July 21, 2014

Mr. John Anderson
U.S. Department of Energy (FE-34)
Attn: Addendum Comments,
Office of Oil & Gas Global Security & Supply,
Office of Fossil Energy
P.O. Box 44375
Washington, DC 20026-4375
(submitted via DOE's website)

RE: Comments of America's Natural Gas Alliance on the Addendum to Environmental Review Documents Concerning Exports of Natural Gas from the United States

Dear Mr. Anderson:

America's Natural Gas Alliance (ANGA) appreciates the opportunity to submit these comments on the U.S. Department of Energy's (DOE) Addendum to Environmental Review Documents Concerning Exports of Natural Gas from the United States.

ANGA represents North America's leading independent natural gas exploration and production companies, and works with industry, government and customer stakeholders to promote increased demand for and availability of our nation's abundant natural gas resource for a cleaner and more secure energy future. The collective natural gas production of ANGA member companies is approximately eight trillion cubic feet per year, which represents one third of the total annual U.S. natural gas supply.

I. Introduction

On May 29, 2014, DOE published a draft report, *Addendum to Environmental Review Documents Concerning Exports of Natural Gas from the United States* (the "Addendum"). The stated purpose of the Addendum "is to provide additional information to the public regarding the potential environmental impacts of unconventional natural gas production activities."[1] However, it is our view that the Addendum fails to achieve this goal. While we support DOE's efforts to

[1] DOE. May 29, 2014. "Addendum to Environmental Review Documents Concerning Exports of Natural Gas From the United States". p. 3. Available at: http://energy.gov/sites/prod/files/2014/05/f16/Addendum_0.pdf. Accessed July 13, 2014.

better inform the public about the natural gas development, we question the methodology, preliminary findings and overall purpose of the Addendum. As DOE itself acknowledges, this Addendum is "beyond what is required for NEPA".[2]

This Addendum is in some measure duplicative of the existing LNG application process and in other ways conflicting. Under the permitting process for applications to export LNG to non-FTA countries, both DOE and the Federal Energy Regulatory Commission ("FERC") have addressed environmental concerns. For example, in its review of the Sabine Pass export proposal, FERC explicitly discussed a broad range of potential environmental concerns including direct environmental impacts and potential cumulative environmental impacts.[3] In its final order, FERC appropriately concluded that NEPA does not require evaluation of potential impacts from induced shale gas development.[4] FERC based this decision on the principles of the Council on Environmental Quality (CEQ), which establish limits on NEPA review.[5] The fourth CEQ principal states, "it is not practical to analyze the cumulative effects of an action on the universe; the list of environmental effects must focus on those that are truly meaningful."[6] FERC found that "impacts which may result from additional shale gas development are not 'reasonably foreseeable' as defined by the CEQ regulations. Nor is such additional development, or any correlative potential impacts, an 'effect' of the project, as contemplated by the CEQ regulations, for purposes of a cumulative impact analysis."[7] This determination is supported by DOE in its approval of the Sabine Pass facility. Therefore, the Addendum conflicts with current DOE policy, as both FERC and DOE have concluded that the environmental impacts of natural gas production should not be considered in the context of LNG exports.

In addition to the fact that the Addendum conflicts with the stated scope of the LNG export review process, the Addendum itself highlights the numerous 'uncertainties' related to LNG exports and natural gas production which call into question the need and usefulness of the document. For example, the Addendum states "fundamental uncertainties constrain the ability to predict what, if any, domestic natural gas production would be induced by granting any specific

[2] DOE. May 29, 2014. "DOE LNG Exports Announcements – May 29, 2014". Available at: http://energy.gov/fe/doe-lng-exports-announcements-may-29-2014. Accessed July 18, 2014.
[3] FERC docket CP11-72-000, "Order Granting Section 3 Authorization". April 16, 2012. Available at: http://www.ferc.gov/CalendarFiles/20120416164846-CP11-72-000.pdf. Accessed July 18, 2014.
[4] Ibid, p. 32.
[5] CEQ. "Considering Cumulative Effects Under the National Environmental Policy Act". Available at: http://energy.gov/sites/prod/files/nepapub/nepa_documents/RedDont/G-CEQ-ConsidCumulEffects.pdf. Accessed July 21, 2014.
[6] Ibid, p. 8.
[7] FERC docket CP11-72-000, "Order Granting Section 3 Authorization". April 16, 2012. p. 32.

authorization or authorizations to export LNG to non-FTA countries."[8] Furthermore, DOE concedes that it "cannot meaningfully analyze the specific environmental impacts of such production." In light of such a finding, the purpose of this Addendum remains in question.

