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Export of Raw Energy Resources *Versus* Local Utilization in Africa: Optimizing the Value of Africa's Natural Resources for Development

By

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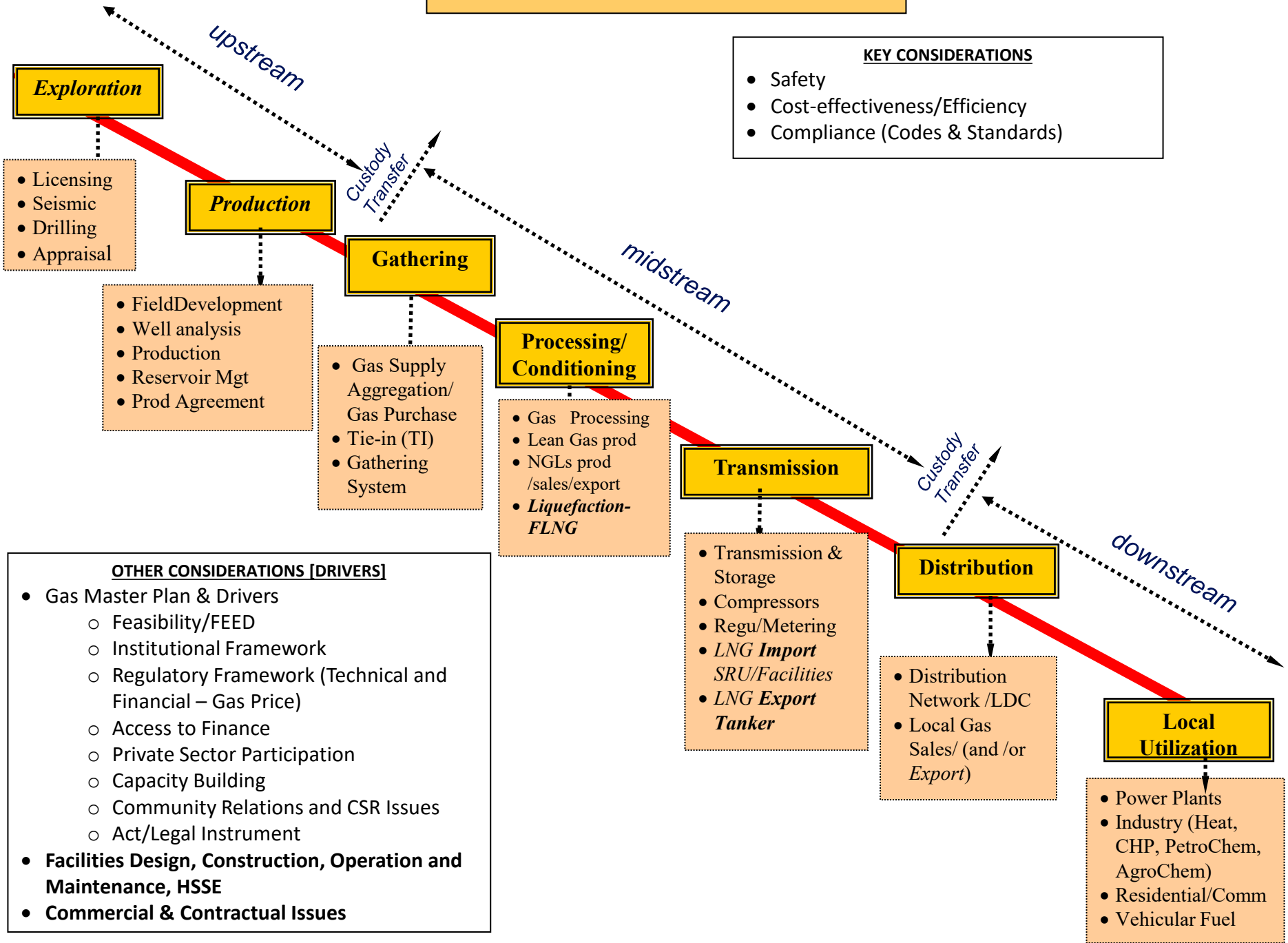
Presentation Outline

1. *Value Chain*
2. *Africa's Gas Reserves, Production & Utilization*
3. *Commercial Models*
4. *Challenges to Resource Development & Local Utilization in Africa*
5. *Commodity Pricing Models*
6. *Recommended Development Framework*

