



NATURAL RESOURCES DEFENSE COUNCIL

July 20, 2011

Secretary of Energy Advisory Board
Natural Gas Subcommittee
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, D.C. 20585

re: NRDC Recommendations for the SEAB Natural Gas Subcommittee

Dear Members of the Natural Gas Subcommittee:

The Natural Resources Defense Council (NRDC) is a national, non-profit organization that uses law, science and the support of 1.3 million members and online activists to protect the planet's wildlife and wild places and to ensure a safe and healthy environment for all living things. Our president, Frances Beinecke, was a member of the National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling, and is a member of the Secretary of Energy Advisory Board (SEAB). NRDC is actively engaged in issues surrounding oil and gas development and hydraulic fracturing nationally, with a particular focus in the Rocky Mountain West and Marcellus Shale regions.

NRDC's President and other environmental leaders wrote to President Obama in January asking that the President and federal agencies address the wide range of environmental and public health concerns pertaining to natural gas extraction and production across the country. We appreciate the President's decision to direct Secretary Chu to convene a special subcommittee of the SEAB to identify better practices in unconventional gas development to protect public health and the environment. In his May 2011 memorandum to the SEAB, Secretary Chu asked the Subcommittee to identify within 90 days "any immediate steps that can be taken to improve the safety and environmental performance of fracking" and to develop within six months "consensus recommended advice to the agencies on practices for shale extraction to ensure the protection of public health and the environment."¹ As Secretary Chu noted, this is "a complex and urgent responsibility."²

¹ http://www.energy.gov/news/documents/Fracking_subcommittee_charge.pdf

² Id.

It is essential that the Subcommittee's efforts be based on the best available science and data and a process that is impartial. In addition, while, as noted above, the Subcommittee's official charge is to "improve the safety and environmental performance of natural gas hydraulic fracturing from shale formations," NRDC urges the subcommittee not to limit its consideration to only fracturing, or to only shale formations. We are equally concerned about the impacts of natural gas exploration and extraction in other formations, including coalbed methane and tight sands. Communities where natural gas extraction is taking place in non-shale formations report significant concerns about the risks of hydraulic fracturing, including drinking water contamination.³

Many have urged the Subcommittee to focus on state government authorities. States have a vital role in regulating natural gas extraction. State regulation, however, is not a substitute for strong federal regulation that ensures consistent basic standards across the country. While a few states have begun to update their regulations, state regulation is a patchwork with rules that often remain outdated and state enforcement activities that are inadequate. States should work with the federal government to ensure the strongest enforcement of federal and state laws.

The industry is expanding extremely rapidly, with over 136,000 natural gas wells drilled in the five years from 2006-2010, and tens of thousands more expected in the near future, many of these extremely close to homes and schools. There is clear evidence of a range of public health and environmental harms in the rush to develop this resource, including surface and groundwater pollution, water withdrawal and depletion, dangerous air pollution including venting and leaking of methane, a potent greenhouse gas, and habitat loss and other land use impacts. Potential impacts to human health and safety from oil and gas activities are poorly understood and the risks are often overlooked, both for workers and members of the public who may be affected by oil and gas activities. Contaminated air, water, and land can have short-term or long-term physical health impacts including respiratory disease, skin, ear & eye irritation, neurological impacts, and increased cancer risk.

Regulation and enforcement, however, have not kept pace, and there is no evidence that industry is adopting best practices widely. This is true even where environmental best practices are profitable, as in the capture of methane venting and leaking in the development process. Further, there is not even a good definition of what best practices are, and a lack of transparency and disclosure of basic information on environmental impacts during operations (e.g., the emissions of methane and hazardous air pollutants, and the extent of radioactive materials and other contaminants brought to the surface with fracturing flowback) leave the public in a state of troubling uncertainty.

Energy efficiency is our largest, cleanest, and cheapest resource to meet our national energy needs. NRDC nonetheless recognizes that natural gas from appropriately selected sites, prudently produced, transported, and efficiently used, has an important, albeit

³ NRDC is equally concerned about the health and environmental impacts of oil extraction, but acknowledges that the charge to the Subcommittee is limited to natural gas.

limited, role to play in the nation's transition to a truly sustainable energy future based on efficiency and renewable energy. While it is beyond the scope of the Subcommittee to address the importance of ensuring that natural gas is used efficiently, it is well within DOE's broader mission and we urge the Subcommittee to note this.

