



PETROLEUM POTENTIAL OF ETHIOPIA: Current Activities and Opportunities

Tolesa Shagi

State Minister

Ministry of Mines

Federal Democratic Republic of Ethiopia

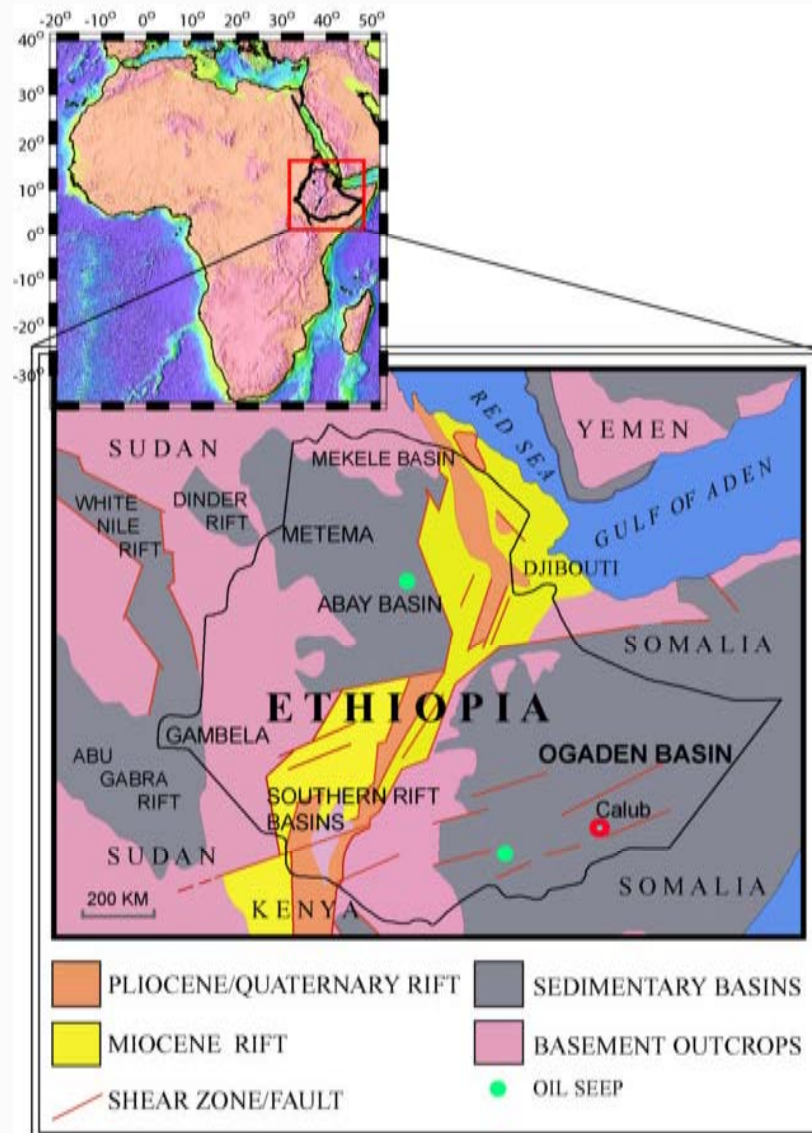


Outline

- Background
- Petroleum Potential of Ethiopia
- None Conventional Petroleum Resources
- Previous and Recent Success story
- Opportunities
- Summary