ANGA agrees with DOE that the potential impacts of expanded natural gas production and transport are "appropriately" regulated at the State level. The natural gas industry in the United States is subject to significant environmental oversight through existing Federal, State, and local regulations. A complex regulatory framework governs operational requirements, drilling practices, emissions standards, land use, water use, and other environmental safeguards. With the expansion of U.S. natural gas production, a broad range of stakeholders are closely examining natural gas operations. ANGA is committed to working constructively with these stakeholder groups to ensure safe and environmentally-responsible development of this abundant resource.

ANGA and its members are committed to minimizing environmental impacts. We think that environmental concerns are best addressed through existing regulatory processes and we view this examination of LNG in this Addendum as unnecessary, especially in light of the FERC and DOE findings detailed above.

II. Corrections to the Addendum

While it is our view that the Addendum is unnecessary, it remains important to correct the record, as the Addendum makes several incorrect assertions with respect to natural gas production. In its draft form, the Addendum contains technical errors with respect to the natural gas production process and environmental impacts. As detailed below, sections of the Addendum rely on outdated and/or flawed data. We urge DOE to strike this data and replace it with sound scientific data that reflects current industry practices.

Below, we provide comments for the record of some of our proposed corrections to the Addendum. We have organized our comments consistent with the sections of the Addendum. We have provided updated information and we welcome the opportunity to work with DOE to identify additional information. In its current form, the Addendum provides an inaccurate view of the potential environmental impacts of natural gas production and overall is inconsistent with stated Administration policy on natural gas production.

(a.) Public Comments

[8] DOE. May 29, 2014. "Addendum to Environmental Review Documents Concerning Exports of Natural Gas From the United States". p. 1.

The public comments section of the Addendum contains comments on a NERA Economic Consulting report on the impact of LNG exports on the U.S. economy. The purpose of this study was to evaluate the macroeconomic impact of LNG exports, and the report does not include any discussion or analysis of the indirect environmental impacts of natural gas production. Despite the fact that this was an economic impact report, numerous comments were submitted regarding alleged and potential environmental impacts of natural gas production. The Addendum only summarizes these comments, which are decidedly in opposition to natural gas development on environmental grounds, and does not provide context or any alternative views. Understandably, many commenters focused solely on the economic impacts of LNG exports and did not comment on possible indirect impacts as they were not included in the NERA report. Therefore, the inclusion in the Addendum of environmental impact-related comments in opposition to natural gas development unfairly excludes stakeholder comments positive toward natural gas development simply because the comments they submitted were relevant to the NERA report. ANGA objects to this section in its current form as the comments are not germane to the NERA report, and are not in context without a broader discussion of the NERA report. Furthermore, the comments cited do not contain or reference any data or facts; instead, they consist only of broad, unsubstantiated statements. The Addendum does not list the comments' authors and the comments are not based in science. For the above-stated reasons, the comments should be omitted from the Addendum.

Beyond our primary objection to the inclusion of comments on environmental issues that were made in response to an economic report, the comments cited are not representative of all comments submitted and could have a prejudicial effect regarding natural gas development. For example, ANGA submitted reply comments referencing the wide range of state and federal regulations that apply to gas production.[9] If DOE chooses to proceed with this report, we urge DOE to include comments by industry and other supporters of natural gas development and to provide references to the sources of all included comments.

