Washington, D.C.[22] Although gas utilities maintain programs to identify and repair leaks that pose a threat to human health and safety, these studies found many such leaks that had thus far escaped detection. In addition to the safety concerns, these studies

[21] For more information, see http://www.wri.org/blog/new-study-sheds-light-methane-leakage-natural-gas.
[22] For the Boston study, see http://www.sciencedirect.com/science/article/pii/S0269749112004800. For the Washington, D.C. study, see http://pubs.acs.org/doi/abs/10.1021/es404474x.

have demonstrated that distribution pipelines – some made of leaky cast iron that is over 60 years old – may be a much larger source of methane emissions than previously thought.

Figure 3: Detected Methane Leaks in the Distribution Network of Washington, D.C.



Source: Robert B. Jackson et al., 2014, Environmental Science and Technology.
Note: Normal background levels of methane are roughly 2 parts per million (ppm).

Taken together, what these and other studies illustrate is that despite the lack of precision in estimating a system-wide leakage rate, we know the problem is greater than previously thought, and we know enough to act. States have once again taken the lead on addressing fugitive methane emissions – regulations in Wyoming and Colorado served as the basis for the EPA New Source Performance Standard (NSPS) for well completions mentioned above – as Colorado is now at the forefront of addressing methane emissions directly. With the support of some of the largest operators in the state – including Anadarko Petroleum, Noble Energy, and Encana – the state established rules requiring implementation of leak detection and repair regimens at facilities across the state.[23] By requiring large oil and gas producers to inspect their equipment for leaks every month, and to fix the leaks they find, Colorado is demonstrating that sensible regulations to address fugitive methane emissions benefit all parties. In praising the rules, Encana noted that "[s]aving methane from leaking should also result in a financial benefit to the industry, since it should end up with more product to sell."[24] Congress should encourage states and the federal government to regulate methane emissions from oil and gas production, and should require the use of all practical emissions control technologies.

A number of such commercially available technologies can provide financial benefit to the oil and gas industry (see Table 1, below), and have been demonstrated to do so.[25] They address leaks and vents throughout the natural gas production life cycle, and while many are utilized voluntarily (and green completions will be required under the NSPS by January 2015), the level of methane emissions detected from natural gas infrastructure tells us that many are not. In a 2012 paper, the Natural Resources Defense Council estimated that over $2 billion worth of natural gas (at $4 per thousand cubic feet, or Mcf) is lost to the atmosphere each year; if leakage rates are indeed higher than previously estimated, or if the price of gas increases, those lost profits could be greater as well.

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[23] See http://www.colorado.gov/cs/Satellite/CDPHE-AQCC/CBON/1251647985820.
[24] Source: http://www.scientificamerican.com/article/colorado-first-state-to-limit-methane-pollution-from-oil-and-gas-wells/.
[25] For a detailed list of technologies and case studies, see http://www.epa.gov/gasstar/tools/recommended.html.

Table 1: Methane Emissions Control Technologies, with Payback Period

Methane Capture Technology Costs and Benefits				
Technology	**Investment Cost**	**Methane Capture**	**Profit**	**Payout**
Green Completions	$8,700 to $33,000 per well	7,000 to 23,000 Mcf/well	$28,000 to $90,000 per well	< 0.5 – 1 year
Plunger Lift Systems	$2,600 to $13,000 per well	600 to 18,250 Mcf/year	$2,000 to $103,000 per year	< 1 year
TEG Dehydrator Emission Controls	Up to $13,000 for 4 controls	3,600 to 35,000 Mcf/year	$14,000 to $138,000 per year	< 0.5 years
Desiccant Dehydrators	$16,000 per device	1,000 Mcf/year	$6,000 per year	< 3 years
Dry Seal Systems	$90,000 to $324,000 per device	18,000 to 100,000 Mcf/year	$280,000 to $520,000 per year	0.5 – 1.5 years
Improved Compressor Maintenance	$1,200 to $1,600 per rod packing	850 Mcf/year per rod packing	$3,500 per year	0.5 years
Pneumatic Controllers Low-Bleed	$175 to $350 per device	125 to 300 Mcf/year	$500 to $1,900 per year	< 0.5 – 1 year
Pneumatic Controllers No-Bleed	$10,000 to $60,000 per device	5,400 to 20,000 Mcf/year	$14,000 to $62,000 per year	< 2 years
Pipeline Maintenance and Repair	Varies widely	Varies widely but significant	Varies widely by significant	< 1 year
Vapor Recovery Units	$36,000 to $104,000 per device	5,000 to 91,000 Mcf/year	$4,000 to $348,000 per year	0.5– 3 years
Leak Monitoring and Repair	$26,000 to $59,000 per facility	30,000 to 87,000 Mcf/year	$117,000 to $314,000 per facility per year	< 0.5 years

Note: Profit includes revenue from deployment of technology plus any O&M savings or costs, but excludes depreciation.

