



ENERGY & NATURAL RESOURCES

U.S. Natural Gas Boom Impacting Local Towns and Distant Nations

Thanks to new extraction methods such as hydraulic fracturing, or “fracking,” the United States is newly flush with natural gas. After decades of importing a large amount of the nation’s gas supply, the country is poised to become a net exporter of this fuel—although the benefits of doing so have been hotly debated.

The U.S. Department of Energy in September approved the development of a new liquid natural gas (LNG) export facility, which would be the fourth of its kind and the third to be approved in the last year. Nineteen other facilities have been proposed, although it’s unlikely that they will all be built, due to intensifying global competition, according to Charles Ebinger, senior fellow and director of the energy security initiative at the Brookings Institution.

“There is no question that the scale of the gas revolution is unprecedented,” Ebinger said. He and other experts considered the natural gas boom in two recent events at AAAS, where it became clear that the implications of this revolution—both posi-

tive and negative—are reaching from small American towns to nations on the other side of the globe. The first discussion, on 16 October, was an annual forum sponsored by Hitachi, Ltd., and co-organized by AAAS and the Brookings Institution.

For now, U.S. natural gas resources are largely staying on the North American continent, which has helped to keep energy prices relatively low in the United States. But countries such as Japan, which imports all of its gas and oil, are eager to take advantage of U.S. exports. Meanwhile, shale gas is set to take off in other regions of the world, such as Australia, the Middle East, and potentially Russia, according to Ebinger.

Greater energy independence for the United States could have implications around the world, said Nobuo Tanaka, global associate for energy security and sustainability at the Institute of Energy Economics, Japan, especially if the U.S. government decides to abandon its traditional role in keeping open oil and gas trade routes such as the Strait of Hormuz, leading out of the

A mixed picture. Rising natural gas production may have economic benefits for countries like the United States, but will it help or harm efforts to protect the environment?

Persian Gulf. It is unknown at this point who might take over that role, Tanaka said.

Domestically, shale gas has been a wind-fall in some regions. In Ohio’s 63rd district, an area just north of Youngstown, BP has spent \$330 million on lease rights alone, according to state representative Sean J. O’Brien. The region has now become one of the fastest growing areas of the country, as the gas revolution has also brought a return of many manufacturing jobs.

The picture hasn’t been completely rosy, however. Locally, O’Brien noted, people have been dealing with secondary effects of fracking, which involves injecting fluid into shale beds at high pressure. More trucks are on the roads, for example, and the burning off of methane produced in the extraction of natural gas can emit chemicals that exacerbate respiratory issues such as asthma.

Ohio is just one of the many locations for which fossil fuel extraction is a new issue, and many of these places are far more populous than previous hot spots for oil and gas, noted Gretchen Goldman, an analyst for the Center for Science and Democracy at the Union of Concerned Scientists.

The federal government has largely stayed out of regulating these new developments in shale gas, leaving the industry with a patchwork of regulations that vary from state to state and sometimes, as in Pennsylvania, town to town. The hands-off approach may work well for states such as Texas, where the regulation of fossil fuel exploration has a long history, Goldman said, but other states without this history may benefit from more federal guidance on managing the risks associated with oil and gas development.

In addition, the implications for the climate are often ignored in discussions of the natural gas rise, in part because this can be such a significant economic opportunity, noted Jonathan Fink, vice president for research and strategic partnerships at Portland State University in Oregon. “The short-term economic positives are drowning out the long-term climate negatives,” he said. “How do we better integrate those two perspectives?”

A similar question emerged in another panel discussion at AAAS, on the global energy outlook between now and 2040. The 21 October forum was sponsored by Georgetown University's Program on Science in the Public Interest, AAAS, and the American Chemical Society.

Globally, natural gas consumption is expected to nearly double between 2010 and 2040, according to projections presented by Howard Gruenspecht, Deputy Administrator of the U.S. Energy Information Administration (EIA). Most of that increase will take place outside today's high-income countries—for example, in China and India, where economic growth is projected to drive a surge in energy use, and in the Middle East and Africa, where both economic and population growth are key drivers.

The World Bank sees access to energy services as “a huge global equity issue,” said Vivien Foster, sector manager in the Sustainable Energy Department at the World Bank, whose president has joined the U.N. secretary-general as co-chairs of an initiative to achieve universal energy access by 2030.

But will it be possible to “make energy available for all without cooking the planet?” asked moderator Richard Harris of National Public Radio. Natural gas could serve as a bridge away from coal and petroleum-based fuels, because burning it produces less carbon and other pollutants. It is still a fossil fuel, however, and despite its cost advantage relative to alternatives such as nuclear and renewable power, its carbon emissions are higher than those options.

While the use of renewable energy sources is also expected to increase by 2040, particularly in the developed world, wind and solar likely will account for about 10% of the global electricity supply, compared to hydropower at about 15%, according to projections by ExxonMobil. Across all demand sectors, most of the world's use of renewable energy will come from biomass, said Rob Gardner, manager of the Economics and Energy Division of ExxonMobil's Corporate Strategic Planning Department. Likewise, the EIA estimates that without major changes in policy, the portion of the global energy mix coming from fossil fuels will decrease only modestly, from about 85% today to about 75% in 2040.