Ghana's Gas Value Chain



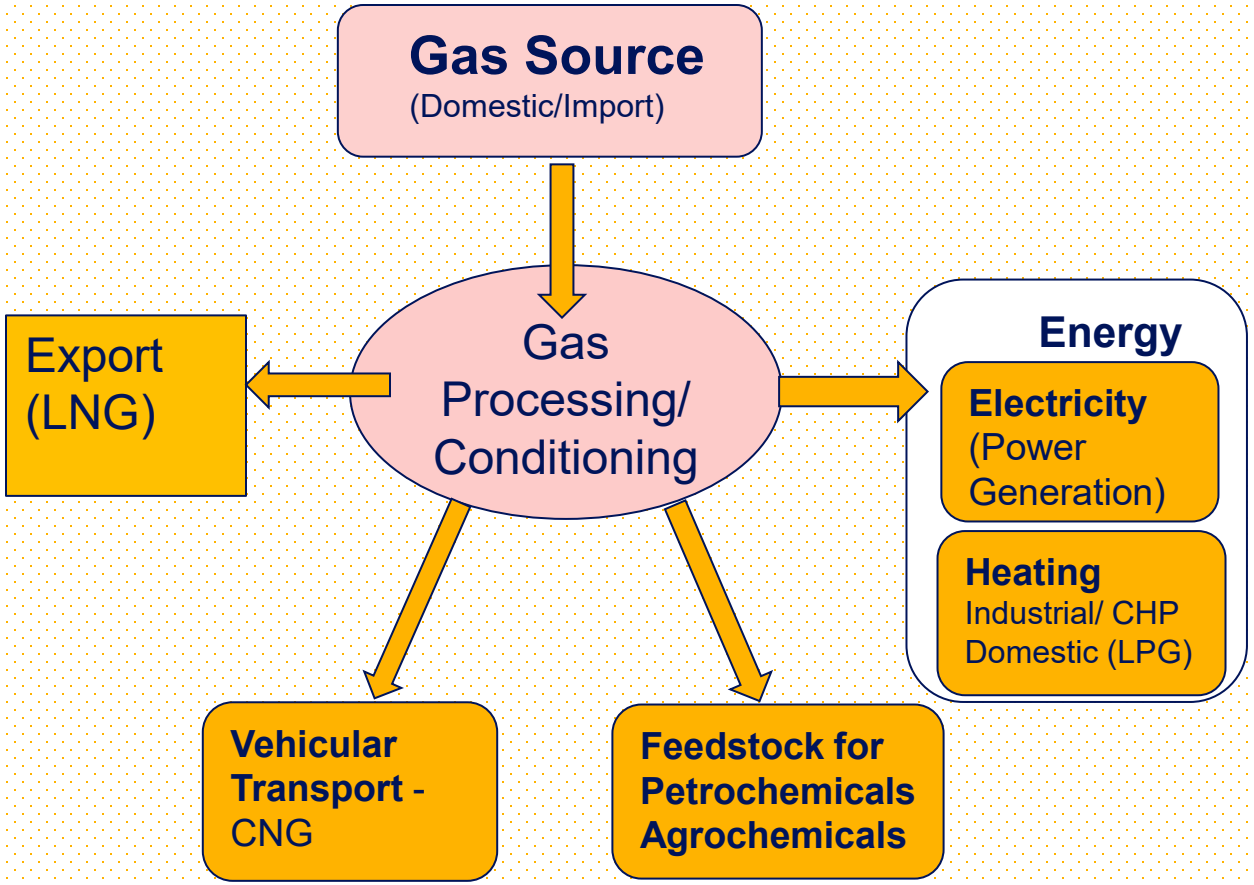
KEY CONSIDERATIONS

- Safety
- Cost-effectiveness/Efficiency
- Compliance (Codes & Standards)

OTHER CONSIDERATIONS [DRIVERS]

- Gas Master Plan & Drivers
  - Feasibility/FEED
  - Institutional Framework
  - Regulatory Framework (Technical and Financial – Gas Price)
  - Access to Finance
  - Private Sector Participation
  - Capacity Building
  - Community Relations and CSR Issues
  - Act/Legal Instrument
- **Facilities Design, Construction, Operation and Maintenance, HSSE**
- **Commercial & Contractual Issues**

Gas Utilization Model



Gas Reserves- Africa

	Country	Reserves (TCF)
1	Nigeria	206.53
2	Algeria	159.1
3	Senegal	120
4	Mozambique	100
5	Egypt	77.2
6	Tanzania	57.54
7	Libya	53.1
8	Angola	13.5
9	Congo	10.1
10	Cameroon	4.8
11	Sudan	3.0
12	Ghana	0.8

Total in excess of 800 TCF

The Mauritania, Senegal, Gambia, Guinea-Bassau-Conakry Basin offshore West Africa is an exciting frontier for oil and gas exploration.