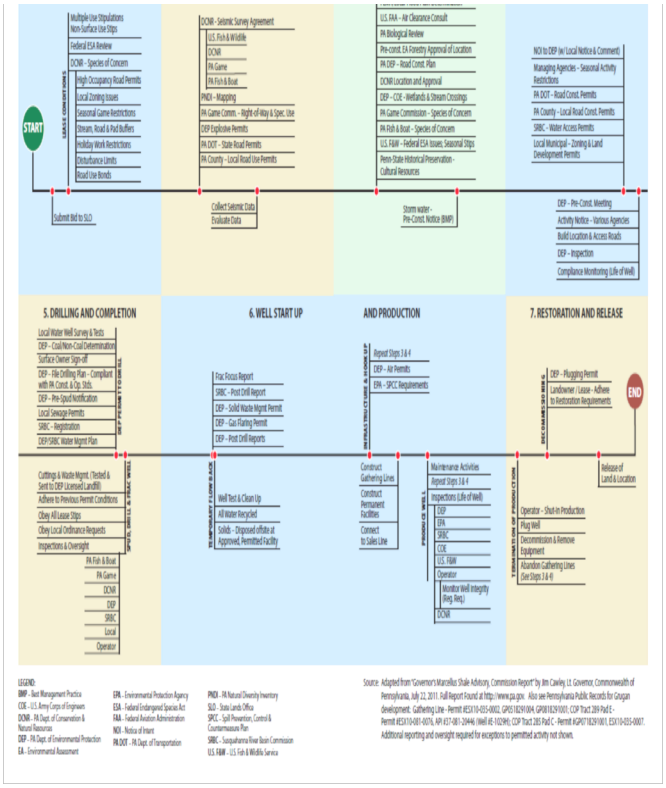
(b.) Unconventional Natural Gas Production Activities in the United States

Figure 5 in the Addendum (page 9) is an incomplete assessment of the timeline associated with shale gas development. For a more complete representation, the figure should include a list of all regulations required at every stage of the natural gas production process. It is

9 Comments submitted by Jason Smith to Mr. Steven Chu. *Reply Comments America's Natural Gas Alliance on the 2012 LNG Export Study*, February 25, 2013.

ANGA's view that inclusion of the table below (Figure 1), from the 2011 National Petroleum Council 2011 *Prudent Development* Report provides a more comprehensive example of natural gas production and associated regulations with which the industry must comply.

Figure 1. Figure ES-11 from the National Petroleum Council 2011 Prudent Development Report[10]



(c.) Water Resources

i. Water Quantity

An important part of the natural gas industry's commitment to environmental stewardship revolves around our ability to use water wisely and to be attuned to community water needs. A typical deep shale gas well stimulation may require between 2 million and 4 million gallons of water. These numbers are significant, but they are smaller relative to the amount of water continually required to generate power from other energy sources. For example, a study by Harvard Kennedy School's Belfer Center for Science and International Affairs found that natural

[10] National Petroleum Council. 2011. "Prudent Development: Realizing the Potential of North America's Abundant Natural Gas and Oil Resources". pp. 28-29. Available at: http://www.npc.org/reports/NARD/NARD_Executive_Summary.pdf. Accessed July 17, 2014.

gas power plants use less water than other power plants, and shale gas has lower water consumption than other fossil fuels.[11] As the Addendum correctly points out, conventional natural gas and shale gas production have a relatively small water footprint with shale gas production typically using less than one percent of total water demand in a region or metropolitan area.

Recognizing concerns associated with the availability of water and restrictions associated with municipal water use, our members have adopted a number of recycling initiatives to be better stewards of the communities in which they operate:

- In the Marcellus Shale, Anadarko's water management and well completion strategies help to reduce truck traffic and associated emissions, while minimizing earth disturbance and conserving available water resources. Additionally, a piping system using two lines, one for natural gas and one for fresh water (located in the same trench to reduce surface disturbance) provides water to well sites for the completion process. The closed-loop system moves water from a pre-determined and approved source through pipelines to containment facilities for use in the hydraulic fracturing process.[12]
- Range Resources has been successfully recycling 100% of its flow-back water in their core operating area in southwestern Pennsylvania since 2009.[13]
- Cabot Oil and Gas has recognized that processes such as water recycling are essential to the long-term viability of modern natural gas and oil production. In its Marcellus Shale operations, which accounted for 60% of Cabot's wells drilled in 2012, they currently recycle virtually all of the water generated through drilling, completion and production operations.[14]