We urge the Subcommittee and Department of Energy (DOE) to find that some areas are simply unsuitable for development, despite the application of best practices, laws or regulations, due to the impossibility of eliminating all risk. We must protect and preserve from development our most sensitive wildlands, drinking water resources, wildlife habitat and other natural resources. In addition, as is discussed below, states should ensure that adequate setbacks and buffer zones are established to protect homes, schools and other sensitive community uses.

NRDC offers three sets of recommendations to the Subcommittee, all of which can make an important contribution to improving the safety and environmental performance of hydraulic fracturing. These are: 1) immediate steps for implementation by industry and government; 2) technical approaches readily available to industry; and 3) clarifications to the Subcommittee's Scope of Work to help ensure that the Subcommittee's efforts address the full range of activities involved in natural gas extraction.

I. IMMEDIATE STEPS THAT THE NATURAL GAS INDUSTRY, FEDERAL GOVERNMENT AND STATES SHOULD TAKE TO IMPROVE THE SAFETY AND ENVIRONMENTAL PERFORMANCE OF NATURAL GAS EXTRACTION AND HYDRAULIC FRACTURING

A. NATURAL GAS INDUSTRY

In its initial 90 day report to the SEAB, the Subcommittee should recommend that companies immediately take the following action to improve the safety and environmental performance of natural gas extraction and hydraulic fracturing:

- Improve Corporate Safety Culture – Operators should develop corporate-wide safety and environmental management systems and standards. While some operators already use anonymous tip lines and encourage employees to have “safety moments” or other regular discussions of how to continuously improve worker safety, all operators should institute or continue such programs and expand them to also encompass environmental concerns. This should include protections for whistleblowers; mandatory reporting of errors, accidents, violations of requirements, irregular practices, or any actions that otherwise jeopardize the safety and environmental protection of the site or surrounding areas; and shutting down of any operation reported until it is demonstrated that the site is safe and abiding by all standards.
- Operational Improvements – Operators should inventory all of their practices and ensure that the highest standards in each location are used company-wide.

For example, if a company determines that it will only use pitless drilling in the Marcellus Shale, it should use the expertise it has developed in the Marcellus Shale to evaluate, and as appropriate, adopt that practice everywhere it operates. Other examples include green completions, maximum recycling of flowback and produced waters, and appropriate setbacks from schools, homes, and sources of drinking water.

- Full Transparency – All operators should develop plans to fully disclose environmental risks and begin implementation as soon as possible. (Voluntary corporate disclosure should be adopted as a quick achievable step, but is not a substitute for subsequent mandatory, government enforced disclosure on all of these items.) All operators should make the following information available through a geographically-based, publically accessible website:
 - Full reporting of all chemicals used on site on a well-by-well basis, including CAS numbers and not limited to chemicals listed on a MSDS.
 - Geochemical characterization of produced water and flowback on a well-by-well basis.
 - Tracking and reporting of storage, treatment and disposal of all wastes.
 - The quantity and chemical composition of all spills and leaks.
 - Baseline geochemical characterization of all USDWs and surface water within an area that may be affected by oil and gas operations.
 - The quantity of air emissions including fugitive methane and hazardous, toxic and criteria air pollutants, such as volatile organic compounds.
 - Baseline characterization of geological conditions in the area, including existing fractures, fault lines and old and/or abandoned wells.

- Industry and independent funders should explore funding establishment of a third-party organization to develop safety and environmental standards that would be independently organized and managed, such as the Forest Stewardship Council and Leadership in Energy and Environmental Design certification systems. The goals of such an organization could be to identify best management practices and best available technology, raise operating standards for all oil and gas activities, and ensure accountability of member organizations through investigations. Input into developing these standards should be sought from a broad range of stakeholders including government, NGOs, academia, and others. Such standards could help provide a foundation for effective regulation.