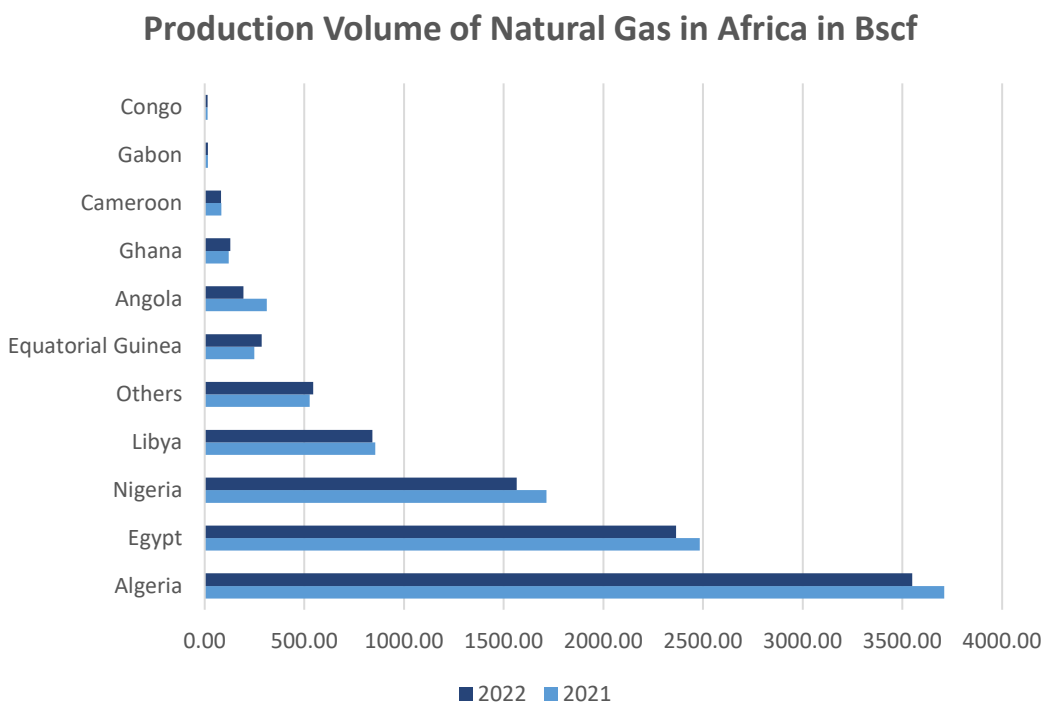
The basin includes

- the GTA gas field, which is estimated to contain more than 100 trillion cubic feet of natural gas
- Yakaar-1 gas field in northern Senegal - estimates at 15 trillion cubic feet.
- the AGC joint maritime zone, sitting between Guinea-Bissau and Senegal and features a regional collaboration between the governments of the five countries.

- ***Gas Reserves -2021 [in excess of 800TCF]***
- ***Gas Production [10-15%, of Global Production]***
- ***Gas Consumption [5-6%, of Global Consumption]***

Source: https://energycapitalpower.com/top-ten-african-countries-sitting-on-the-most-natural-gas/

Gas Production - Africa



Production of Natural Gas in Africa, Bscf		
Country	**2021**	**2022**
Algeria	3,709.56	3,549.59
Egypt	2,82.91	2,364.71
Nigeria	1,715.31	1,564.69
Libya	856.17	840.74
Others	526.29	545.05
Equatorial Guinea	248.86	286.23
Angola	311.48	194.41
Ghana	120.56	127.75
Cameroon	84.05	82.64
Gabon	16.03	16.35
Congo	14.66	14.94

source: statista.com (2023)

