NATURAL GAS *brief*

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Stanford | Natural Gas Initiative
School of Earth, Energy & Environmental Sciences and Precourt Institute for Energy

The Stanford Natural Gas Initiative and Energy for Growth Hub co-hosted a virtual forum March 30-31 on "The Future of Natural Gas in Sub-Saharan Africa." Forum speakers and panelists included distinguished public sector, private sector, and academic experts from Ghana, Nigeria, Senegal, Seychelles, and the United States. In this brief, Mark Thurber draws five important lessons from what they said.

Five Lessons for the Future of Natural Gas in Sub-Saharan Africa

Expert Insights from a Virtual Forum hosted by Stanford NGI and Energy For Growth Hub

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ABOUT THE AUTHOR

Mark Thurber

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Dr. Thurber co-edited and contributed to *Oil and Governance* (2012) and *The Global Coal Market* (2015) from Cambridge University Press. His most recent book, *Coal* (Polity Press, 2019), examines why coal continues to play such a significant role in the global energy mix despite its serious environmental impacts.

Dr. Thurber teaches a course on energy markets and policy in the Graduate School of Business at Stanford, in which he runs a game-based simulation of electricity, carbon, and renewable energy markets. Dr. Thurber holds a Ph.D. from Stanford University and a B.S.E. from Princeton University.

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Natural Gas Briefs:
ngi.stanford.edu/briefs

1 SOME FAST-GROWING COUNTRIES ARE COUNTING ON GAS TO BALANCE DEVELOPMENT AND ENVIRONMENTAL GOALS

Government strategy for expanding the electricity supply and meeting climate goals in both Ghana and Senegal involves phasing out highly-polluting oil (and in Senegal's case, some coal) in favor of as much renewable energy as possible, plus gas. Both Ghana and Senegal have appreciable gas resources, and there are currently no better alternatives than gas for managing the intermittency of wind and solar. Gas turbines can ramp up and down quickly to compensate for fluctuations in renewable energy output, and their low fixed costs mean gas turbines can remain financially viable in a future where wind and solar generate the lion's share of electricity. Energy storage, on the other hand, is not ready for large-scale deployment in sub-Saharan Africa. Batteries are limited by high cost and storage duration, and electricity markets in sub-Saharan Africa lack key features—such as price volatility and ancillary services payments—that could help batteries make money.

2 STIMULATING GAS DEMAND IS AS IMPORTANT AS DEVELOPING GAS SUPPLY

Nigeria and Ghana have both seen gas demand growth fall short of projections, and both are working to diversify their end uses of gas. A common pitfall in gas development is overreliance on the power sector as a source of demand. Petrochemicals and other industries can serve as reliable anchor customers to help finance the gas transmission and distribution infrastructure that may ultimately support gas uptake by a wide range of end uses. Compressed natural gas (CNG) for transportation is one end use that has been implemented for a modest number of vehicles in Nigeria and Ghana, but its scale remains limited.