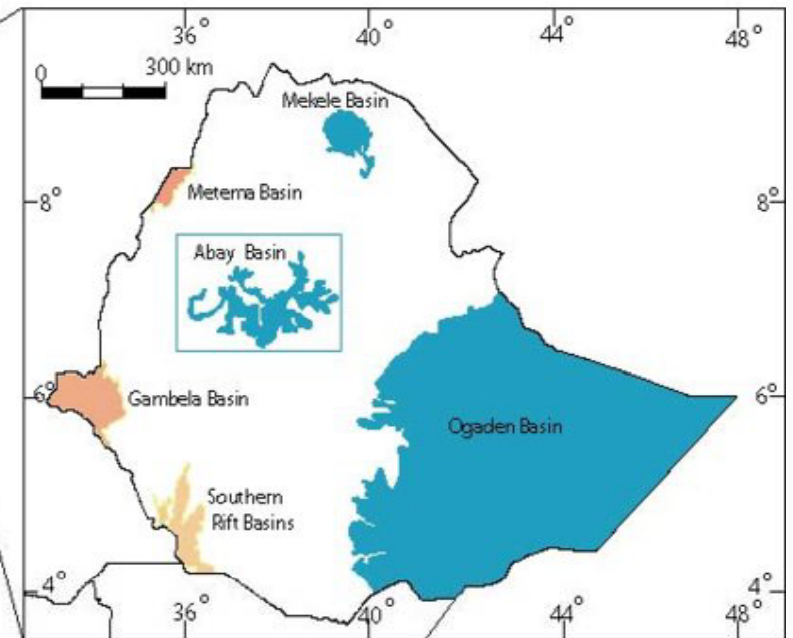
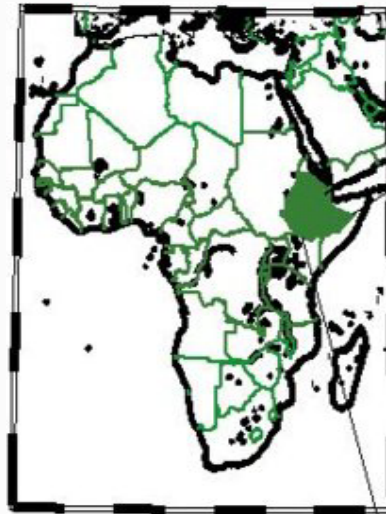
Background

- Location
 - In the horn of Africa
 - Area > 1, 222,000 km²
- Population
 - 77 – 80 Million
- Government – Federal Democratic Republic
- Economic Growth
 - ~ 11% growth for the last six consecutive years
 - Many infrastructures building
 - Roads
 - Energy
 - Housing
 - Communication
 - Etc.
 - New program for growth and transformation