Gas Consumption - Africa

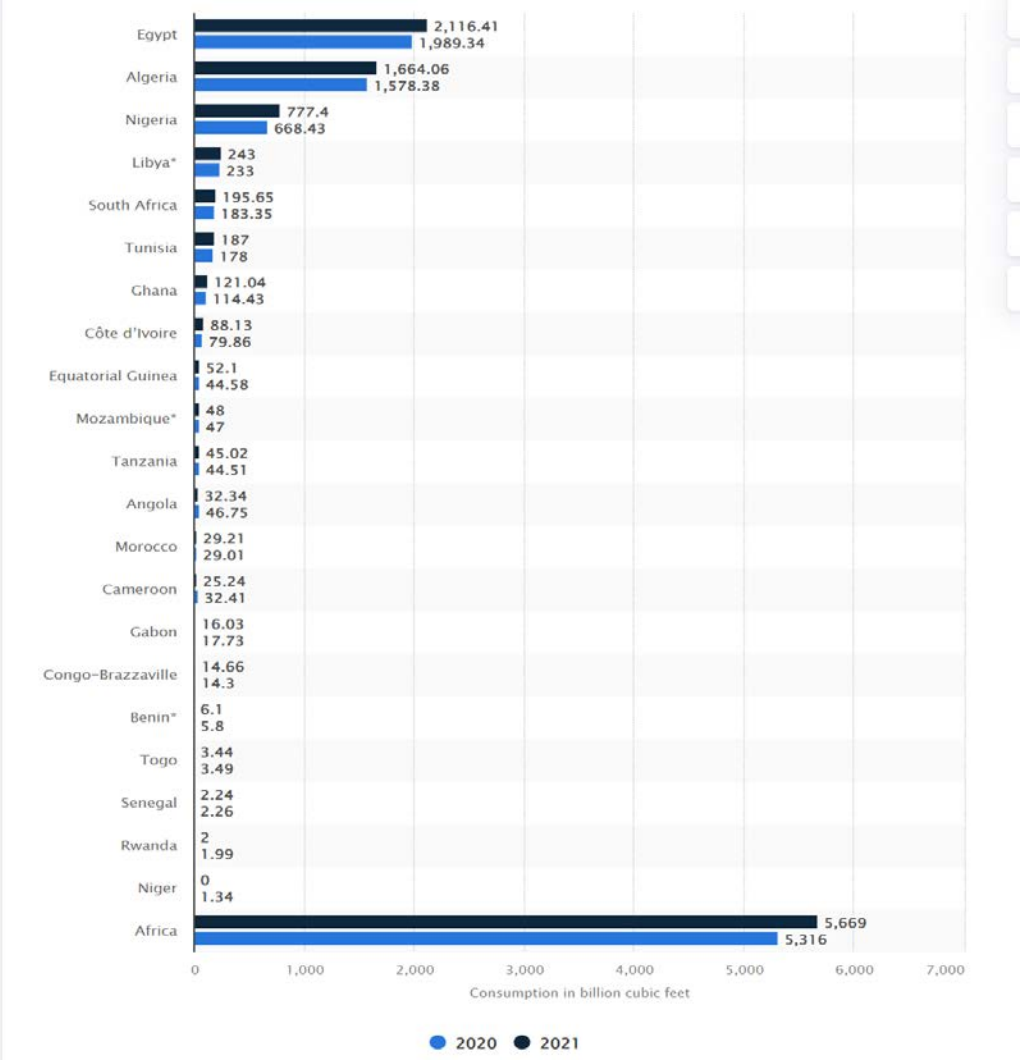
- Total Gas Consumption of natural gas in Africa for **2021** – 5185BCF
  - Egypt – 2116 BCF
  - Algeria – 1664 BCF
  - Nigeria – 777.4 BCF
  - Ghana - 121.04 BCF

Africa's gas share in the global market was **6%** in 2021 and its expected to increase to over **11%** by 2050.

Production is projected to increase from **260 billion** cubic meters in **2021**, to **585 billion** cubic meters in **2050**