[11] Erik Mielke, Lauda Diaz Anadon, and Venkatesh Narayanamurti, "Water Consumption of Energy Resource Extraction, Processing and Conversion." October 2010. Cambridge: Harvard Kennedy School Belfer Center for Science and International Affairs. Available at: http://belfercenter.ksg.harvard.edu/files/ETIP-DP-2010-15-final-4.pdf. Accessed July 11, 2014.
[12] Anadarko. "Safeguarding Water". Available at: http://www.anadarko.com/Operations/Pages/SafeguardingWater.aspx. Accessed July 17, 2014.
[13] Range Resources. "Range Answers Questions on Hydraulic Fracturing Process". Available at: http://www.rangeresources.com/Media-Center/Featured-Stories/Range-Answers-Questions-on-Hydraulic-Fracturing-Pr.aspx. Accessed July 17, 2014.
[14] Cabot Oil & Gas. 2013. "Social Responsibility: Water". Available at: http://www.cabotog.com/social-responsibility/water/. Accessed July 17, 2014.

- To reclaim produced water as a way to conserve water, Chesapeake Energy developed Aqua Renew® in 2006 as a logical evolution of its involvement with the Barnett Shale Water Conservation and Management Committee in North Texas.[15]

These efforts take into account the local climate, weather patterns, existing water use rates and needs. Accordingly, we urge the DOE to amend the Addendum to reflect the range of private sector initiatives underway to alleviate concerns around access to water and promote responsible development of natural gas.

The Addendum makes broad assertions about stream and aquifer usage with no substantive discussion around sourcing of water or the quality of sourced water. Some of these statements seem to suggest that oil and gas operations are depleting fresh water sources, which is misleading. It should be noted that many states require water management plans that ensure water withdrawals will not harm the watershed by adversely affecting stream flow, aquatic life or sensitive environments.[16] A more robust discussion is necessary to clarify the factors that companies weigh while sourcing water for their operations.

ii. Water Quality

The Addendum makes statements about the risks associated with development of unconventional resources but provides neither context nor sufficient citations to justify such broad claims. For example, the Addendum notes that failure of a casing or cement bond could lead to aquifer contamination and identifies contamination risks associated with improper drilling practices but provides no contextual data related to regulations that minimize risk, actual incidents or the probability of occurrence.

ANGA supports public disclosure of hydraulic fracturing chemicals through FracFocus.org, a public database of hydraulic fracturing fluids developed by the Ground Water Protection Council (GWPC) and the Interstate Oil and Gas Compact Commission (IOGCC). The GWPC represents state regulatory agencies that work to protect local ground water supplies. The IOGCC represents state regulatory agencies tasked with day-to-day oversight of natural gas development. The state-based public registry of hydraulic fracturing fluids includes information on a well-by-well basis for operations on both government and private lands.

(d.) Air Quality

[15] Chesapeake Energy. 2014. "AquaRenew®". Available at: http://www.chk.com/corporate-responsibility/ehs/environment/water/pages/aqua-renew.aspx. Accessed July 17, 2014.
[16] Resources for the Future. June 2013. "The State of State Shale Gas Regulation". p. 40-42.

i. Regulations

The Addendum correctly notes that EPA issued regulations for the oil and gas industry in 2012. Compliance with these regulations and additional voluntary industry actions are currently reducing production-related emissions. However, the Addendum incorrectly states that flowback occurs after well drilling and before completion. Flowback is from well completion, and is accurately defined in EPA's Oil and Gas New Source Pollution Standards. This definition should be corrected in the Addendum to ensure that it aligns with the definition given in EPA's regulations.

ii. Emission Components and Sources

On page 23 of the Addendum, DOE states, "[v]ented emissions originate when natural gas is flared at well sites or vented during well completion and workover activities." This definition conflicts with the definition of vented emissions in Table 6, which, correctly, does not include flared emissions. In venting, natural gas is released directly to the atmosphere. In flaring, it is combusted and the byproducts are released to the atmosphere. Fugitive emissions are similar to vented emissions in composition, with the difference being that vented emissions are intentional while fugitive emissions likely are not.

