

VIRTUAL INFORMATIONAL WORKSHOP ON RESPONSIBLE AND SUSTAINABLE NATURAL GAS: CHALLENGES AND OPPORTUNITIES IN AFRICA

SEPTEMBER 14-15, 2021

SUMMARY

The U.S. Department of Energy's Office of International Affairs, in partnership with the Office of Fossil Energy and Carbon Management, and the National Energy Technology Laboratory, hosted this workshop in support of Power Africa, an interagency initiative led by the United States Agency for International Development. Power Africa brings together technical and legal experts, the private sector, and governments from around the world to work in partnership to increase the number of people in sub-Saharan Africa with access to power.

The workshop focused on the challenges and opportunities for responsibly developing and utilizing Africa's natural gas resources, while protecting the environment, fighting climate change, and exploring ways to promote partnerships and finance options to use natural gas as part of the pathway to the clean energy transition.

The workshop drew 73 registrants from thirteen countries – eleven African nations (Burkina Faso [1], Cote d'Ivoire [2], Eswatini/Swaziland [1], Ethiopia [1], Ghana [3], Kenya [3], Mauritania [1], Nigeria [19], Rwanda [1], South Africa [6], Uganda [1]; the United Kingdom [2]; and the United States [31]. The attendees, moderators and speakers were from the U.S. and African governments; international energy companies; multilateral development financial institutions; research organizations; U.S. and African universities; and non-governmental organizations.

The presentations and discussions over the course of the event emphasized a number of critical points, which comprehensively suggested that satisfying energy demand in Africa without gas would be challenging, and that managing and abating methane emissions will be expensive. This presents both challenges and opportunities that could be explored further.

Africa's significant natural gas resources mean that gas is considered an attractive, low-cost, short-term option for some countries – particularly those that are fossil fuel-consumers and producers – as the world increases reliance on clean energy sources and moves away from carbon-emitting hydrocarbon fuel sources. Natural gas produces lower carbon emissions than coal, liquid fuels, and biomass, and remains part of many country plans for use in electric power generation, transportation fuels, and other industrial pursuits, such as gas-to-liquids, the production of plastics, petrochemicals, fertilizers, cement, hydrogen, and water desalinization.

Like the rest of the world, Africa suffers from the impact of climate change, and its countries must prepare for shifts in their ecosystems and biodiversity that will negatively affect their economic sectors and the livelihoods that depend upon them. Africa is unique in the challenges of managing the intersection of energy poverty and climate change in ways that can promote development

and reduce emissions growth simultaneously. As interest grows, relative to gas in Africa as an interim fuel on the pathway to clean energy, some speakers offered that now might be the time to examine whether some African economies could or should become gas producers. Conversely, while the rest of the world is reducing its traditional use of fossil energy (without decarbonization), the economic impacts of that shift will be felt by those African countries already producing oil and gas, and by those considering developing their indigenous resources.

The speakers addressed the potential economic benefit of increasing natural gas production and use across the continent, while noting that the wider systemic challenges must be faced when commercializing gas, whether for export or domestic consumption. These challenges were defined as: (1) economic viability of domestic consumption of gas, and (2) distance to market based on a lack of infrastructure. Some of the speakers expressed the view that local markets are not developed enough to attract financing for the technical solutions available for deployment while ensuring investors can be paid in a timely manner to recover investments and operate profitably. They also noted opportunities to implement small-scale solutions, such as small-scale LNG and CNG via “virtual pipelines,” as one approach to close an infrastructure gap and to do a better job of bridging inadequate infrastructure and managing economies of scale in smaller markets.

