
Role of Government in Mineral and Energy Resources Research

Position Statement. The Geological Society of America (GSA) strongly advocates that sound scientific knowledge guide public decisions about the exploration, exploitation, and stewardship of finite energy and mineral resources. Sustaining and enhancing that knowledge require more public investment in energy and mineral resource research, education and stewardship.

Purpose. GSA recognizes the essential role of government in conducting and supporting research that contributes to 1) developing a steady, sustainable mineral and energy supply for a resilient society; 2) developing renewable energy resources, recycling, resource substitution, and strategies to increase efficiency and conservation; 3) promoting sound mineral and energy policies through enhanced assessment of mineral and energy resources and the environmental implications of their use; and 4) enhancing public awareness of mineral and energy resource issues.

RATIONALE

Economic prosperity and societal well being require a safe and reliable supply of energy and mineral resources. Currently, global production of most non-renewable energy and mineral resources (e.g., iron, copper, and coal) is at or near all-time historic highs. Some geologic resources, such as non-metals, i.e. crushed stone, sand, and gravel, are widespread, and supplies lie near areas of use. In contrast, most metals and energy resources are relatively rare, and deposits lie far away from consuming regions. The public role (governmental agencies, policy and planning bodies) in identifying and assessing energy and mineral resources is crucial, in order to improve long-term planning and avoid unforeseen resource shortages.

Non-renewable resource/energy development and use increasingly have profound environmental and social implications. Increased efficiency and conservation, substitution of renewable resources, and recycling may help mitigate some impacts of the looming non-renewable energy/resource shortages by reducing demand. Nonetheless, with a growing population, accelerating industrialization, and improving standards of living in many parts of the world, global demand for most energy and mineral resources is at an all-time high and will inevitably increase in the near future.

PUBLIC POLICY ASPECTS OF THE ROLE OF GOVERNMENT IN ENERGY AND MINERAL RESOURCES

Sound evaluation of potential costs, benefits, and consequences associated with the extraction and use of mineral and energy resources requires a holistic approach, considering all related factors. Government agencies alone possess the broad perspectives required to develop sound public policies. Knowledge of the impacts of fossil fuels and conventional nuclear power are widespread, but impacts of newer alternative energy sources is just beginning. For example,

- Production of some biofuels requires large quantities of fresh water and fossil fuels, may degrade water quality in agriculturally productive areas, may increase greenhouse gas emissions, and impacts global food prices;
- Existing hydrogen production technologies require significant energy and raw mineral resources that also increase greenhouse-gas emissions;
- Many solar/hybrid technologies require rare earth elements (REE), which currently have a global production bottleneck (about 95% currently come from China).

Development of adequate independent sources will take over a decade. Better understanding of the science of energy and mineral resources and impacts of their use can improve decisions addressing issues such as adequate supplies for a frugal, sustainable, resilient society, land-use conflicts, and potential environmental consequences of extraction and consumption. Geologic knowledge required for effective decision-making includes (1) the location and extent of present and possible future resources, (2) the geological processes that formed and concentrated them, (3) exploration for undiscovered

resources, and (4) technological needs and environmental effects of their extraction and use at local, regional, and global scales.

The application of the skills and knowledge of geologists is essential for informed discussions about wide ranging issues related to energy and mineral resources. These issues include

- resource exploration and production, environmental consequences, reclamation, and post-production land-use planning;
- applied and fundamental research, resource assessment and analysis of future supply and demand;
- identification of alternative and renewable supplies;
- regulatory compliance, and waste disposal throughout the life cycles of energy and mineral products;
- management and stewardship of public and private lands.

Particularly, federal, tribal, state, and provincial governmental agencies need qualified geologists to fulfill their missions as stewards of the land and its natural resources. Beyond the need for trained specialists, Earth-science education in secondary schools and higher education institutions is essential in order to develop a broad public appreciation of the relevant geologic issues and support for sound public policy.