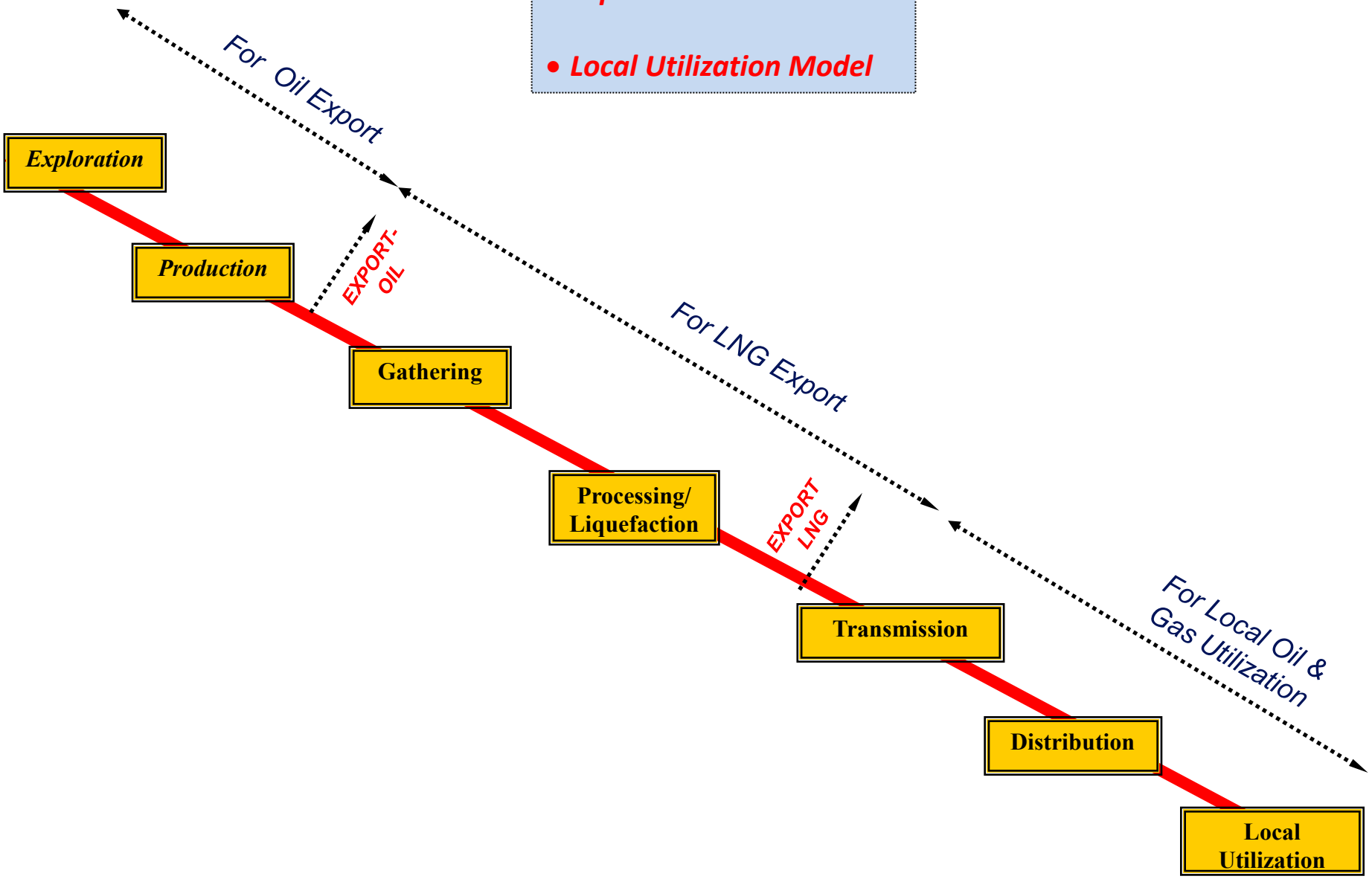
source: statista.com (2023)

Production (10-15%)
Utilization (5-6%)



Commercial Models

- *Export Model*
- *Local Utilization Model*



Challenges in the Development and Utilization of Energy Resources in Africa

	Development & Utilization Challenges	
1	Lack of Access to Capital for projects	
2	Lack of Adequate requisite Infrastructure	
3	Unattractive Fiscal Regime/Taxation Requirement	
4	Unclear Institutional and Regulatory Framework	
5	Lack of adequate requisite Intellectual Capacity	
6	Inadequate local/private sector participation in the energy sector	
7	Non-Cost Reflective Delivered Commodity price	
8	Inter-Sectoral Debt between Public Entities	
9	Imprudent Management of Resource Revenues	

Delivered Gas Price Components

The following are typical components of the delivered price of gas :

- ❑ gas commodity price
- ❑ gas pipeline tariff
  - gas gathering
  - gas transmission
  - gas distribution
- ❑ gas processing tariff
- ❑ levies, fees and taxes (where applicable)