In addition, the document describes the six criteria air pollutants without indicating which are and are not emitted from natural gas production in meaningful quantities. For example, the SO_2 paragraph notes that the "largest sources of SO_2 emissions are from fossil fuel combustion at power plants (73 percent) and other industrial facilities (20 percent)." However, these statistics refer to coal-fired power plants. As EPA notes, "[e]missions of sulfur dioxide … from burning natural gas are negligible."[17] Further, these are downstream impacts. At the upstream end, the use of low-sulfur fuels in auxiliary equipment has greatly reduced SO_2 emissions from diesel-fueled sources at the production site.

iii. Discussion of Anticipated Impacts

The Addendum asserts that "[s]tates issue air permits for new air emissions sources based on each individual source." However, not all states require a permit for every activity. Further, the document mischaracterizes important parts of the State Implementation Plan (SIP) process –

[17] U.S. EPA, Clean Energy: Natural Gas. Available at http://www.epa.gov/cleanenergy/energy-and-you/affect/natural-gas.html. Accessed July 11, 2014.

for example, not all non-attainment areas require SIPs and related requirements (e.g., RACT/BACT/LAER) do not apply to every source.[18]

(e.) Health Effects

We have additional concerns about the Health Effects section beginning on page 30 of the Addendum. The discussion of potential pollutants and health effects is broad and not specific to relevant pollutants or pathways (for example, the entirety of the hazardous air pollutants - HAPs - section includes EPA's generic overview of HAPs and is not specific to natural gas). Instead of quoting the scientific literature, DOE opens the section with unattributed, speculative statements about "[c]laims of substantial impacts". The literature that DOE does quote is inconclusive. For example, McKenzie, et al (2012), concludes that, "preliminary results indicate that health effects resulting from air emissions during unconventional [natural gas development] warrant further study."[19]

(f.) Greenhouse Gas Emissions from Upstream Natural Gas Industry

The section on greenhouse gas (GHG) emissions from natural gas production is flawed as it relies in large part on outdated information.

i. GHG Inventory Data

Parts of the Addendum contain outdated GHG emission data that should be replaced with current data. Page 33 of the draft includes information from EPA's 2012 GHG Emissions Inventory (2010 data). This paragraph should be updated based on 2012 emissions data from the 2014 GHG Inventory. The resulting paragraph would read:

> *Based on 2012 data, CH_4 emissions from upstream natural gas systems accounted for 18 percent of all U.S. CH_4 emissions and for approximately 1.8 percent of EPA's U.S. total inventory of GHG emissions on the basis of CO_2-e.*[20]

Table 7, which is currently based on data from the draft 2014 GHG Inventory, should also be updated with data from the final 2014 GHG Inventory. These changes provide consistency and represent the most recently available data.

ii. Global Warming Potential

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[18] Reasonably Available Control Technology/Best Available Control Technology/Lowest Achievable Emission Rate.
[19] McKenzie LM, et al, Human health risk assessment of air emissions from development of unconventional natural gas resources, Sci Total Environ (2012), doi:10.1016/j.scitotenv.2012.02.018, p. 8. Available at http://cogcc.state.co.us/library/setbackstakeholdergroup/Presentations/Health%20Risk%20Assessment%20of%20Air%20Emissions%20From%20Unconventional%20Natural%20Gas%20-%20HMcKenzie2012.pdf. Accessed July 10, 2014.
[20] U.S. EPA. 2014. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2012. Environmental Protection Agency, Washington, D.C., p. ES-6, 3-63. Available at http://www.epa.gov/climatechange/ghgemissions/usinventoryreport.html. Accessed July 10, 2014.