B. FEDERAL GOVERNMENT

In its initial 90 day report to the SEAB, the Subcommittee should recommend that federal agencies immediately take the following actions to improve the safety and environmental performance of natural gas extraction and hydraulic fracturing:

- **Department of Energy (DOE)**
 - Robust scientific analysis of the health and environmental impacts of natural gas operations is severely lacking. DOE and its federal labs oversee a substantial amount of research resources. DOE should immediately develop a plan to shift more of these resources toward research into the environmental impacts of natural gas extraction, and ways to prevent and mitigate these impacts.
 - DOE should determine how to maximize federal research funds to contract with independent academic researchers to conduct investigations into the environmental and health impacts of natural gas extraction, and methods for preventing and mitigating these impacts.
- **Environmental Protection Agency (EPA)**
 - As the primary federal regulator of the oil and gas industry, EPA should fully enforce all federal laws in its oversight of the natural gas extraction process. EPA should work with states to ensure robust and vigorous enforcement and oversight.
 - EPA should ensure that it fully enforces the Safe Drinking Water Act when diesel is used in hydraulic fracturing or there are other threats to underground sources of drinking water or surface waters.
 - EPA should act on the petition submitted by NRDC, asking the EPA to promulgate regulations subjecting wastes from the exploration, development and production of oil and natural gas as hazardous waste to provisions of Subtitle C of the Resource Conservation and Recovery Act (RCRA).
 - The administration should request that Congress appropriate the full funding needed for EPA to fully enforce the laws and update its rules.
- **Department of the Interior (DOI)**
 - As the largest mineral manager in the nation, DOI, through the Bureau of Land Management (BLM), can and should be a model for the rest of the country when it comes to best practices for onshore natural gas production. The BLM should move swiftly to develop a suite of best practices, beyond the limited recommendations of the Gold Book, to act as

a model for the rest of the nation.

- The administration should request that Congress appropriate the full funding needed for the BLM to fully enforce the laws and update its rules for natural gas development.
 - The BLM should immediately move to include Health Impact Assessment or an equivalent tool in the environmental review process for natural gas extraction involving federal resources.
 - The U.S. Geological Survey should immediately begin an analysis of the potential cumulative impacts of widespread hydraulic fracturing in natural gas formations, including an assessment of the potential for contaminants to migrate over long time scales subsequent to full-field development, and the associated extensive network of interconnected fractures.
 - **Department of Health and Human Services (HHS)**
 - Individuals around the country report serious health symptoms that they or their physicians believe are being caused by nearby natural gas extraction activities, including neurological and motor symptoms, respiratory conditions, skin rashes, eye and throat irritation, nosebleeds, pain, burst eardrums, and more. HHS should immediately begin an investigation into the health impacts of working, living, or attending school near natural gas activities. HHS should begin independent environmental monitoring, exposure assessment to toxic substances, identification of toxic effects of typical chemical mixtures found near natural gas facilities, and monitoring and tracking of health outcomes. HHS should work with the BLM and state governments to ensure that Health Impact Assessments are conducted to fully understand the health implications of any new proposals for natural gas extraction.
 - **Department of Agriculture (USDA)**
 - Farmers and ranchers have reported livestock reproductive abnormalities, illness, or death in agricultural communities around the country where natural gas production takes place. Reported symptoms include birth defects, stillbirths, blindness, hair loss, poisoning leading to death, low or no milk production, low fertility, smaller litters, and additional unexplained illnesses. In some cases, veterinarians have ruled out all other potential causes of serious symptoms in cattle, goats, sheep, chickens, and horses.
 - USDA should launch an investigation into the reported health effects on livestock and crops located near natural gas extraction sites, including implications for organic certification.
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C. Congress

- Congress should eliminate exemptions for oil and gas activities from landmark federal environmental laws. The oil and gas industry enjoys exemptions from certain provisions of the Clean Water Act, Clean Air Act, Safe Drinking Water Act, and Resource Conservation and Recovery Act. Due in part to these exemptions, some oil and gas activities have unacceptable levels of environmental risk and the industry is given unfair advantages compared to other energy industries.
- Congress should ensure sufficient funding for EPA and BLM to: (a) fully enforce all federal laws pertaining to natural gas extraction; (b) conduct any necessary research into the environmental impacts of natural gas extraction and ways to prevent and mitigate them; and (c) update rules pertaining to the current state of the natural gas extraction industry.

D. STATES

In its initial 90 day report to the SEAB, the Subcommittee should recommend that states should immediately take the following actions to improve the safety and environmental performance of hydraulic fracturing and natural gas extraction:

- States should immediately ensure that each permit application receives an adequate review and that staff has sufficient resources for thorough field inspections, timely response to complaints, and enforcement.
- States should immediately begin to: (a) fully enforce their current laws and regulations; and (b) impose the maximum appropriate penalties when violations occur—including shutting down sites with serious health and safety violations. States should not hesitate to take strong actions to enforce laws, protect the public, and fulfill expectations of nearby communities.
- States should review relevant state laws and regulations to determine where updates are needed. Among other things, states should address the need for improved setbacks from sensitive areas such as schools, homes, and drinking water sources, as well as the need for some areas to be completely off limits. Particular attention should be given to whether setbacks are based on the current and prospective cumulative industry footprint, and the variety and amount of chemicals, toxic waste, machinery and equipment, noise generated, air emissions, that may be in close proximity to homes and schools.
- States should evaluate and, if necessary, raise fees to support adequate staffing, and assess whether inspection and enforcement resources are

adequate to the pace of development.

