

Gas Competence Seminar

*Natural Gas – driving Social and Economic Development
East and Southern African Perspectives*



22-23 September 2015
Polana Serena Hotel Maputo
Mozambique
By invitation only

Existing partners:



United Nations
Educational, Scientific and
Cultural Organization



Foreword

The World Bank Group (WBG), in association with the International Gas Union (IGU) and Sustainable energy for All (SE4ALL), is organizing a regional Gas Competence Seminar on September 22-23, 2015, in the city of Maputo in Mozambique. The seminar is supported by the Government of Mozambique.

The seminar will provide an opportunity for high-level government representatives and industry professionals to share knowledge, raise awareness and discuss strategic options that natural gas offers for sustainable access to energy, and social and economic development. Sub-Sahara Africa is rich in natural gas energy resources which offer unique opportunities for improved living standards for its population.

The seminar will focus on various themes of interest including institutional/regulatory models required to develop local gas markets, gas based power generation, production of fertilizers based on gas, gas use in the transportation sector, job creation through services, infrastructure financing options and competence development. Please refer to the enclosed seminar programme.

Several case studies and panel discussions are planned to share best practices and accelerate transfer of strategic competence. We have invited policy makers and government delegates from East and Southern Africa, and representatives from the regional energy industry. The number of delegates, on invitation only, will be about 80 participants.

We have the pleasure of inviting you to attend the seminar, and are confident that your participation will enrich the seminar, and that you will benefit from the interactive debate with the global gas experts.

We are looking forward to welcoming you to Maputo.

Yours sincerely,



Anita Marangoly George
Senior Director, Energy & Extractives
The World Bank



Pål Rasmussen
Secretary General
International Gas Union

Pathways for Concerted Action toward Sustainable Energy for All

Executive Summary from Sustainable Energy for All - A Global Action Agenda, April 2012

Energy is the golden thread that connects economic growth, increased social equity, and an environment that allows the world to thrive. Development is not possible without energy, and sustainable development is not possible without sustainable energy.

The Sustainable Energy for All initiative will catalyse major new investments to speed the transformation of the world's energy systems, pursue the elimination of energy poverty, and enhance prosperity. UN Secretary-General Ban Ki-moon has launched this global initiative to mobilise all stakeholders to take concrete action toward three critical objectives to be achieved by 2030: (1) ensuring universal access to modern energy services; (2) doubling the global rate of improvement in energy efficiency; and (3) doubling the share of renewable energy in the global energy mix.

The initiative will “change the game” by introducing new public-private partnerships built from constructive dialogue on policy, investment, and market development by governments, businesses, and civil society. It brings together the global convening power of the United Nations, the ability to mobilise bold commitments and leverage large-scale investment, and a rapidly expanding knowledge network.

This Global Action Agenda charts a path forward for the initiative and its stakeholders. It also aims to help countries and stakeholders create their own pathways toward Sustainable Energy for All, based on technology choices that are appropriate to their unique national and local circumstances. It serves as the starting point of a longer journey and is a living and evolving document that will be periodically refined.

The Global Action Agenda identifies 11 Action Areas to achieve the three objectives. These provide a framework for identifying high-impact opportunities; a way to organise multi-stakeholder actions across all relevant sectors of the economy; and tangible entry points for stakeholders interested in taking action in specific areas of interest.

The Action Areas include seven “sectoral” areas: (1) modern cooking appliances and fuels; (2) distributed electricity solutions; (3) grid infrastructure and supply efficiency; (4) large-scale renewable power; (5) industrial and agricultural processes; (6) transportation; and (7) buildings and appliances. There are also four “enabling” Action Areas: (1) energy planning and policies; (2) business model and technology innovation; (3) finance and risk management; and (4) capacity building and knowledge sharing.

We invite all stakeholders to take action across all relevant sectors. Each Action Area contains a set of high-impact opportunities that will drive transformational change.