3 THE EARLY STAGES OF GAS INFRASTRUCTURE BUILD-OUT RARELY RUN SMOOTHLY

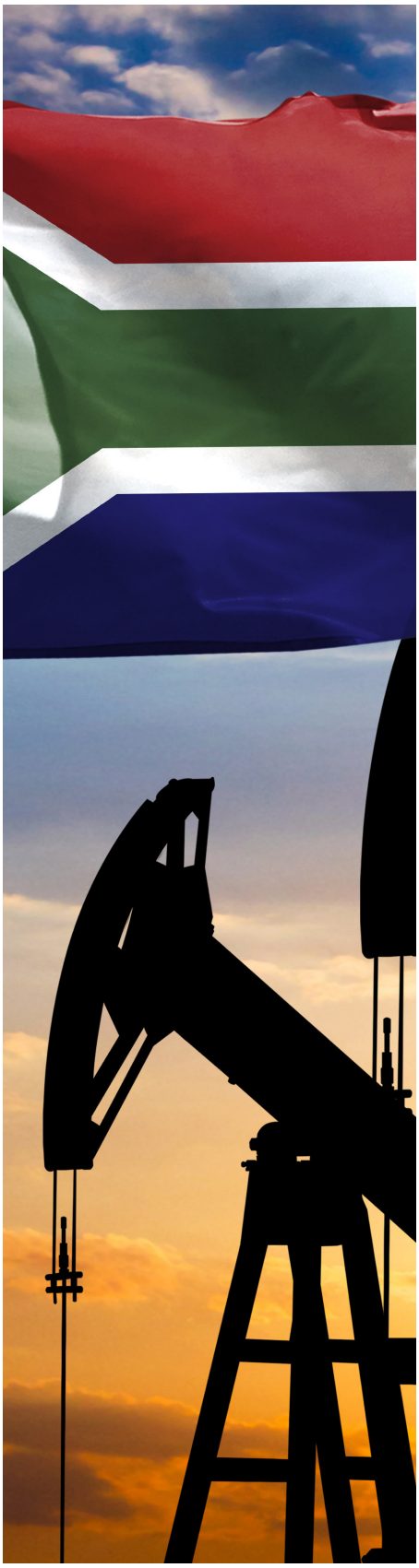
Ghana faces an oversupply of gas at the moment, with production from three domestic fields, a contract for gas from Nigeria via the West African Gas Pipeline, and liquefied natural gas (LNG) imports gearing up. With take or pay agreements on most of this gas, the country is for now stuck paying for gas it doesn't need. This has resulted in much hand wringing—but in fact, most countries building out domestic gas markets and infrastructure experience rocky transition periods like the one Ghana is currently in. There is too little gas, or too much gas, or the gas can't be transported to the location where it is most needed. Exactly matching supply to demand is rarely possible as nascent gas markets develop, and before gas-consuming industries can count on reliable supply from diverse gas sources including LNG. In the long run, gas infrastructure enables widespread gas use, although this may be scant consolation to fiscally-burdened governments in the interim.

4 REGIONALIZING GAS AND POWER INFRASTRUCTURE IS A WORTHWHILE BUT CHALLENGING GOAL

Cross-border gas pipelines (and electricity transmission lines) can facilitate regional gas market development by absorbing gaps between local supply and demand. Locations with more gas than needed at a particular point in time can export it (or export electricity produced from gas); locations with more demand than supply can import gas (or electricity). The West African Gas Pipeline illustrates both the potential and the challenge of cross-border energy infrastructure. This pipeline from Nigeria to Benin, Togo, and Ghana, which was commissioned in 2006, is a success of joint regional infrastructure development. That said, the project took a long time to develop, and a long time after that to establish reliability of supply ***and*** demand—and it continues to face challenges.

5 FOSSIL FUEL BANS BY WESTERN LENDERS ARE UNLIKELY TO STOP KEY GAS DEVELOPMENTS

Announcements that development agencies and multilateral development banks will stop financing projects involving fossil fuels—including gas—are not causing countries to abandon projects they view as essential to their development. As one panelist put it, "Our government has taken steps to diversify our investors, but for now gas is the only path forward to increase access to energy while reducing climate impact." Another country expert noted that announcements of fossil fuel financing bans have in fact created a sense of urgency among lawmakers to ensure the investment framework is attractive for gas developments. These country responses should not be taken to indicate a lack of public concern about climate change. Indeed, multiple panelists described growing environmental consciousness in their countries, especially among the youth. While educating outside investors about Africa's needs and challenges is worthwhile, increasing the involvement of this local constituency is even more important for achieving environmental and development goals in sub-Saharan Africa.