Source: Natural Resources Defense Council, "Leaking Profits," 2012.

If these technologies are as cost-effective as their proponents claim, why aren't companies using them more often? There are several possible explanations. First, while many technologies pay for themselves in three years or less, this may entail a lower rate of return than companies expect from other investments. Companies' internal hurdle rates may preclude investment in some emissions control technologies. In addition, there are misaligned incentives throughout the natural gas industry. While a vertically integrated company, one that controlled all aspects of natural gas production from drilling through distribution, would seize on opportunities to reduce leaks and increase profits, there are few examples of such integration. With thousands of companies providing services like drilling wells and building pipelines, the companies that sell natural gas do not often control the gas as it moves from the ground to its point of combustion. Service providers often do not have the incentive to minimize methane leakage, as they will see few, if any, of the benefits. While some gas majors are working to correct this market inefficiency, there is a clear opening for policymakers to influence the workings of the market in a way that would benefit industry as a whole, as well as the environment. A number of options available to Congress are listed in the summary, above. Natural gas customers, and Americans concerned about wasting domestic energy resources, should demand nothing less.

The natural gas stepping stone

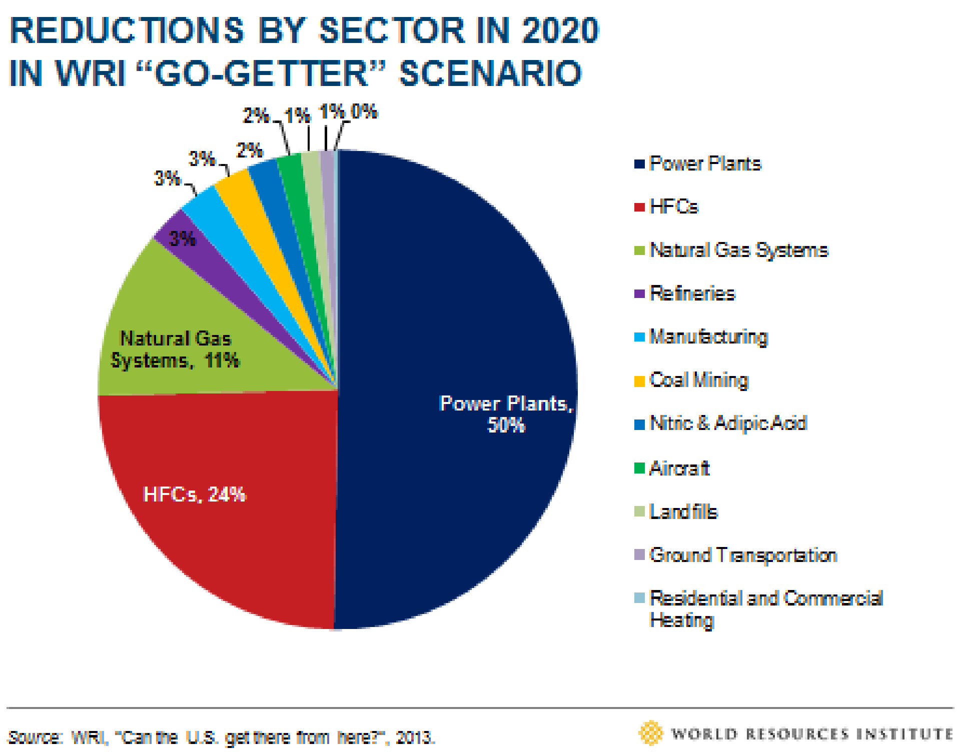
A 1% leakage rate would ensure that fuel switching from coal or diesel to natural gas is a net positive for the climate, but even eliminating methane leaks altogether would not make natural gas a long-term solution for reaching our climate goals. Natural gas may be cleaner than coal at the point of combustion, but merely being cleaner than the dirtiest fossil fuel is a low bar to clear.[26] Natural gas, like coal and oil, is a fossil fuel, and burning it still produces unsustainable levels of CO_2. Natural gas can be an initial step toward a low-carbon future, but it cannot be the dominant source of energy (even displacing coal) for more than another 20 years, at most.

