



TOWARDS LOW SULPHUR FUELS

-

ECOWAS/ARA ROADMAP

Engr Tony Ogbuigwe

ECOWAS Regional Advisor to African Refiners Association

Presentation outline

- World refining environment
- Demand outlook forecasts
- Evolving Fuel Specifications
- ECOWAS/ARA Consultation
- Sulphur levels in fuels in 2016
- Health impacts
- ECOWAS/ARA Roadmap
- Timetable for Study
- Conclusions

World Refining Environment

Refiners have been seeing improving operating conditions across the globe:

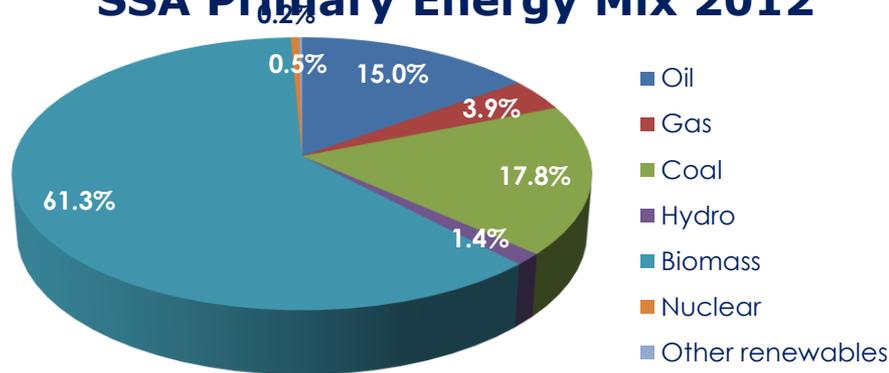
- Historically low refinery margins have only seen recent improvements due to falling oil prices
- Large scale refinery plants are coming onstream in the Middle East and Asia
- Restriction until recently of export of US tight oil production has meant refining margin and product export bonanza for US Refiners
- Low shipping freight rates offer increasing product arbitrages - from AG, India & USGC