The speakers also noted that to reach the continent’s goal of universal energy access by 2030, Africa’s energy production must grow by 150%, which some hope will be met largely through renewables. Electrification expansion will require blending different cost-effective business models through grid development and off-grid solutions based on renewable energy – traditional hydro, solar, and wind, but also batteries, storage, hydrogen – all while ensuring that Africa has enhanced and reliable baseload generation capacity, and using existing and emerging technology to abate emissions. Technology “leapfrogging” – that is building capacity for use of advanced clean energy technology while avoiding conventional technology – has potential, but only when appropriately applied in limited situations where the probability of success is very high. Kenya’s electricity sector was offered as a good example of leapfrogging relative to its deployment of utility scale renewables in the context of less mature grids. A systems approach is essential to ensuring that reliable and resilient energy systems are built whether countries or regions choose to rely on mini grids, national infrastructure, and/or regional interconnects. As new technologies develop, and prices fall over the coming years, these new technologies can plug into these systems and power a clean energy future for Africa.

Africa’s energy industry emissions profile was noted as different from that of the rest of the world, as it accounts for only about 3% of global emissions – driven largely by four countries – South Africa, Egypt, Algeria, and Nigeria. Expanded natural gas exploration, production and utilization will ultimately lead to increased greenhouse gas (GHG) emissions throughout the life cycle, particularly methane, which is 28 times more damaging to Earth’s climate than carbon dioxide (CO₂). To that end, there was considerable dialogue on the importance of on decarbonization and methane mitigation through focusing on the natural gas lifecycle with: (1)

data gathering and quantification to improve overall understanding of emissions, (2) technology and policy interventions to help curtail, harness, and monetize flared gas, (3) preventing fugitive emissions, and (4) government playing an active role setting effective regulations and emissions limits, and then actively monitoring operators and ensuring compliance.

The speakers advanced the concept of shared responsibility for Africa's transition to a zero-carbon economy with a call for research on a country-by-country basis to pragmatically examine opportunities and pathways to improve understanding of the economic viability of options for emissions abatement, methane management, and cleaner energy development for African countries. Participants stressed throughout the event that each country is different and each will require a roadmap specific to its energy situation, the type of resources it has, including human capacity and the current and planned/future regulatory environment.

The Workshop also underscored that Africa has significant deposits of critical minerals that are important to the clean energy technologies that underpin the global transition to a zero-carbon economy. It is critical for the long-term sustainability of Africa's mineral sector to consider diversification of the critical minerals supply chain beyond where the relevant expertise is concentrated in certain parts of the world. Finding a way to localize enrichment and product development would help Africa diversify its role in the global supply chain. The research that the U.S. (e.g., Department of Energy) is doing on rare earths and critical minerals was identified as critical, and represents a significant opportunity for Africa. African nations need regulations in place and help to build government capacity to assure nations with these resources are able to take advantage of market opportunities that will allow the continent to grow, prosper, and contribute to the global zero-carbon transition.

Speakers emphasized that collaboration offers Africa the best avenue through which to address the challenges and opportunities for extracting maximum value from domestic energy resources, all while protecting the environment and public health and promoting the clean energy transition. Speakers identified the following areas of potential collaboration: (1) technology research and development (R&D) on energy and related environmental technologies, including (a) carbon capture, utilization and sequestration (CCUS), (b) natural gas value chain methane emissions monitoring, reduction, and mitigation, (c) hydrogen production, and (d) mineral carbonation of CO₂; (2) capacity building in R&D planning and implementation; (3) environmental regulation; (4) infrastructure development and repurposing; and (5) strategic energy planning and analysis.

Participants also identified the importance of the U.S. and Africa working together to design and assist in the implementation of integrated, affordable, clean energy systems in Africa. With integrated systems, African nations' move toward clean energy development, utilization, and integration into national and regional energy systems can be facilitated by a strong emphasis on using cleanly developed natural gas paired with renewable systems that would lower emissions and ensure both the flexible power infrastructure needed to meet net-zero emissions and an affordable transition to decarbonization and the power sector of the future. Cooperation would

also focus on minimizing methane leaks as well as controlling other emissions to ensure that the future energy system is as clean and carbon free as possible.