These high-impact opportunities will be addressed by actions already under way that align with the objectives of Sustainable Energy for All, as well as actions that arise from new initiatives and partnerships. We seek not just participation, but strong collaboration of multiple stakeholders across all relevant sectors of the economy.

This Action Agenda will accelerate global momentum toward Sustainable Energy for All by linking the results of individual actions with its ambitious global objectives. Regular progress assessments will renew a dialogue about the pace and scale of change. The initiative will facilitate a continued multi-stakeholder dialogue involving all relevant sectors to ensure that sustainable energy stays at the forefront of political attention.

The initiative will track progress toward the three objectives over time. To instigate and sustain change in the world's energy systems over the next two decades, the initiative will identify metrics to measure the progress of actions in both the short and long term. It will also develop regular assessments of progress toward the three objectives themselves, so that it is clear how much remains to be accomplished, how individual actions are contributing, and where more action is needed.

Sustainable Energy for All is a call to action for our collective future. Working together, we can achieve a broad-based transformation of the world's energy systems over the next 20 years, harnessing the power of technology and innovation in the service of the planet—for us, for our children, and for generations yet to come.

Source: <http://www.se4all.org/wp-content/uploads/2014/01/SEFA-Action-Agenda-Final.pdf>

Background for the Gas Competence Seminar

Objectives:

- Raise awareness of options gas offers for
 - Sustainable access to energy, and
 - Social & economic development
- Accelerate transfer of strategic competence
 - Governmental policies to attractive investments
 - Share best practice along gas value chain
 - Long term competence development

Main target group:

- Policy makers from governments in East and Southern Africa
- Business people / company representatives
 - Strategy, business development, financing
- Educational institutions/academia

Selected topics:

- Country studies to discuss lessons learnt
- Regulatory/institutional/policy framework for gas market development
- Gas for industrial development
- Gas as a basis for social investment
- Electricity generation with gas
- Gas in the transportation sector (CNG/NGV)
- Combination of gas and renewables
- Local gas distribution and LPG for cooking
- Market development
 - How to incentivise investments?
 - Business models, public-private partnerships
- Financing of investments
- Competence development long term

Seminar model:

- Social & Economic Development in Sustainability
- New Opportunity of Industry in the New Context
- Meet Regional Needs

Gas Competence Seminar Programme

Reception: Monday, 21 September 2015

18:30 Reception Dinner

1st Day Morning: Tuesday, 22 September 2015

08:00 Registration and Coffee

Session 1 Introduction

09:00 Inauguration & Welcome

- *Mozambique: Mr. Alfredo Nampete, Permanent Secretary, Ministro dos Recursos Minerais e Energia*
- *ENH Mozambique: Mr. Paulino Gregório, Exploration and Production Administrator*
- *World Bank: Mr. Mark Lundell, Country Director*
- *IGU: Mr. Pål Rasmussen, Secretary General*
- *SE4ALL: Mr. Erik Kjaer, Manager, Country Action*
- *UNESCO: Mr. Moussa-Elkadhum B. Djaffar, Director of the UNESCO Mozambique office*
- *NORAD: Mr. Pål Arne Davidsen, Senior Adviser, Private Sector Development*

09:45 Opportunities offered by Gas Development

- *IGU: Mr. Pål Rasmussen, Secretary General*
- *Mozambique LNG: Mr. John Peffer, Anadarko Country Manager*
- *African Development Bank: Mrs. Sheila Khama, Director, African Natural Resources Center*

10:15 Coffee Break and Group-photo

Session 2 Gas: Regulatory and Institutional Framework

10:40 Regional Policy Perspective

- *AfDB: Mrs. Sheila Khama, Director, African Natural Resources Center*

11:00 Fundamental Requirements for Market Development, with Case Study

- *TAQA Arabia, Egypt, Mr. Akmal Zaghloul, Business Development Director*

- 11:20 **Case Study: ENH role to meet Mozambique Gas Plan**
- *ENH Mozambique, Mr. Tavares Martinho, Commercial vice-President*

- 11:40 **Open Panel Discussion**
- *SE4ALL Moderator: Mr. Erik Kjaer, Manager, Country Action*