Demand outlook forecasts

IEA forecasts oil will remain an important part of energy mix in SSA



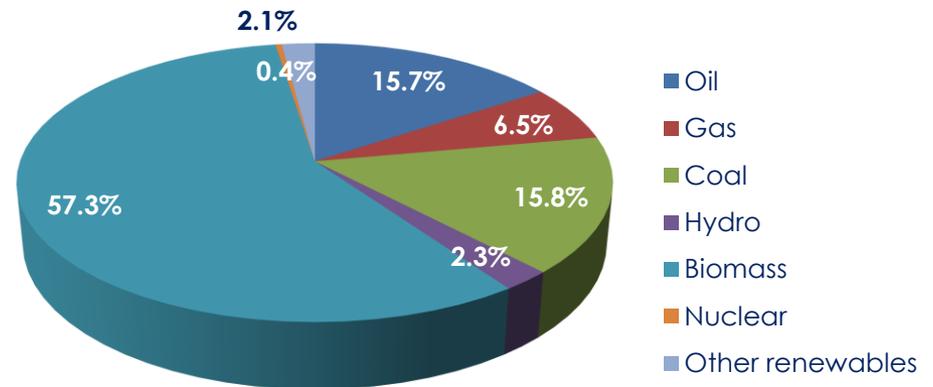
SSA Primary Energy Mix 2012



Source: IEA Africa Energy Outlook

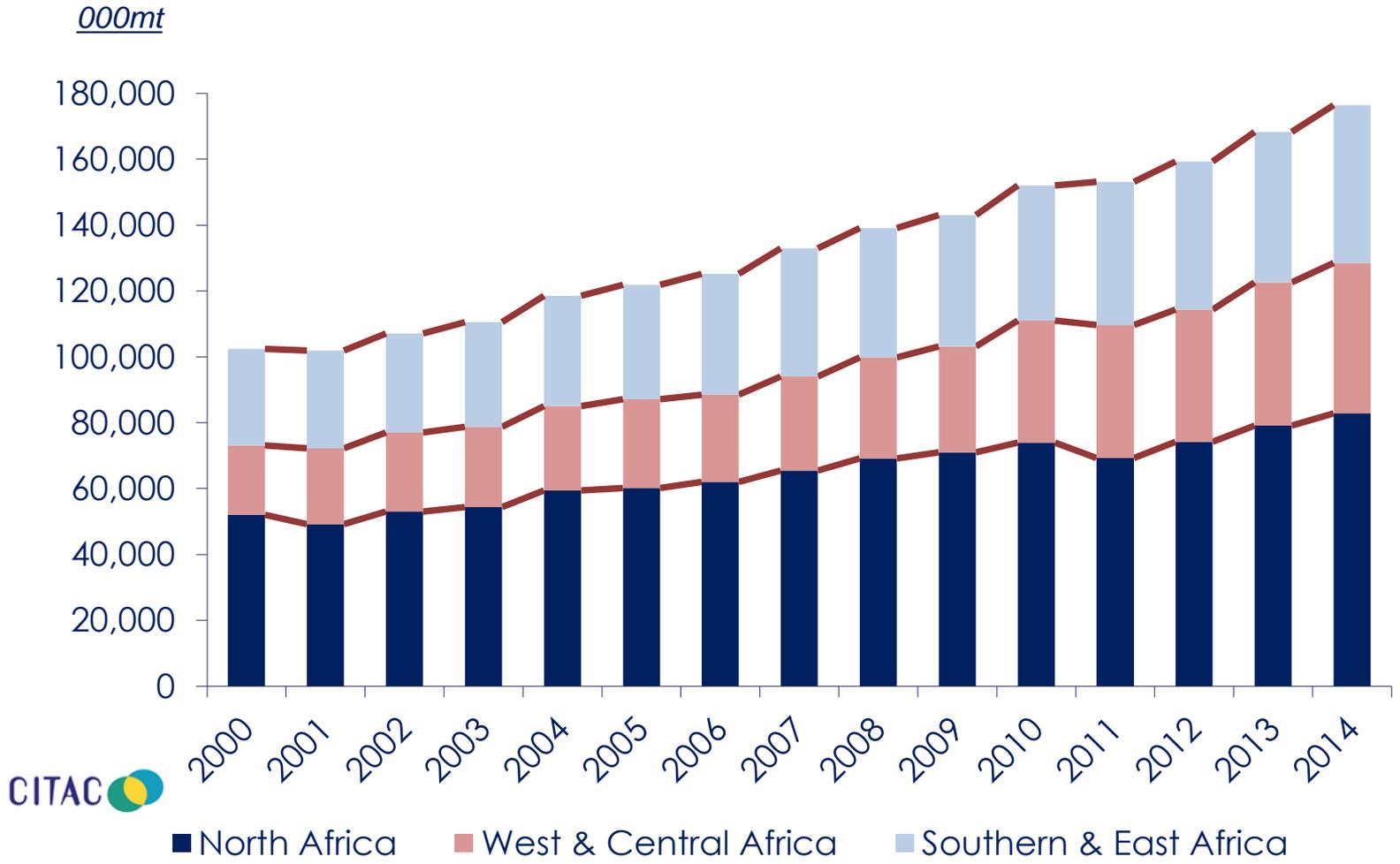
- Stable, 15.0 – 15.7%, in percentage terms, but more volume due to economic growth
- A strategy for downstream oil is needed →
- An economic, efficient, safe and sustainable petroleum product supply chain