Government has well-established roles and responsibilities regarding mineral and energy resources research. For example, in the United States, several federal agencies, including the Departments of Agriculture, Commerce, Defense, Energy, Health and Human Services, Interior, and Labor, and the Environmental Protection Agency, have important programs. Government supports energy and mineral resource research and development as a public benefit; industry funds research associated with its business interests; and scientific funding agencies (e.g. US National Science Foundation, National Science and Engineering Research Council of Canada, and the Consejo Nacional de Ciencia y Tecnologia of Mexico) support development of new knowledge from basic research in academic institutions.

RECOMMENDATIONS

GSA recommends increased public investments and public-private partnerships to improve our understanding of mineral and energy resources and to support programs for renewable energy resources, energy efficiency, and resource recycling.

- Sustained public investments are essential to evaluate (1) energy and mineral deposit forming processes; (2) mineral resources weathering processes and the environmental impacts of exploitation of weathered deposits; (3) exploration for new resources to replace depleted ones; (4) new resources to support evolving technology, such as nanotechnology and superconductivity; (5) advanced technologies to increase the efficiency of locating and extracting resources, including reducing costs, enhancing recovery, and developing energy-environmental systems, and mitigating environmental impacts of resource use; and (7) global biogeochemical impacts of resource material extraction, use, recycling, disposal, and dispersal.
- Federal, tribal, state, and provincial governments should support mineral and energy resource assessments and related land management needs, physical sample preservation, and development of new knowledge about possible future resources. Geologists and decision makers should evaluate existing and prospective mineral and energy resources from a "systems perspective", considering all economic, environmental, and social impacts of their development and use.
- Enhanced partnerships between government and industry can improve access to land and foster new technology developments. Private foundations and public funding agencies can also support research related to mineral and energy resources.
- Government supported mineral and energy-resource research in academic institutions is essential, as this research has created most new knowledge in the past few decades.
- Governments should provide funding and economic incentives to increase the use of renewable energy resources, improve energy efficiency, and increase resource recycling.

ABOUT THE GEOLOGICAL SOCIETY OF AMERICA

The Geological Society of America (GSA), founded in 1888, is a scientific society with over 24,000 members from academia, government, and industry in more than 90 countries. Through its meetings, publications, and programs, GSA advances the geosciences, enhances the professional growth of its members, and promotes the geosciences in the service of humankind. GSA encourages cooperative research among earth, life, planetary, and social scientists, fosters public dialogue on geologic issues, and supports all levels of earth science education. Inquiries about GSA or this position statement should be directed to GSA's Director for Geoscience Policy, Dr. Craig M. Schiffries, at +1-202-669-0466 or cschiffries@geosociety.org.

OPPORTUNITIES FOR GSA AND ITS MEMBERS TO HELP IMPLEMENT RECOMMENDATIONS

To facilitate implementation of the goals of this Position Statement, the Geological Society of America recommends that its members:

- *Actively discuss with decision makers the role of government in mineral and energy resources research.* To improve the technical basis for decision-making, geoscientists should clearly discuss (1) the abundance and distribution of energy and mineral resources; (2) potential long-term benefits and consequences—including environmental and related consequences—of resource development; and (3) the value of the geosciences in stewardship of public lands.
- *Participate in professional forums and town hall meetings on the role of government in mineral and energy resources.* We should emphasize the critical use of geologic information regarding finite energy and mineral resources and the need for additional public investment to improve understanding of mineral and energy resources research, stewardship, and education.
- *Participate in public education at the local level, in order to foster interaction among local, state, and federal governments; educational and research institutions; energy developers and industry; and the public.* We should seek better to inform the public and to increase grass-roots support for funding for geologic information of energy and mineral resource issues.
- *GSA can support members with print, Web, and personnel resources to facilitate communication with decision makers regarding the role of government in mineral and energy resources.* GSA's Geology and Public Policy Committee, Geology and Society Division, and Director for Geoscience Policy in Washington, D.C., have considerable expertise for such help.
- *GSA can also raise awareness of the role of geology and government in mineral and energy resources by publishing articles, conducting symposia, technical sessions, and workshops at annual and sectional meetings on these subjects.* <http://blog.energy.gov/blog/2010/12/15/department-energy-releases-new-critical-materials-strategy>