12:30 **Lunch**

1st Day Afternoon: Tuesday, 22 September 2015

Session 3 Gas Utilization: Large Scale Industrial Development

- 14:00 **Investments in fertilizers and other gas based industries – the Qatar case**
- *Norsk Hydro, Norway, Mr. Odd-Ivar Biller, Senior Vice President*
- 14:20 **Case Study: Gas utilization - Gas to liquids - adding value and creating jobs**
- *Shell, Mr. Onno van Kessel, Business Opportunity Manager*
- 14:40 **Case Study: JV between Sasol/CMH/IFC for the Pande Temane project**
- *IFC, Mrs. Katia Daude Goncalves, Senior Country Officer*
- 15:00 **Open Panel Discussion**
- *World Bank Moderator: Mr. Anas Benbarka, GGFR Regional Coordinator*

15:30 **Coffee Break**

Session 4 Gas and Power Development

- 16:00 **Gas based electricity generation**
- *GE, Mr. Marco Caccavale, President GE Oil & Gas Sub-Saharan Africa*
- 16:20 **Gas & renewables, biogas**
- *Liander, Mr. Elbert Huijzer, Senior Strategist*
- 16:40 **Market Modelling and Tarification**
- *DNV-GL, Mr. Bert Kiewiet, Head of Section Gas System Management*

Session 5 Project Financing & Structuring

17:30 **Financing Options**

- *IFC, Mrs. Katia Daude Goncalves, Senior Country Officer*

17:50 **Financing Domestic Gas Infrastructure and Gas-Based Industries**

- *Standard Bank, Mr. Paul Eardley-Taylor, Head of Oil & Gas Southern Africa*

17:10 **Case Study: Energy Project Finance**

- *Societe Generale, Mr. Katan Hirachand, Managing Director*

18:30 **Open Panel Discussion**

- *World Bank Moderator: Mr. Mustafa Hussain, Senior Energy Specialist*

19:00 **Evening Event: Cocktail Reception and Networking Dinner**

2nd Day Morning: **Wednesday, 23 September 2015**

08:20 **Coffee**

Session 6 Gas Market Development

09:00 **Gas pipeline infrastructure for residential/commercial market**

- *ENH-KOGAS, Mr. Manwoo Han, Managing Director*

09:20 **Scope for Regional Cooperation and Cross-border partnership**

- *ENH Mozambique, Ms. Nilsa Issufo, vice-President for Engineering and Projects Development*

09:40 **Clean cooking: LPG for households**

- *WLPGA, Mr Simphiwe Mehlomakulu, Chairman of Reatile Gaz*

10:00 **Case Study: Implementation of Natural Gas Vehicle in South Korea**

- *KANGV, Mr. Jungho Park, Team Leader*

10:20 **Open Panel Discussion**

- *IGU Moderator: Mr. Dong Hoon Kim, Incoming Secretary of CC*

10:50 **Coffee break**

Session 7 Sustainable Energy & Social Development

- 11:10 Local Content in Gas projects
- *Mozambique LNG: Mr. Fernando Nhantumbo, National Content Manager*
- 11:30 Global Sustainable Energy For All Agenda
- *SE4ALL, Mr. Erik Kjaer, Manager, Country Action*
- 11:50 Initiative to Reduce Global Gas Flaring
- *World Bank: Mr. Anas Benbarka, GGFR Regional Coordinator*
- 12:10 **Open Panel Discussion**
- *IGU Moderator: Mr. Torstein Indrebø, Honorary Secretary General*
- 12:30 **Lunch**