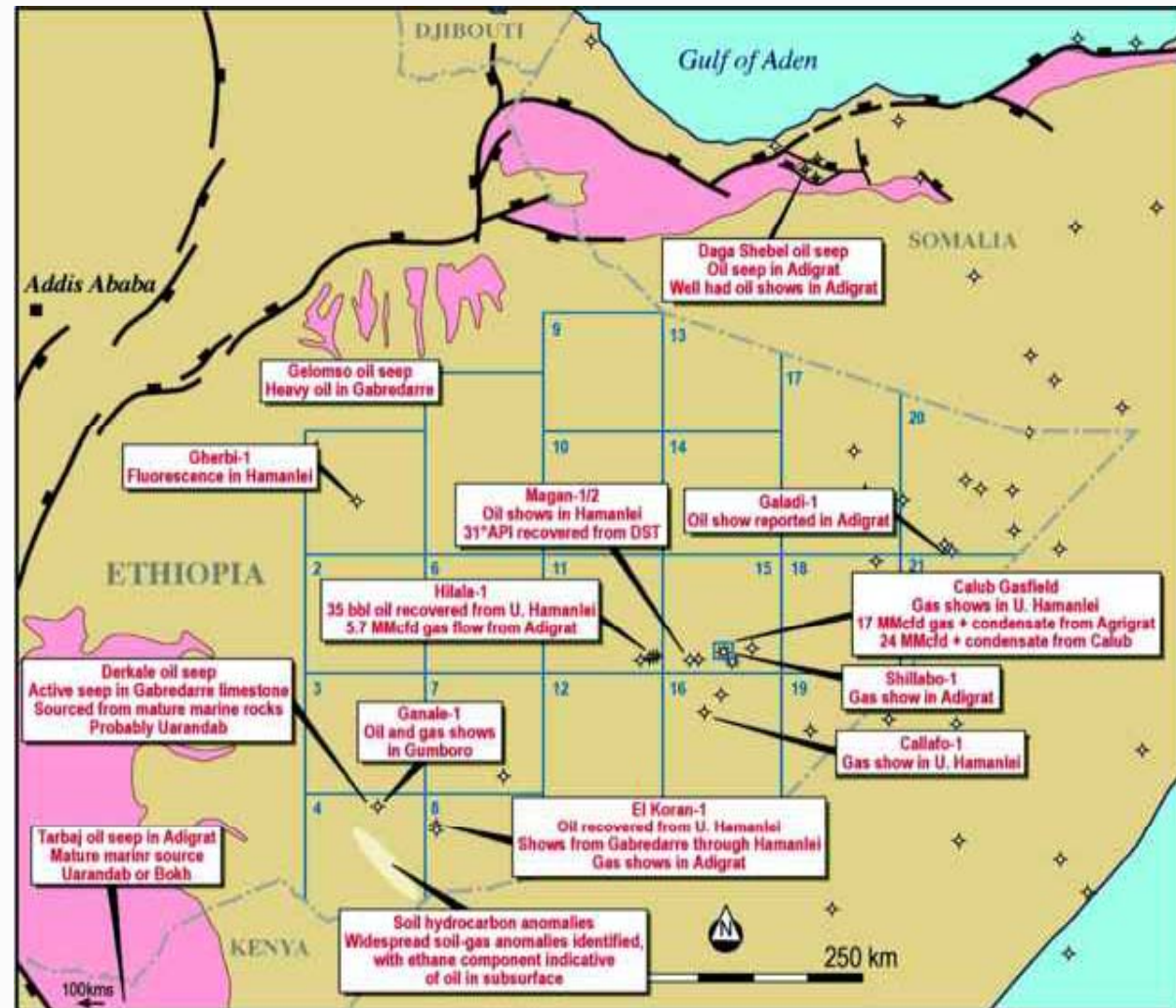
Petroleum Potential of Ethiopia

- More than 30% Sedimentary cover
- Known Sedimentary basins
 - ◆ The Ogaden Basin
 - ◆ The Abay/Blue Nile Basin
 - ◆ The Gambela Basin
 - ◆ The Mekele Basin
 - ◆ Metema Basin
 - ◆ The Ethiopian Rift Basins