The Addendum's description of the Global Warming Potential ("GWP") for methane is confusing and should be clarified. On page 36 the Addendum states that methane's GWP "is approximately 100 times greater than that of CO_2", but provides no timescale. In the same paragraph, methane is listed as having a 20-year GWP of 72. The Addendum needs to be clear and should explain the difference between 20- and 100-year GWP and how they are applied. The Addendum should also note that the 100-year GWP is the value used in U.S. and global policy discussions. For example, EPA's annual GHG Inventory submitted to the United Nations uses the 100-year GWP to convert methane to CO_2 equivalents. And, EPA's GHG Reporting Program similarly uses the 100-year GWP.

iii. Natural Gas Production Process and Associated Methane Emissions

The Addendum's assessment of GHG emissions from the different phases of natural gas production should be updated to reflect current regulations and industry practices. The section on well drilling and completion incorrectly asserts that all gas during flowback is either vented or flared and claims that unconventional wells may have higher emissions due to longer flowback periods. Currently, federal regulations require all hydraulically fractured wells to flare methane emissions – venting is allowed only under specific safety-related circumstances. By 2015, all hydraulically fractured gas wells will be required to use reduced emission completions (REC). However, many operators have been employing RECs for several years. For example, the 2014 GHG Inventory shows that 49 percent of hydraulically fractured wells used RECs in 2012.[21] Overall, the paragraph contains information on emissions during well completion that does not provide an accurate reflection of actual or potential emissions. It should be updated to characterize emissions from current work practices and supported by scientifically sound data.

The paragraph on well workovers and maintenance does not accurately portray emissions from liquids unloading and fails to differentiate workovers from recompletions. The Addendum states that emissions from liquids unloading are either vented or flared, but provides no data and does not describe control technologies, such as plunger lifts, that are commonly used to increase recovered natural gas. The 2012 ANGA/API survey found that a significantly higher numbers of wells were using plunger lifts and artificial lifts than EPA accounted for in its GHG Inventory.[22]

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[21] U.S. EPA. 2014. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2012. Environmental Protection Agency, Washington, D.C., Appendix 3, p. A-184. Available at http://www.epa.gov/climatechange/ghgemissions/usinventoryreport.html. Accessed July 10, 2014.

[22] American Petroleum Institute (API) and America's Natural Gas Alliance (ANGA). 2012. Characterizing Pivotal Sources of Methane Emissions from Natural Gas Production. Summary and Analysis of API and ANGA Survey Responses. Final Report.

After accounting for this new information, EPA dramatically reduced its estimate of 2010 emissions from liquids unloading from 85.6 million metric tons CO_2e ($mmtCO_2e$) in the 2012 GHG Inventory to 5.4 $mmtCO_2e$ in the 2013 GHG Inventory, a reduction of 94 percent.[23] This information should be included as part of a broader discussion on control technologies to provide a more accurate understanding of emissions from liquids unloading.

This section also conflates workovers and recompletions, describing them as one and the same. While the first full paragraph on page 38 explains the recompletion process, it is incorrectly labeled as a workover. Workovers involve a well kill to stop production, followed by an examination and cleaning, repair or replacement of the wellbore. A recompletion often follows a workover, but they are distinct, separate events. This paragraph should be edited to differentiate the two procedures.

Figure 12 on page 41 should be modified so that it does not include data from the Howarth study. The Howarth study has been characterized as inherently flawed by the scientific community,[24] and more reputable studies, including DOE's own lifecycle emissions study released at the same time as the Addendum, have found that upstream natural gas systems produce significantly fewer methane emissions.[25,26,27]

Any discussion of GHG emissions from upstream natural gas systems should also include data on CO_2 reductions from the increased use of natural gas as an end-use fuel. This is a critical point given that DOE is interested in the broader effects of natural gas development and use. When combusted to generate electricity, natural gas produces roughly half as much CO_2 as coal. This is an important benefit of natural gas use whether it is used to generate electricity in the U.S. or in other countries. EIA data show that energy-related CO_2 emissions in the U.S. were the

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September 21, 2012. Available at http://www.api.org/~/media/Files/News/2012/12-October/API-ANGA-Survey-Report.pdf. Accessed July 11, 2014.

[23] U.S. EPA. 2013. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2011. Environmental Protection Agency, Washington, D.C., p. 3-68. Available at http://www.epa.gov/climatechange/Downloads/ghgemissions/US-GHG-Inventory-2013-Main-Text.pdf. Accessed July 10, 2014.