THE NATURAL GAS INITIATIVE AT STANFORD

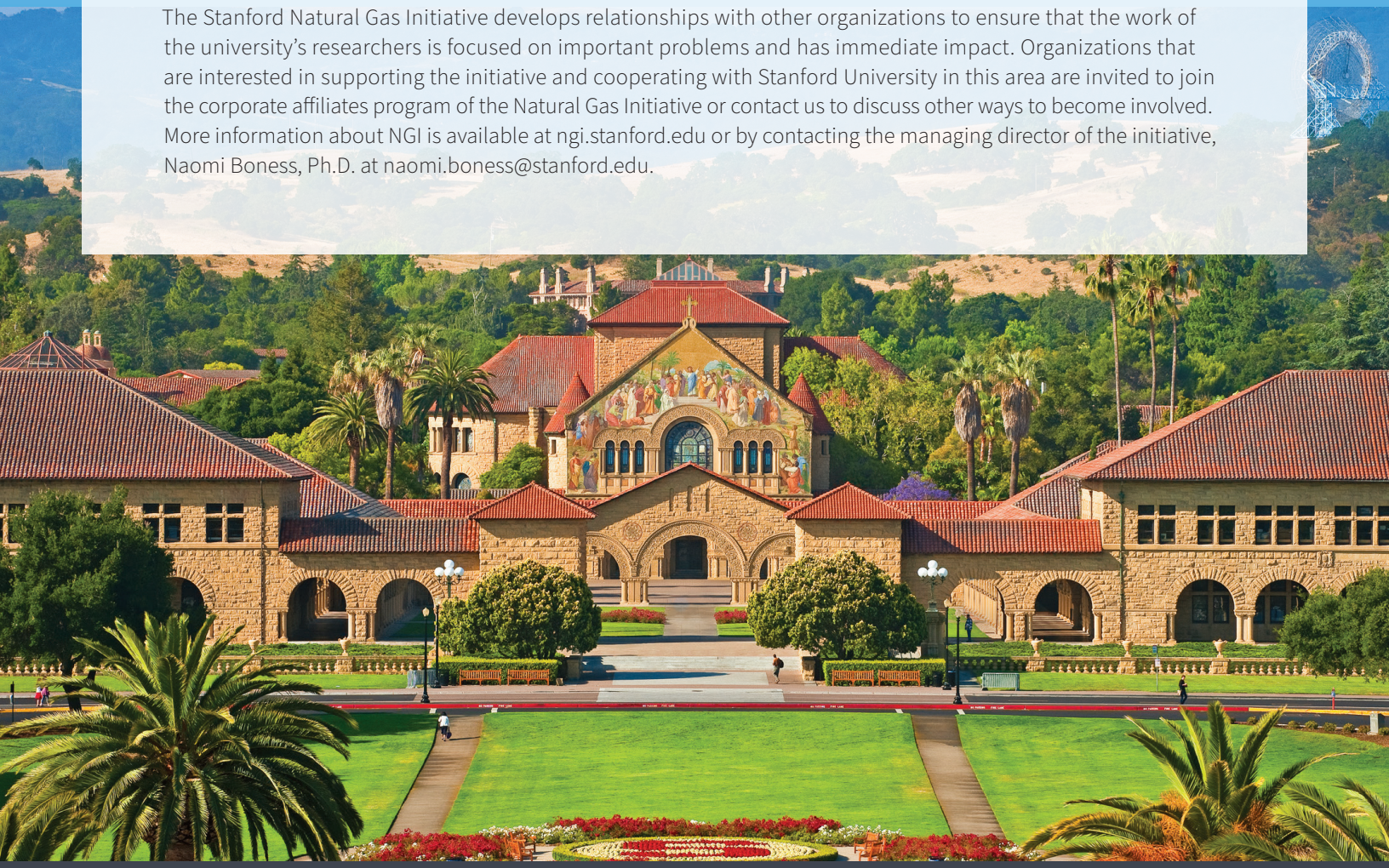
Major advances in natural gas production and growth of natural gas resources and infrastructure globally have fundamentally changed the energy outlook in the United States and much of the world. These changes have impacted U.S. and global energy markets, and influenced decisions about energy systems and the use of natural gas, coal, and other fuels. This natural gas revolution has led to beneficial outcomes, like falling U.S. carbon dioxide emissions as a result of coal to gas fuel switching in electrical generation, opportunities for lower-cost energy, rejuvenated manufacturing, and environmental benefits worldwide, but has also raised concerns about global energy, the world economy, and the environment.

The Natural Gas Initiative (NGI) at Stanford brings together the university's scientists, engineers, and social scientists to advance research, discussion, and understanding of natural gas. The initiative spans from the development of natural gas resources to the ultimate uses of natural gas, and includes focus on the environmental, climate, and social impacts of natural gas use and development, as well as work on energy markets, commercial structures, and policies that influence choices about natural gas.

The objective of the Stanford Natural Gas Initiative is to ensure that natural gas is developed and used in ways that are economically, environmentally, and socially optimal. In the context of Stanford's innovative and entrepreneurial culture, the initiative supports, improves, and extends the university's ongoing efforts related to energy and the environment.

JOIN NGI

The Stanford Natural Gas Initiative develops relationships with other organizations to ensure that the work of the university's researchers is focused on important problems and has immediate impact. Organizations that are interested in supporting the initiative and cooperating with Stanford University in this area are invited to join the corporate affiliates program of the Natural Gas Initiative or contact us to discuss other ways to become involved. More information about NGI is available at ngi.stanford.edu or by contacting the managing director of the initiative, Naomi Boness, Ph.D. at naomi.boness@stanford.edu.



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