2nd Day Afternoon: Wednesday, 23 September 2015

Session 8 Long Term Competence Building - Next Steps

- 14:00 Thematic areas in Norwegian development cooperation
- *NORAD, Mr. Pål Arne Davidsen, Senior Advisor, Private Sector Development*
- 14:20 UEM Challenges in Oil & Gas to deliver skilled workforce: the case of the Faculty of Engineering
- *Universidade Eduardo Mondlane (UEM), Prof. Dr. Al J Tsamba, Dean of the Faculty of Engineering*
- 14:40 Academic Partnership for Master's of Science Degree in Petroleum Engineering
- *Mozambique LNG, Mr. Antonio Sevilla, Anadarko Director of Human Resources & Administration*
- 15:00 Building the Critical Mass in Science and Engineering to Enhance Sustainable Development in Africa Post 2015
- *UNESCO, Ms. Peggy Oti-Boateng (PhD), Africa Regional Science Advisor*
- 15:20 **Open Panel Discussion: UNESCO / UNIDO**
- *IGU Moderator: Mr. Mats Fredriksson, Director*
- 15:40 **Closing Remarks**
- *IGU, Mr. Jae Ho Song, IGU Vice President*
 - *WBG, Mr. Anas Benbarka, GGFR Regional Coordinator*

Background Information

Harnessing African Natural Gas: A New Opportunity for Africa's Energy Agenda ?

Excerpt from: Santley, David; Schlotterer, Robert; Eberhard, Anton. 2014. World Bank Group.

A Sub-Saharan Africa's persistent power shortages act as a severe constraint on its economic and human development. Over the last several years, a series of major offshore gas discoveries in Mozambique and Tanzania have rekindled interest in expanding the use of natural gas to address the continent's power shortages. Once thought of as a Nigeria-only story, gas-to-power in Sub-Saharan Africa is now being considered in a continent-wide context, both as a supplement to Africa's abundant hydropower resources and as a replacement for more carbon intensive coal and liquid fuels. But the concentration of gas resources in just a few countries and the virtual absence of gas transportation infrastructure create economic challenges to the wider adoption of gas as a power generation fuel, particularly in smaller countries that cannot achieve economies of scale in gas production and transportation. As a result, the timeline between the discovery of gas and its commercialization is often measured in decades.

... Based on a country-by-country analysis of public and proprietary data sources, this study estimates the total discovered natural gas resources in Sub-Saharan Africa at 359 TCF. If produced over 30 years and consumed in high-efficiency CCGT power plants, such a quantity of gas could fuel over 160 GW of power generation capacity, double the total existing installed capacity in Sub-Saharan Africa. ... Although the total gas resource base in Sub-Saharan Africa is enormous in relation to current energy consumption in the continent, the commercialization options available to resource-holding countries are not all the same.

... For countries with large gas resources, allocating gas supply between LNG exports and domestic power markets involves economic trade-offs, particularly with respect to gas pricing. From the point of view of a gas producer, these trade-offs almost always strongly favor LNG because of the superior contract terms usually available from foreign buyers. However, from a government perspective, the trade-offs are more complex, involving a balance between maintaining investment incentives for producers, maximizing royalty and tax income, and realizing much needed supply increases and cost reductions in the power sector.

To illustrate the range of prices that various commercialization options can present, this study has estimated two upstream price benchmarks. The minimum wholesale price is the sum of upstream capital and operating costs, royalties, and taxes, and a minimum after-tax rate of return (taken here to be 15 percent). The LNG netback price is the delivered LNG price in the destination market less the costs of liquefaction and shipping. The two benchmark prices carry implications for the allocation and pricing choices facing the large-resource holders in Sub-Saharan Africa.

... Directing gas from export to domestic markets can bring cost savings to the power sector. But if domestic gas is priced lower than LNG netbacks, there will be a cost in terms of reduced royalties and taxes from production. In the extreme case, low gas prices can result in upstream gas development projects not going forward at all. The cost-benefit balance among all of these factors varies according to specific country circumstances such as the extent to which diesel-fired power is the relevant alternative generation source, the extent to which domestic sales displace exports, the cost of upstream development, and the scope for negotiating higher royalties and taxes in lieu of below-market domestic service obligations.