[24] Cathles, L., and L. Brown, M. Taam, and A. Hunter. 2012. "A commentary on 'The greenhouse-gas footprint of natural gas in shale formations,' by R.W. Howarth, R. Santoro, and A. Ingraffea." Climatic Change 113(2): 525–535. Available at http://www.geo.cornell.edu/eas/PeoplePlaces/Faculty/cathles/Natural%20Gas/2012%20Cathles%20et%20al%20Commentary%20on%20Howarth.pdf. Accessed July 10, 2014.

[25] Burnham, A., J. Han, C.E. Clark, M. Wang, J.B. Dunn, and I.P. Rivera. 2011. "Life cycle greenhouse gas emissions of shale gas, natural gas, coal, and petroleum." Environ Sci Technol. doi: 10.1021/es201942m. Available at http://pubs.acs.org/doi/pdfplus/10.1021/es201942m. Accessed July 10, 2014.

[26] Joint Institute for Strategic Energy Analysis (JISEA). 2012. Natural Gas and the Transformation of the U.S. Energy Sector: Electricity. Logan, J., Heath, G., Paranhos, E., Boyd, W., Carlson, K., Macknick, J. NREL/TP-6A50-55538. Golden, CO, USA: National Renewable Energy Laboratory. Available at http://www.nrel.gov/docs/fy13osti/55538.pdf. Accessed July 10, 2014.

[27] DOE/NETL. May 29, 2014. "Life Cycle Greenhouse Gas Perspective on Exporting Liquefied Natural Gas from the United States". DOE/NETL-2014/1649. Available at: http://energy.gov/sites/prod/files/2014/05/f16/Life%20Cycle%20GHG%20Perspective%20Report.pdf. Accessed July 18, 2014.

lowest in 2012 since 1994. EIA attributed this drop almost exclusively to the shift from coal to natural gas for power generation.[28]

(g.) Induced Seismicity Associated with Unconventional Oil and Gas Activities

The Addendum implies an association between unconventional oil and gas development activities with increased incidents of induced seismicity, yet notes that existing data is limited and thus proving human activity caused a particular event can be difficult. We believe that the Addendum does not provide a fair or concise assessment of induced seismicity nor provide sufficient citations throughout. For example, the section begins asserting induced seismicity can cause damage to public property but later notes that most seismicity from gas and oil industry activities is too small to be felt beyond the local occurrence. In fact, the Addendum creates a point of confusion by more broadly referencing "energy development," which has implications beyond oil and gas operations.

i. Industry Practices & Regulations

In considering industry practices, it is important to clarify that companies take into account local conditions when conducting an assessment for potential seismic events and identifying preventative operational measures. As currently drafted the text does not appear to provide sufficient insight into why industry practices may differ among various shale plays.

ii. Assessment of Environmental Impacts

The Addendum correctly notes that the National Research Council, an arm of the National Academies concluded that current hydraulic fracturing techniques for shale gas recovery do not pose a high risk for inducing felt seismic events. However, the Addendum proceeds to identify a range of relative risks associated with further expansion of the unconventional natural gas industry activities. Some of these risks are not correctly referenced and cited (for example, page 54, bullet number 4).

(h.) Land Use Impacts

The Addendum's description of land-use impacts is not properly sourced or cited and provides prejudicial information with respect to unconventional natural gas development and operations. Not enough weight is given to the regulatory mechanisms in place at the state and federal level to minimize environmental impacts and disturbances. In fact, the Addendum does not address common mitigation measures or practices required by law or commonly utilized by

[28] U.S. EIA. April 5, 2013. "Energy-related carbon dioxide emissions declined in 2012". Available at http://www.eia.gov/todayinenergy/detail.cfm?id=10691. Accessed July 10, 2014.

industry to reduce land use impacts until the end of the section. Each state has regulatory agencies that enforce federal law and administer state rules. State regulations include the review and approval of permits for all aspects of drilling activities, such as well design, location, spacing, operation, water management and disposal, waste management and disposal, air emissions, wildlife impacts, surface disturbance and worker health and safety. State-led enforcement, in conjunction with current federal oversight, is considered critical because drilling practices are customized to the unique geological characteristics of different parts of the country, making state-level expertise essential to the oversight process. While states may adopt their own standards, by law they must be at least as protective as federal standards.