Scientists have been warning for years about the dangers of exceeding a global temperature increase of 2 degrees Celsius above pre-industrial levels. With every degree of temperature change, there will be increasingly more severe impacts, for example from rising sea levels to increasing frequency and intensity of severe weather, significantly altering the way of life for people around the world. There is also the increased risk of abrupt and irreversible changes in the climate system. To reduce the risk of such catastrophic levels of warming, developed countries would have to reduce emissions 80-95% below 1990 levels by 2050, with emissions from

[26] For comparative emissions rates of coal, oil, and gas when burned to generate electricity, see http://www.eia.gov/tools/faqs/faq.cfm?id=74&t=11.

developing countries in all regions deviating substantially from their baselines. Clearly, natural gas alone is not the answer for achieving reductions of this magnitude, especially when previous analysis has determined that the electricity sector (along with natural gas systems) is the source of some of the most cost-effective ways to reduce GHG emissions.[27]

Figure 4: GHG Emissions Reductions by Sector in "Can the U.S. Get There from Here?"



There is an interesting new precedent for how to treat natural gas-fired power generation under an aggressive emissions reduction regime. Regulators in Massachusetts recently approved the construction of a natural gas power plant that will have to comply with the state's Global Warming Solutions Act, which mandates state-wide emissions reductions of 80% below 1990

[27] See, for example, http://www.wri.org/publication/can-us-get-there-here. Emissions reduction opportunities in the power sector include, but are not limited to, supply-side efficiency, demand-side efficiency, combined heat and power, fuel switching, increased renewable generation, and improved dispatch of low-carbon energy sources.

levels by 2050.[28] The permit conditions for the power plant require it to reduce or offset an increasing fraction of its GHG emissions, ultimately reducing its emissions by 80%, relative to the plant's expected start date of 2016, before the power plant is retired in 2050. The state offered the plant's operator flexibility in how the emissions reductions are achieved, including the use of carbon dioxide capture and storage (CCS) or other on-site emissions reduction options, or market-based approaches such as renewable energy certificates or allowances from the Regional Greenhouse Gas Initiative. The plant's useful life of 34 years will provide Massachusetts with time to ramp up its renewable energy capacity while decreasing its reliance on fossil-fired electricity generation.

Viewing energy infrastructure through a climate lens

The example of the natural gas-fired power plant in Massachusetts is instructive, as it demonstrates one way of factoring climate considerations into infrastructure decisions. The math is straightforward: natural gas without CCS or other emissions constraints cannot comprise more than a small fraction of the U.S. energy mix in the low-carbon economy we need to reach by the middle of this century. Internalizing that reality is critical for governments and private companies alike, if we are to avoid stranding expensive, high-emitting infrastructure assets while avoiding dangerous levels of warming.

Some of the largest companies in the world are starting to move in this direction, leaving policymakers to play catch-up. Major corporations as diverse as ExxonMobil, Wal-Mart, Google, and Wells Fargo have disclosed that they are factoring an internal carbon price as high

[28] For more information, see http://www.mass.gov/eea/pr-2014/salem-approval.html and http://www.nytimes.com/2014/02/21/business/energy-environment/massachusetts-approves-a-gas-power-plant-with-an-expiration-date.html?hpw&rref=science.

as \$60 per ton of CO_2 into their decision-making.[29] Many of these companies also have their own internal GHG emission reduction targets. These are not necessarily the companies one would consider to be leaders in the fight against climate change; rather, they acknowledge the risks that warming poses to their operations and their bottom line, and they anticipate a world with binding carbon constraints.[30] Getting out ahead of the curve is simply good for business.

Smart climate policy is indisputably compatible with smart economic policy. Reducing methane emissions from leaky infrastructure is good for business. And numerous studies have made the case that inaction on climate change will be more expensive than taking action now to mitigate GHG emissions. Taken together, these arguments point to the need to take climate considerations into account when making investment decisions on long-lasting energy infrastructure. Power plants, pipelines, and other energy infrastructure are designed to last for decades. For Congress to provide the certainty, through comprehensive climate legislation, that unchecked GHG emissions will no longer be tolerated, would ensure that companies take all relevant factors into account when making both short- and long-term investment decisions.

[29] For the full report from CDP, see http://big.assets.huffingtonpost.com/22Nov2013-CDP-InternalCarbonPriceReprt.pdf.

[30] Many companies with international operations are already dealing with explicit or de facto prices on GHG emissions. A recent study found that 66 countries, responsible for 88% of GHG emissions, have legislation in place to reduce those emissions. For more information, see http://www.globeinternational.org/studies/legislation/climate.