- States should assess whether financial responsibility requirements (bond, insurance, trust fund, etc.) for oil and gas activities are adequate to cover all reclamation, potential costs of corrective action, well plugging and abandonment, emergency and remedial response, long-term monitoring, and any clean up action that may be necessary in case of catastrophic events.
- States should assess opportunities to improve community outreach and involvement requirements, including providing information and soliciting input from potentially impacted communities during all stages of planning, exploration, and development.
- States should require full transparency and disclosure of environmental risks and impacts. While there is a need to protect legitimate confidential business information, disclosure should otherwise be complete and transparent. Voluntary methods such as FracFocus, while positive steps, are not sufficient to ensure the public has complete access to necessary information, or that state regulators have needed information to ensure they have sufficient regulations and evaluate potential contamination claims.
- States should actively participate in STRONGER, both to request reviews by STRONGER and to contribute expertise and other resources in STRONGER reviews by other states. States should implement the recommendations made in the review process to update and strengthen their regulations. (While STRONGER is no substitute for state or federal regulation, and is not precise enough to replace any need for regulations, updating of regulations, or enforcement of regulations, it does offer a useful general assessment).

II. AVAILABLE TECHNICAL APPROACHES TO IMPROVE ENVIRONMENTAL PROTECTION AND SAFETY

The following technical approaches and methods should be adopted, whether mandated at the federal or state level, or voluntarily adopted at the corporate level, to best protect human health and the environment. While we believe that there should be enforceable regulations, industry would be wise to adopt these policies on their own as soon as possible:

- Pre-planning that includes an assessment of all health and community impacts, including increased traffic, noise, visual impacts, industrialization, etc., and the adequacy of information regarding these impacts, and identification of where risks are poorly understood and

inadequately addressed. Pre-planning should also explicitly consider whether energy development activities will impact overall community health or “character,” including infrastructure, community services, and first responder capacity. Energy development can include both positive and negative community impacts but this is an often overlooked category in site selection and planning.

- Assessment of cumulative impacts, which can accumulate over time, from one or more sources, and can result in the degradation of important resources,⁴ and a plan for minimizing them. Council on Environmental Quality guidelines⁵ provide a model; an assessment should address: surface disturbance, water use and water quality over the life of the project, waste management, air quality impacts, and a detailed analysis of the cumulative impacts of hydraulic fracturing on the geology of producing and confining zone(s) over the life of the project.
- Improved site characterization and planning, including:
 - a) detailed study of regional and local geologic stratigraphy and structure including lithology, geologic facies, faults, fractures, stress regimes, seismicity, and rock mechanical properties through the use of 3D seismic surveys, outcrop analog studies, collection of core and relevant analysis, and well logs. These data are necessary to determine potential subsurface fluid migration pathways and the presence or absence of an appropriate confining zone.
 - b) baseline characterization, including:
 - i. Geochemical analysis of any and all USDWs and surface waters that may be endangered by oil and gas activities. Potentially endangered waters should be delineated based on modeling that accounts for the physical and chemical extent of all such activities.
 - ii. Hydrocarbon sampling and analysis to determine variations in chemical and isotopic compositions of any hydrocarbons which may be encountered both vertically in a wellbore and areally throughout an oil or gas field, and to help determine the sources and migration pathways if hydrocarbons are detected in groundwater. Mineralogy, petrology, and major and trace element bulk geochemistry of the producing and confining zone(s) to aid investigators in determining what naturally occurring contaminants may be mobilized by oil and gas activity. Detailed analysis of regional and local hydrology including, at a minimum, hydrologic flow and transport data and modeling and aquifer hydrodynamics

⁴ U.S. Environmental Protection Agency, Office of Federal Activities (2252A), May 1999, Consideration Of Cumulative Impacts In EPA Review of NEPA Documents, available at