Natural gas has the least land-use impact of any electric generating option, including renewables. However, this information is not reflected in the Addendum. Instead, the draft simply notes that it is difficult to compare land use impacts associated with electricity generation to land use impacts associated with unconventional gas because the recovered gas may be used for more than electricity generation. Data is needed to reflect the scale of natural gas electric generation from unconventional sources and the associated land use impacts of these operations relative to other electricity generating options. SAIC/RW Beck shows that to serve 1,000 households per year, natural gas generation only needs 0.4 acres (including land needed for fuel production). This is the smallest footprint of any major generation source.[29]

i. Description of Disturbances

As currently drafted, this section contains significant inaccurate information not credibly sourced. For example, information on soil compaction is not cited (page 60). Further, an NPR news article is used as a source to describe the implications of shale gas development on forested lands (page 62). This is not scientific source of information for a policy document of this nature. Further, the Addendum implies that state and local governments are leasing public lands at increasing rates in order to generate additional revenues without providing examples or citations of this actually occurring, and is in direct conflict with declining oil and gas production on federal lands.[30]

Furthermore, this section does not appear to be representative of the entire industry. For example, Figure 17, *Typical Well Pad Development in a Wooded Location*, implies that the use

[29] SAIC/RW Beck, "Comparison of Fuels for Power Generation", 2013.
[30] Marc Humphries, "U.S. Crude Oil and Natural Gas Production on Federal and Non-Federal Areas", Congressional Research Service, April 10, 2014. pp. 2, 4.

of large-scale reservoirs is a typical industry practice. Additionally, Figures 24 and 25, *The Effect of Landscape Disturbance on Non-Forest Habitat* and *Aerial Picture of Gas Development Near Odessa, Texas*, respectively, do not appear to be representative examples of land use impacts associated with unconventional natural gas development.

(i.) Traffic and Roadway Impacts

The impacts highlighted throughout this section are redundant throughout the Addendum. The issues of truck traffic and impact on road infrastructure have been addressed proactively in many shale development areas through the utilization of a road maintenance agreement (RUMA) or state approved road management plans. A RUMA is an agreement between a governing body - typically at the local level such as county or a township- and a gas exploration company. RUMAs are entered into prior to the development of well pad sites and before any drilling or hydraulic fracturing take place. In many jurisdictions a RUMA is required to be obtained prior to the issuance of any permits associated with development activities.

RUMAs establish the parameters by which a gas producer will use the local road infrastructure. Typically the agreements are between a producer and a locality that cover road repairs, upgrades and bonding. These agreements often stipulate designated travel routes for heavy equipment to ensure safety and minimize impact. They also take into account school bus routes and travel schedules as well as other issues of local concern that can be mitigated through effective transportation planning and government/operator collaboration.

Additionally, the advent and wide utilization of water recycling and reuse programs has dramatically reduced truck traffic. The construction of centralized fresh water impoundments and temporary over surface water lines that deliver water for well stimulation without the need for vehicular transport is further minimizing impacts on local transportation infrastructure. In Pennsylvania alone between 2008 and 2011 according to a Marcellus Shale Coalition operator survey, gas producers invested over $411 million on construction of new roadways, upgrades and repairs since development began in earnest.[31]

III. Conclusion

ANGA appreciates the opportunity to review the Addendum. We agree with DOE that this review is beyond NEPA requirements and further agree that environmental impacts are appropriately regulated at the State level. ANGA and its member companies are committed to

[31] Marcellus Shale Coalition. June 21, 2011. "MSC Member Companies Invest $411 Million in Local, State Roads". Available at: http://marcelluscoalition.org/2011/06/msc-member-companies-invest-411-million-in-local-state-roads/. Accessed July 17, 2014.

minimizing the environmental impact of natural gas production and will continue to work with stakeholders within appropriate venues to address concerns. Finally, we are confident that a robust LNG export policy to non-FTA countries can be done in an environmentally safe manner and furthermore, such policy is consistent with the public interest.

If you have any questions, please contact me at ebowman@anga.us or (202) 789-2642.

Sincerely,

Erica Bowman
Vice President, Research & Policy Analysis
America's Natural Gas Alliance