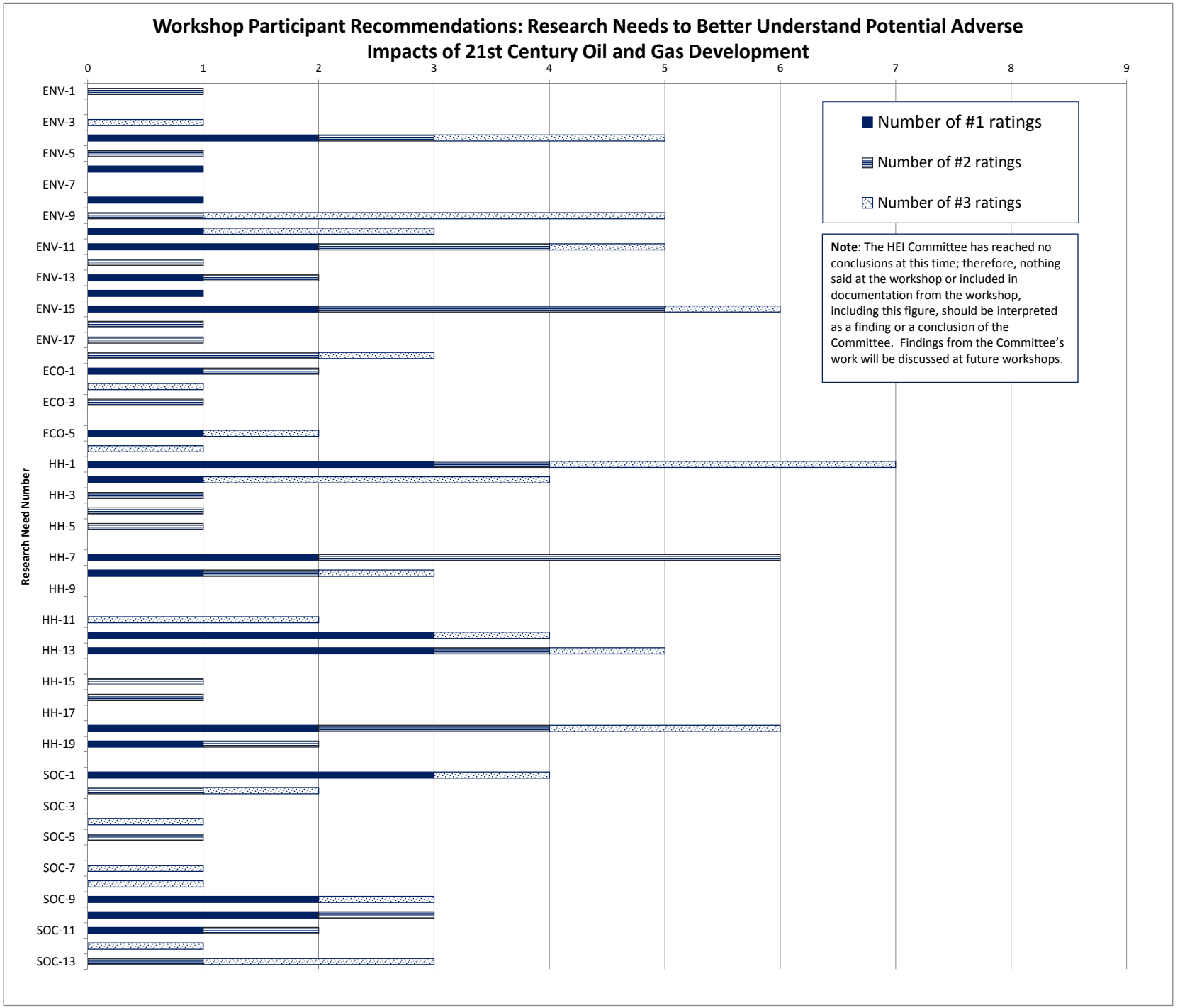
Workshop Participant Recommendations: Research Needs to Better Understand Potential Adverse Impacts of 21st Century Oil and Gas Development
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1
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Research Need Number
ENV-1
ENV-3
ENV-5
ENV-7
ENV-9
ENV-11
ENV-13
ENV-15
ENV-17
ECO-1
ECO-3
ECO-5
HH-1
HH-3
HH-5
HH-7
HH-9
HH-11
HH-13
HH-15
HH-17
HH-19
SOC-1
SOC-3
SOC-5
SOC-7
SOC-9
SOC-11
SOC-13
Number of #1 ratings
Number of #2 ratings
Number of #3 ratings
Note: The HEI Committee has reached no conclusions at this time; therefore, nothing said at the workshop or included in documentation from the workshop, including this figure, should be interpreted as a finding or a conclusion of the Committee. Findings from the Committee's work will be discussed at future workshops.