SSA Primary Energy Mix 2025

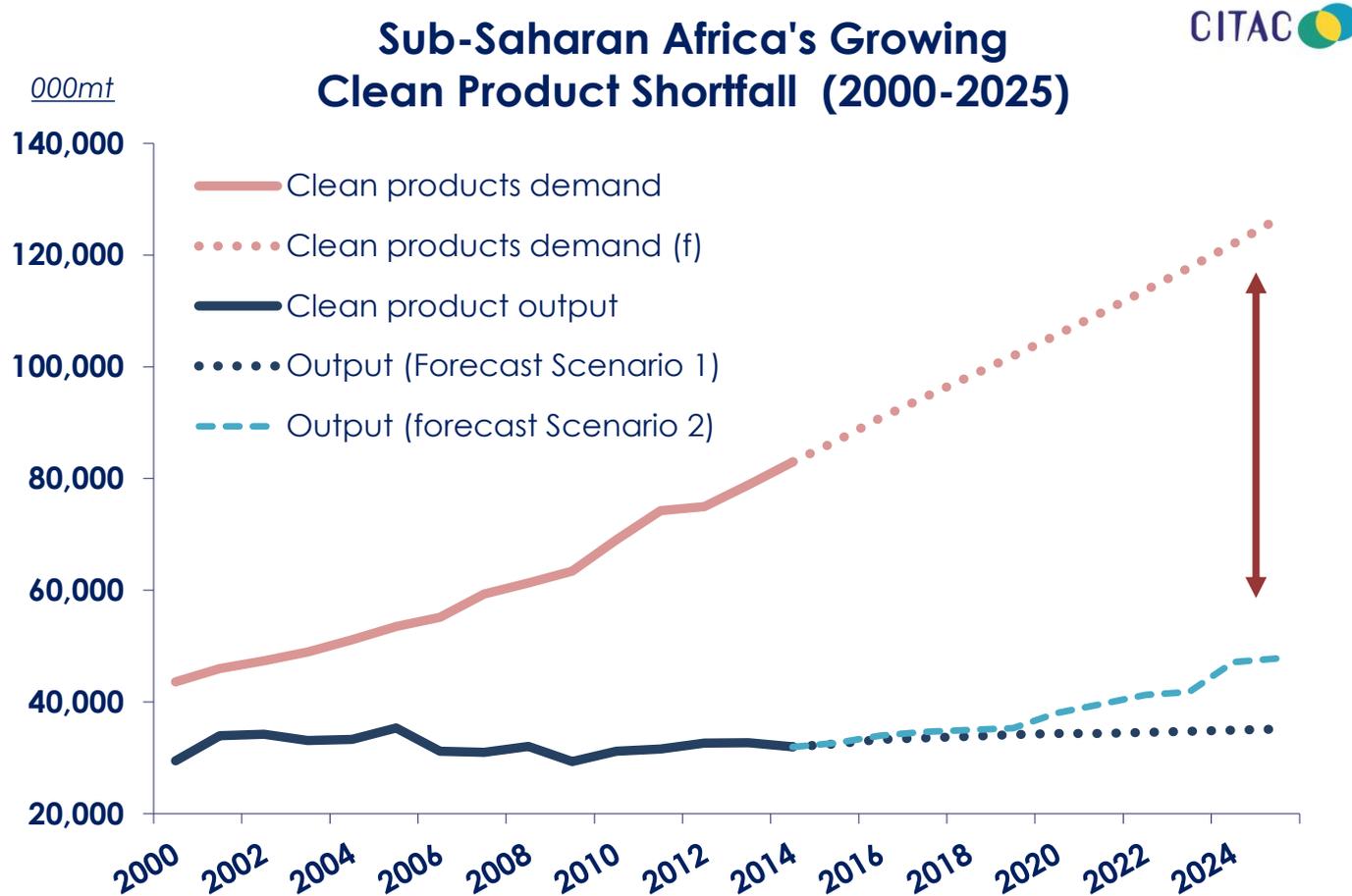


Source: IEA Africa Energy Outlook

Robust petroleum demand growth



Forecast demand growth implies huge increase in clean product production/imports



Evolving Fuel Specifications

ARA's AFRI Fuel Specifications



- The ARA advocates common **regional specifications and tax policies** in order to promote trade and an efficient supply chain across Africa.
- The ARA's goal is to **improve Africa's air quality**, with the consequent improvements in public health, while recognising:
 - Air quality problems are localised, not universal
 - Clean fuel demand can only be met by modernising refinery infrastructure or product imports
 - Time is needed for the local economies and consumers to support the tightening of specifications and the consequent cost increase
 - Refinery investment must be in line with car fleet modernisation and vehicle controls

Implications for Refiners

- Both existing and new refinery builds must meet new emission guidelines
- Refiners and the entire supply chain must prepare
- The choice of where to invest down the supply chain, particularly between refining and product imports, is increasingly driven by the ability to attract financing
- Whereas storage and distribution companies have been able to secure financing, refiners still struggle.

AFRI specifications - gasoline

Property	AFRI-1	AFRI-2	AFRI-3	AFRI-4	AFRI-5
RON, min. ⁽¹⁾	91	91	91	91	91
MON, min.	81	81	81	81	81
Lead content, mg/l max.	13	13	13	13	5
Sulphur content, mg/kg, max.	1000	500	300	150	50
Benzene content, vol%, max.	to be reported	to be reported	5	1	1
Aromatics, vol%, max.	n/a	n/a	n/a	n/a	42
Density at 15°C, kg/m ³ min-max	n/a	n/a	n/a	n/a	725-780
RVP, kPa, max.	n/a	n/a	n/a	n/a	65
Ethanol content, vol%, max.⁽²⁾	5	5	5	10	10

1. A higher grade of gasoline may be marketed if required.
2. Imported gasoline to be free from oxygenates.
3. In cases of dispute ASTM D3244 / EN ISO 4259 shall be used.