<http://www.epa.gov/compliance/resources/policies/nepa/cumulative.pdf>

⁵ Council on Environmental Quality, January 1997, Considering Cumulative Effects Under the National Environmental Policy Act, available at http://ceq.hss.doe.gov/publications/cumulative_effects.html

- iii. Thorough identification of existing wellbores, determination of the integrity of those wellbores (i.e. casing, cement, etc.), and mitigation where necessary, to ensure that existing wellbores do not become migration pathways for contaminants to reach groundwater. Biologic surveys and mapping to identify sensitive and critical habitat and sensitive, threatened or endangered species and plans to eliminate, reduce, or mitigate impacts.
- c) A water quality monitoring program should be developed and implemented throughout the life of oil and gas exploration and production, including the use of dedicated water quality monitoring wells to help detect the presence of contaminants prior to their reaching domestic water wells and placement of such wells based on detailed hydrologic flow models and the distribution and number of hydrocarbon wells.
- d) As development of an oil or gas field proceeds, these data sets must be continually updated as new information becomes available, both temporally and areally.
- o The strongest possible onshore well construction standards to minimize improperly constructed and/or maintained wellbores that can provide leakage pathways for hydrocarbons, drilling fluid, or hydraulic fracturing fluid to contaminate groundwater.⁶ Current state and federal wellbore construction regulations for onshore natural gas wells must be updated to reflect appropriate risk management and rapid changes in gas well drilling technology. The recent revisions of federal offshore well construction regulations serve as a good model of the kinds of improvements that are necessary to ensure that all wells are drilled with appropriate minimum safety and environmental standards. Specifically, updated regulations should include but are not limited to the following improvements:
 - (a) Wellbores must be designed and constructed to protect USDWs, control formation pressures and fluids, prevent the movement of fluids between different strata, and prevent the release of fluids to the surface.
 - (b) Casing and cement design based on Good Engineering Practices (GEP) and Best Available Technology (BAT) must take into account all relevant geologic and engineering factors, including but not limited to the presence or absence of hydrocarbon bearing zones, lithology of the production and

⁶ See, e.g.

DEP Reaches Agreement with Cabot to Prevent Gas Migration, Restore Water Supplies in Dimock Township, Agreement Requires DEP Approval for Well Casing, Cementing
<http://www.portal.state.pa.us/portal/server.pt/community/newsroom/14287?id=2418&typeid=1>
 DEP Monitors Stray Gas Remediation in Bradford County Requires Chesapeake to Eliminate Gas Migration, Chesapeake Commits to Evaluate, Remediate All PA Wells to Conform with Improved Casing Regulations
http://www.portal.state.pa.us/portal/server.pt/community/search_articles/14292

confining zones, fracture gradients, depth to useable water, depth to producing formation, formation pressures, anticipated casing stresses including hydraulic fracturing pressure, nature of formation fluids, and local conditions.

- (c) The casing and cement must be designed for the life of the well.
 - (d) Surface casing must extend 100 feet below the base of the lowermost USDW and be cemented to surface.
 - (e) Any strata containing hydrocarbons, brine, or useable quality water and any abnormally pressured zones must be isolated behind cement and casing in a manner that prevents the movement of fluids.
 - (f) Casing pressure tests and cement compressive strength test must be performed on all surface, intermediate, and production casing. Casing shoe tests must be performed immediately after drilling out of surface or intermediate casing.
 - (g) The integrity and location of cement must be verified by tools capable of evaluating cement quality radially and identifying channeling.
- States should adopt regulations to ensure the protection of wildlife. Impacts and risks to wildlife from oil and gas activities and mitigation strategies to address them must be more fully examined and incorporated into state and federal regulation. Oil and gas activity can result in wildlife habitat destruction and fragmentation. Noise and light pollution can disrupt or alter wildlife behavior and impact reproduction. Surface activities can introduce non-native and/or invasive species that can compete with or displace native species.

III. SCOPE OF WORK – CLARIFICATIONS AND SPECIFICS

NRDC appreciates the comprehensive ‘Scope of Work’ in the Secretary’s charge to the Subcommittee identifying areas that require prompt and ongoing application of improved practices. The Scope of Work recognizes that shale gas development is a complex activity, and that best practices extend beyond just the hydraulic fracturing process itself. Below are some suggested clarifications and additional specifics for activities that should be addressed under the broad topics outlined for the Subcommittee.