Workshop Participant Recommendations: Research Needs to Better Understand Potential Adverse Impacts of 21st Century Oil and Gas Development

Special Scientific Committee on Unconventional Oil and Gas Development
December 11, 2014 Workshop

Potential Impact Category	Research Need	Research Need Number
Environment	characterize methane emissions	ENV-1
	characterize radon in gas	ENV-2
	what is being emitted into the air	ENV-3
	characterize waste materials and TENORM	ENV-4
	investigate what can go wrong (and how it could be avoided) - as oppposed to what would happen if best practices observed)	ENV-5
	consider whether research on all types of potential impacts might be more feasible in other plays	ENV-6
	how do all chemicals being used interact and influence waste composition and management	ENV-7
	variability in waste management	ENV-8
	evaluate emerging technologies to control/prevent potential impacts	ENV-9
	data describing what air emissions leave a well pad during different phases of its development and production life cycle	ENV-10
	develop baseline data for water quality in aquifers before wells are developed	ENV-11
	characterize fine PM in air emissions	ENV-12
	include all ancillary facilities on and beyond well site in characterization of air emissions	ENV-13
	horizontal/vertical extent of fracture propogation	ENV-14
	distinguish impacts from shale gas development from everything else (draw from existing data where feasible)	ENV-15
	best available technology on equipment to prevent impacts	ENV-16
	how to verify wellbore integrity	ENV-17
	quality control and assurance programs that control/prevent impacts	ENV-18
Ecologic	habitat fragmentation	ECO-1
	what should be measured before, during, and after development on health of ecosystems	ECO-2
	research-based best management practices for purpose of validating them.	ECO-3
	habitat loss	ECO-4
	cumulative delivery of sediments to surface water bodies	ECO-5
	animal health (e.g., birth defects), particularly in rural areas where animals outside 24/7	ECO-6
Human Health	data collection from health care facilities (e.g., urgent care) to understand health effects; database of health effects	HH-1
	worker and community member exposure to air emissions	HH-2
	what is the most likely health-related impact	HH-3
	air quality impact from switch to gas from coal	HH-4
	exposure pathways that should be part of first responder training (e.g., inhalation during chemical/waste handling)	HH-5
	mortality risk associated with transport of waste material	HH-6
	evaluation of exposure pathways that could affect human health	HH-7
	cumulative/regional impact based on density of development and production	HH-8
	land impacts related to solid waste management (e.g., landfills above drinking water supplies)	HH-9
	what ecological impacts could be indicators of human health effects and what should be monitored for this purpose	HH-10
	mechanisms for evaluating long-term risks to health	HH-11
	promote worker safety	HH-12
	review potential for cumulative exposure, with recognition that not all comes from oil and gas	HH-13
	household level exposure assessment	HH-14
	inexpensive air and water monitoring methods that could be part of a "citizen science" study	HH-15
	influence of setback distance given variation in topography	HH-16
	look at health effects (e.g., leukemia) associated with boom-bust in western communities	HH-17
	longitudinal random sample to track potential impacts over time	HH-18
	definition of an exposed population	HH-19
	health effects on migratory work force related to travel to/from work sites	HH-20
Social	Adequacy of regulatory framework (e.g., well-by-well oversight instead of cumulative oversight)	SOC-1
	how to equip local government and municipal officials to address potential impacts	SOC-2
	better understand conflict resolution to support collaborative decision-making process	SOC-3
	comparative study of setback requirements among states with goal of defining best practices on a scientific basis	SOC-4
	tax structures for local governments	SOC-5
	promising practices to address social and health concerns	SOC-6
	Encourage citizen participation in research	SOC-7
	impacts from rapid change in infrastructure (e.g., roadway) use	SOC-8
	define a pathway to solutions that research can support	SOC-9
	community-based participatory research	SOC-10
	longitudinal random sample to track potential impacts over time	SOC-11
	how might development of Marcellus proceed given economic and other factors	SOC-12
	case studies on community-industry-govt involvement	SOC-13