... These pricing benchmarks also have implications for the competitiveness of gas-fired power in Nigeria, Mozambique, and Tanzania. ... Using standard assumptions about CCGT and OCGT plant efficiencies and capital and operating costs, gas prices are then converted to levelized electricity costs that are compared to relevant generation alternatives in each country. ... In all countries analyzed in this study, gas-fired power, even in an OCGT configuration, maintained a large cost advantage over diesel and HFO in baseload, mid-cycle, or peaking applications. However, the ability to capture this cost reduction depends on the location of the power generation requirement and its distance from a gas supply source.

... Gas pipeline infrastructure in Sub-Saharan Africa is almost nonexistent apart from coastal Nigeria and a handful of small, subregional projects. ... From the five case studies evaluated, it is clear that economies of scale are the main challenge to development of gas pipeline infrastructure in Sub-Saharan Africa. In most cases, the markets are too small and the distances too great to make pipelines economically viable. Indeed, the study suggests that over a distance of 1,000 kilometers, power transmission will be the lower-cost alternative unless enough demand can be aggregated to fill a 28-inch pipeline. In power terms, this equates to 3,000 MW, a thermal generation demand that very few markets in Sub-Saharan Africa can sustain.

... The case for gas trade in Sub-Saharan Africa depends not only on transportation economics, but ultimately on the competitiveness of the delivered gas versus other generation options for the importing country. South Africa has decided to impose a hard cap on CO₂ emissions from the electricity sector and this creates an opportunity for an expanded role for gas in power generation. ... For Kenya, the competitiveness of imported Tanzanian gas depends entirely on upstream gas pricing.

... While the resources held by smaller countries are not material on a regional scale, they are enormous in relation to current energy demand in those countries. ... However, economies of scale—or the lack thereof—form a powerful obstacle to gas-to-power development in smaller countries. ... Potential for overcoming the economic barriers comes from several avenues. First, to increase volume above minimum scale, projects can export power or gas to neighboring countries. ... Second, gas prices can be increased to levels needed to provide reasonable rates of return even at low volumes. While the minimum wholesale price for small-field development can be \$10 per MMBTU or more, such seemingly high prices still offer important savings over liquid fuels. Last, where production royalties and taxes are an

important component of the minimum wholesale price—as this study suggests is often the case—governments can reduce these burdens to the degree needed to improve upstream economics to the point where projects go forward and the potential cost savings in the power sector are captured.

The analysis in this study provides both encouraging and cautionary notes. Clearly, the gas resource base itself is large enough to support whatever power sector demand could plausibly materialize. And the cost of gas-fired power competes very favorably against liquid fuels and, in a surprising number of cases, against coal. But at the same time, this study shows that Africa’s abundant hydropower and coal resources and the high cost of moving gas from resource centers to demand centers are factors that can limit the economic reach of gas.

The study suggests three primary roles for gas in addressing Sub-Saharan Africa’s power needs. Replacing liquid fuels such as HFO and diesel is the strongest argument for gas, although even this apparent low-hanging fruit depends on how liquid-fired generation is being used and where the gas supply would originate. Second, displacing coal with gas, although not always viable, shows up here as a surprisingly competitive option, especially when fuels are priced at international levels or where the opportunity cost of gas is low. In fact, when coal is priced at international prices, gas-fired power will be competitive whenever the price of the delivered gas is \$9 per MMBTU or less. Last, the flexibility of gas-fired power plants suggest a strong role for gas in addressing short-term power deficits, supporting the implementation of variable renewable energy generation, and mitigating risks in hydropower implementation. The case for each of these three broad gas-to-power applications depends on local conditions in each country.

What is clear, however, is that gas is not a panacea for the acute power deficits in Sub-Saharan Africa. Gas must compete against other generation options, and large-resource holders face trade-offs between domestic gas utilization and LNG exports. Nevertheless, the gas production, transportation, and power generation segments of the value chain align in enough instances that an expanded role for gas-fired power in Sub-Saharan Africa is assured.

Source: <http://documents.worldbank.org/curated/en/2014/01/19880807/harnessing-african-natural-gas-new-opportunity-africas-energy-agenda>

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