- WELL DESIGN, SITING, CONSTRUCTION, AND COMPLETION
 - Site and subsurface characterization and planning
 - Corrective action to eliminate any potential subsurface migration pathways for fluids or gas to groundwater
 - Proper well design and construction (e.g. prevents movement of fluids or gas to groundwater, designed to withstand hydraulic fracturing treatment)
 - Proper hydraulic fracturing treatment design (e.g. ensuring that hydraulic fracturing pressure will not initiate fractures in the confining zone)
 - Appropriate setbacks (e.g. distance of wells from schools, homes, private water wells, etc.)
 - Water quality monitoring program
 - Land-use planning
 - Traffic planning
 - Public health impacts assessment

 - CONTROLS FOR FIELD SCALE DEVELOPMENT
 - Evaluation of cumulative impacts

 - OPERATIONAL APPROACHES RELATED TO DRILLING AND HYDRAULIC FRACTURING
 - Fracture growth modeling
 - Techniques to monitor fracture growth (e.g. microseismic, tiltmeters, tracers)
 - Implementation of a water quality monitoring program including use of dedicated water quality monitoring wells
 - Well mechanical integrity testing and maintenance
 - Tracking and reporting of injected and recovered volumes of fracturing fluid

 - RISK MANAGEMENT APPROACHES
 - See site characterization and planning
 - “Safety case” approach/SEMS – modes of failure planning

 - WELL SEALING AND CLOSURE

 - SURFACE OPERATIONS
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- “Green Completions” and pitless drilling
 - Wildlife mitigation plans
 - Centralized facilities
 - Strategies to reduce truck traffic
 - Strategies to reduce air emissions (GHGs, VOCs, HAPs, etc.)
- WASTE WATER REUSE AND DISPOSAL, WATER QUALITY IMPACTS, AND STORM WATER RUNOFF
 - Strategies to maximize reuse/recycling of flowback and produced water
 - Cumulative water use planning, taking into account sources, volumes, timing, designated best use, transport distances and methods, potential impacts to aquatic species and habitat, etc.
 - Cumulative waste water disposal planning taking into account anticipated volumes of waste, storage methods, transport distances and methods, available disposal or treatment methods and ability of those methods to properly treat that water
 - Surface water impacts: construction activities (storm water runoff, siltation, mobilization of contaminants), spills, leaks, depletion of water sources
 - Subsurface water impacts: migration of hydraulic fracturing fluid, formation fluid, or natural gas into groundwater through wellbores or natural faults or fractures, surface spill or leaks that leach into groundwater, depletion of water sources
- PROTOCOLS FOR TRANSPARENT PUBLIC DISCLOSURE OF HYDRAULIC FRACTURING CHEMICALS, DRILLING CHEMICALS, AND OTHER INFORMATION OF INTEREST TO LOCAL COMMUNITIES
 - Public disclosure of hydraulic fracturing chemicals on a well-by-well basis
 - Public disclosure of flowback and produced water chemistry on a well-by-well basis
 - Public disclosure of air emissions
 - Community engagement and planning
- OPTIMUM ENVIRONMENTALLY SOUND COMPOSITION OF HYDRAULIC FRACTURING AND DRILLING CHEMICALS, REDUCED WATER CONSUMPTION, REDUCED WASTE GENERATION, AND LOWER GREENHOUSE GAS EMISSIONS
 - Maximize use of non-potable water and reuse of waste water
 - Lower GHG combustion emissions from more efficient rigs (i.e., highest Tier possible), reduced vehicle traffic, replacement of diesel engines where possible
 - Lower GHG non-combustion emissions (i.e. vented, leaked, and flared methane & CO₂) from use of emissions capture technologies
- EMERGENCY MANAGEMENT AND RESPONSE SYSTEMS

- METRICS FOR PERFORMANCE ASSESSMENT
 - Comprehensive reporting of spills; leaks; accidents; vented, leaked, and flared GHG and toxic air emissions

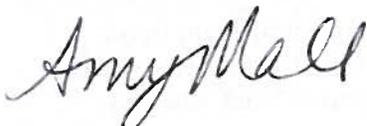
- MECHANISMS TO ASSESS PERFORMANCE RELATING TO SAFETY, PUBLIC HEALTH AND THE ENVIRONMENT

We thank the Subcommittee for its work and its consideration of our comments. We look forward to continued participation in the Subcommittee's review process.

Sincerely yours,



Robin Roy
Director, Building Energy and Clean Energy Strategy



Amy Mall
Senior Policy Analyst