AFRI specifications - diesel

Property	AFRI-1	AFRI-2	AFRI-3	AFRI-4	AFRI-5
Sulphur content, mg/kg mass, max.	8000	3500	500	50	50
Density at 15°C, kg/m ³ , min - max.	800 - 890	800 - 890	800 - 890	820 - 880	820 - 880
Cetane Index (calculated), min.	42	45	45	45	46
Cetane Number, min.	n/a	n/a	n/a	n/a	49
Polycyclic Aromatic Hydrocarbons (PAH), mass %, max.	n/a	n/a	n/a	n/a	11
Lubricity (HFRR @ 60 °C), micron, max.	to be reported	to be reported	460	460	460
Oxidation stability (Hr) ⁽¹⁾	20	20	20	20	20
FAME content, vol%, max.	7	7	7	7	7

GAS OIL / DIESEL

1. Applicable only to gas oil / diesel containing more than 2 % v/v FAME.
2. In cases of dispute ASTM D3244 / EN ISO 4259 shall be used.



ECOWAS/ARA Consultation



- ARA hosted a meeting in Abidjan with ECOWAS officials and experts from the member states in May 2016
- Meeting reviewed situation in the region:
 - Cote D'Ivoire and Niger fully meet their demand
 - Nigeria, Ghana and Senegal though having refineries, still import more than 70% of demand
 - Other countries depend 100% on imports
 - The multiplicity of sources of supply of oil products remains an issue for our region, which remains on the sidelines of global efforts to regulate the use of low-sulfur fuels

Sulphur levels in fuels in 2016

- Sulphur content in products from the region's refineries is currently between 500 and 2000 ppm for diesel and 500 and 1000 ppm for gasoline. Niger is an exception, where sulfur content in diesel is 380 ppm and 160 ppm in gasoline.
- Overall, sulphur content in the fuels sold in the region remains at levels above the AFRI-4 specification targeted for 2020
- Use of higher sulphur content fuels in various sectors including transport, industry, etc., result in releases of pollutants with negative impacts on health and the environment

Health Impacts

- According to WHO, nearly 800 000 people die prematurely every year in the world due to urban air pollution, and vehicle exhaust emissions are among the factors contributing to poor air quality in urban areas
- The 2009 World Bank/ARA SSA Refinery & Health Study concluded an investment of \$4.96billion to improve existing refineries would lead to over \$32billion savings over ten years in avoidable health costs by adopting AFRI-4
- These benefits accrue to the governments, who, within ECOWAS, are also significant refinery shareholders

ECOWAS/ARA Road Map



- Adopt AFRI-4 for implementation by 2020
- AFRI-5 by 2030
- For fuel imports into the sub-region from Europe, Asia and America
 - Adopt the AFRI-4 specification wef 2017
 - Refiners operating within the sub-region will be allowed until 2020 to make necessary improvements
- Introduce and implement vehicle emission standards and controls in tandem with the above

Roadmap: Preliminary Assessment

- The growing automotive sector in most ECOWAS Member States remains dominated by second-hand vehicles, which represent 80% of the fleet with an average age around 20 years. These are the worst offenders in exhaust emission levels.
 - Assess the current situation and the characteristics of the vehicle fleet in the ECOWAS region;
- Identify and assess current fuel specifications and vehicle emission standards in force in the fifteen (15) Member States of ECOWAS relative to the AFRI specifications developed by the ARA and international best practices;
- Conduct a cost/benefit comparative analysis with respect to the adoption of the AFRI specifications in the ECOWAS region;

Roadmap: Recommendations

- To recommend vehicle emission levels to be applied in the region;
- To develop a harmonized regional framework taking into account the realities of the region, and propose an action plan for implementation;
- To develop two draft regional guidelines: one on oil product specifications (gasoline and diesel) and the other on motor vehicle emission limits.

Timetable for Study

Activities	Person in charge	Duration
Start of work		Mo
Progress Report	Consultant	Mo+1
Comments on progress report	ECOWAS	Mo+1.5
Interim Report	Consultant	Mo+2.5
Restitution of the interim report	ECOWAS	Mo+3
Interim report validation workshop	ECOWAS+ Member States	Mo+4
Final report	Consultant	Mo+4.5
Approval of the final report	ECOWAS	Mo+5

CONCLUSIONS

- Promote the AFRI Road Map for product quality
- Introduce in parallel, vehicle emission limits and controls
- Promote regional harmonisation of fuel excise duties, taxes and subsidies
- Promote best practice for biofuels handling and use
- Promote infrastructure policy for fuel distribution

Thank You for Listening