“It's still pretty much a fossil fuel world unless the world makes [very different] policy decisions,” said Gruenspecht.

—Sarah Zielinski and Kathy Wren

AAAS Kavli Science Journalism Award Winners Named

Stories about efforts to prevent the Asian carp from invading the Great Lakes, about evolutionary stress on endangered pupfish in the Mojave Desert, and about the use of “crowdsourcing” to solve tough biological problems are among the winners of the 2013 AAAS Kavli Science Journalism Awards.

Large Newspaper—(Circulation of 100,000 or more): Dan Egan, the Milwaukee *Journal Sentinel*, for “Deep Trouble,” 19 August, 22 August, and 26 August 2012. The series examined why a seemingly radical solution, damming and reversing the flow of the Chicago River, may be necessary to protect the Great Lakes from the invasive Asian carp.

Small Newspaper—(Circulation less than 100,000): Azeen Ghorayshi, *East Bay Express*, for “Warning: Quake in 60 Seconds,” 1 May 2013. Ghorayshi reported on the work of a group at the University of California, Berkeley, that has been developing an earthquake warning system, and she pointed out the wide gap between the United States and Japan in deployment of such systems.

Magazine: Hillary Rosner, *Wired*, for “Attack of the Mutant Pupfish,” December 2012. Rosner described what happened when a few pupfish from a different species managed to infiltrate a refuge designed to preserve the endangered Devil's Hole pupfish in the Mojave Desert.

Television—(Spot News/Feature Reporting, 20 minutes or less): Joshua Seftel, NOVA scienceNOW, for “Adrien Treuille Profile,” 14 November 2012. Seftel explained how a Carnegie Mellon University computer scientist harnessed the brainpower of thousands of people who play computer games as a way to help solve difficult biological problems such as protein folding.

Television—(In-Depth Reporting, more than 20 minutes): Dennis Wells, Linda Goldman, David Royle, Smithsonian Channel, for “Killer in the Caves,” 13 March 2013. The winning program followed a bat expert and a wildlife manager in their fight against white-nose syndrome, a disease that is driving little brown bats, one of the most common bat species in the northeastern United States, toward extinction.

Radio: Howard Berkes, Andrea de Leon, Sandra Bartlett, NPR, and Chris Hamby, The Center for Public Integrity, for “As Mine Pro-

tections Fail, Black Lung Cases Surge” and “Black-Lung Rule Loopholes Leave Miners Vulnerable,” 9 July and 10 July 2012. The segments described the resurgence of a disease once thought solved and weaknesses in regulatory science meant to protect coal miners.

Radio: Certificate of Merit: Ashley Ahearn, KUOW Public Radio, Seattle, for a three-part series on the potential health and environmental impacts of coal in the Pacific Northwest (11 March and 12 March 2013 and 18 June 2013).

Online: Phil McKenna, MATTER, for “Uprising: Can a self-trained scientist solve one of the biggest problems in energy policy?,” 21 February 2013. McKenna, writing for an online site dedicated to long-form science journalism, described one man's hunt for natural gas leaks from urban distribution systems and their potential contribution to climate change.

Children's Science News: Barbara Lich, *GEOLino* magazine (Germany), for “Kaltwasserkorallen: Ein Paradies am Meeresgrund” (“Cold Water Corals: Paradise on the Seabed”), October 2012. Lich told her young readers about lesser-known cold water corals living hundreds of meters below the surface, a realm only reachable by a crewed submersible. The children's science news award, established in 2005, is the only AAAS Kavli award open to journalists from abroad, as well as the United States.

The awards, administered by AAAS since their inception in 1945, go to professional journalists for distinguished reporting for a general audience. The Kavli Foundation provided a generous endowment in 2009 that ensures the future of the awards program.

Independent panels of science journalists pick the winners, who will receive \$3000 and a plaque at the 2014 AAAS Annual Meeting in Chicago in February. Learn more about the winning entries at www.aaas.org/sja2013.

—Earl Lane

AAAS Members Elected as Fellows

In October 2013, the AAAS Council elected 388 members as Fellows of AAAS. These individuals will be recognized for their contributions to science and technology at the Fellows Forum to be held on 15 February 2014 during the AAAS Annual Meeting in Chicago, Illinois. The new Fellows will receive a certificate and a blue and gold rosette as a symbol of their distinguished accomplishments. Presented by section affiliation, they are:

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Stewart M. Gray, USDA-ARS/Cornell Univ.
Rodney Allan Hill, Univ. of Idaho
Jonathan D. G. Jones, Univ. of East Anglia/The Sainsbury Laboratory (UK)
James E. Kinder, The Ohio State Univ.
Nora L. V. Lapitan, Colorado State Univ.
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John F. Leslie, Kansas State Univ.
Yiqi Luo, Univ. of Oklahoma
Bruce A. McDonald, ETH Zürich (Swiss Federal Institute of Technology)
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