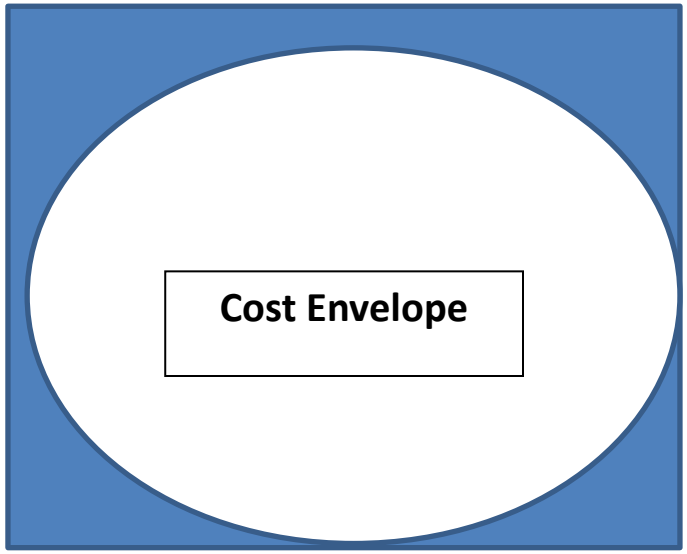
Delivered Gas Pricing Equation

EQUATION FOR Delivered Gas Price

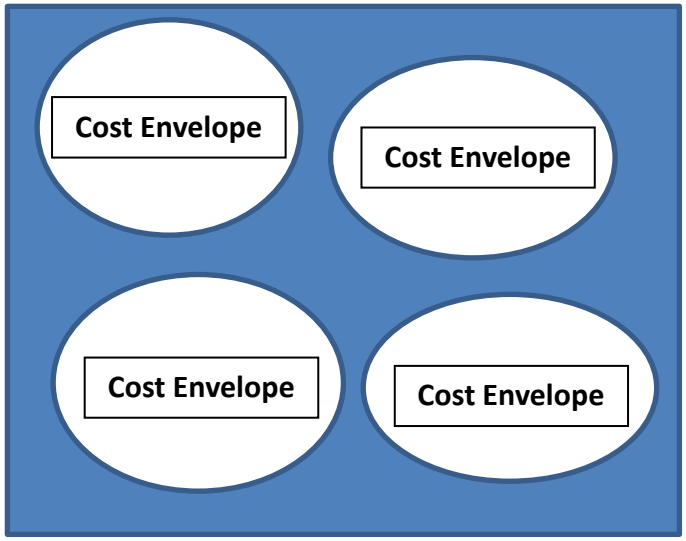
$$WACOG = \sum_{i=1}^{\eta} \left[\frac{Q_i}{Q_T} x(Gas\,\mathrm{Cos}\,t_i + Tariff_i + Levies_i + Fees_i) \right]$$

WACOG	Weighted Average Cost of Delivered Gas, $/MMBtu
Qi	Flow (c) associated with each Commodity source, Service type, Levies & Fees, **MMBtu/d**
QT	Total System Flow(c) , **MMBtu/d**
Gas Cost	Gas or Commodity Cost from supply source, $/MMBtu
Tariff	Tariff or Service Cost [**gathering, processing, transmission]** , $/MMBtu
Levies	Regulatory **Levy,** $/MMBtu
Fees	**Gas Management** Fees , $/MMBtu

Commodity Pricing Models



Integrated Market Model



Segregated Market Model

Recommended Development Framework for Africa's Energy Sector

Some of the **key considerations** for a viable Energy Sector in Africa are as follows:

Governance

1. Develop a Master Plan or roadmap for guiding the development of the sector
2. Ensure clear and appropriate Institutional and Regulatory framework
3. Promote the building of Local Intellectual Capacity for the sustainability of the industry
4. Encourage Private Sector Participation in the development of the sector
5. Manage the Resource Revenue prudently along the chain to minimize sector debt

Commodity Security & Monetization

1. Provide sustainable and reliable **Commodity Supply** (supply plan)
2. Develop an Appropriate Balance for both **Local** and **Export** markets (demand plan)
3. Minimize the **Delivered Cost of Commodity** with minimum Fluctuation

Financing and Infrastructure Assurance & Security

1. Facilitate access to capital for projects (with attractive Fiscal Regime)
2. Ensure adequate and reliable **infrastructure** that links the supply sources to the markets
3. Develop effective Operations & Maintenance Protocols including Infrastructure Protection

Thank You!
Merci!