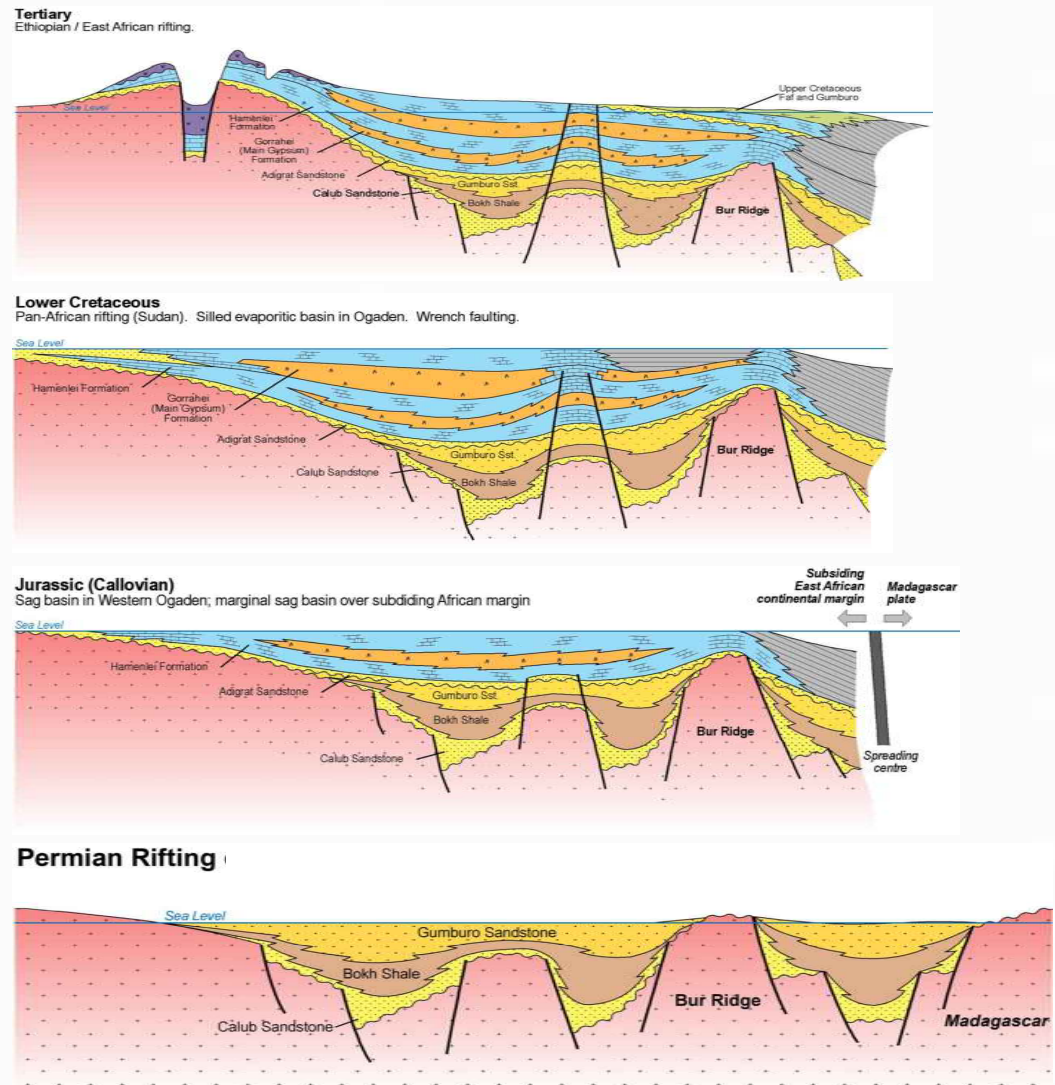
Petroleum Potential of Ethiopia

- Oil seeps in different part of the country
- Oil and gas shows in many of the exploratory wells
- Recently mapping activities indicated oil stained/impregnated reservoir rocks in many places



Petroleum Potential Cont....

- The Karoo and Jurassic/Cretaceous rift
 - poorly understood - structurally & Stratigr
- Basins formed during this multiphase episode contain major oil accumulation in Sudan and Yemen & other countries
- Understanding the age, rifting pattern and basin development in the Ogaden basin is crucial



Stratigraphy of the Ogaden Basin

APPROXIMATE AGE	LITHOSTRATIGRAPHY	LITHOLOGY	DEPOSITIONAL ENVIRONMENT	SEA LEVEL Rising Falling	STRUCTURAL ENVIRONMENT	
EOCENE - PALAEOCENE	TALEH AURADU		Open marine		Late Tertiary uplift and volcanics - Tertiary East African rift phase	
	JESSOMA		Fluvial to marginal marine			
MAASTRICTIAN TO CENOMANIAN	BELET UEN		Open marine			
	PERFER		Shallow open marine to restricted lagoonal			
ALBIAN TO APTIAN	MUSTAHL FM					
	BARREMIAN TO VALANGINIAN	MAIN GYPSUM				Shallow open marine to restricted lagoonal
L. GORRAHEI			Stable carbonate platform overall shallowing upward			
GABBREDARRE FM			Shallow open marine			Local reef development
BERRIASIAN TO ? L. OXFORDIAN	UARANDAB FM		Open marine			REGIONAL TRANSGRESSION
	? E. OXFORDIAN TO CALLOVIAN	UPPER HAMANLEI				Shallow open marine
BATHONIAN TO EARLY JURASSIC		MIDDLE HAMANLEI		Marginal marine to sabkha	Stable carbonate evaporite platform: local open marine depressions and reef rims	
	LOWER HAMANLEI		Fluvial to marine			
	TRANSITION		Open marine	EARLY JURASSIC TRANSGRESSION (REGIONAL)		
? TRIASSIC TO LATE PERMIAN	ADIGRAT FM		TOP KARROO			
	GUMBORO FM		Fluvial	Sedimentation overstepping basement		
	BOKH FM		Lacustrine	Rift fill - tectonically stable		
	CALUB FM		Fluvial	Rifting		
EARLY PALAEOZOIC AND OLDER	BASEMENT					



Petroleum systems

- Four petroleum systems in the Ogaden basin
 - Bokh Shale _ Calub Sandstone
 - Urandab Shale – Upper Hamanlei Limestone
 - TOC 2.3 - 3 % as high as 7%
 - Transition zone – Adigrat Formation
 - The Middle Hamanlei Carbonates and Lower Hamanlei reefal build ups
- New petroleum system recently discovered
 - Bokh Shale – Gumburo Sandstone

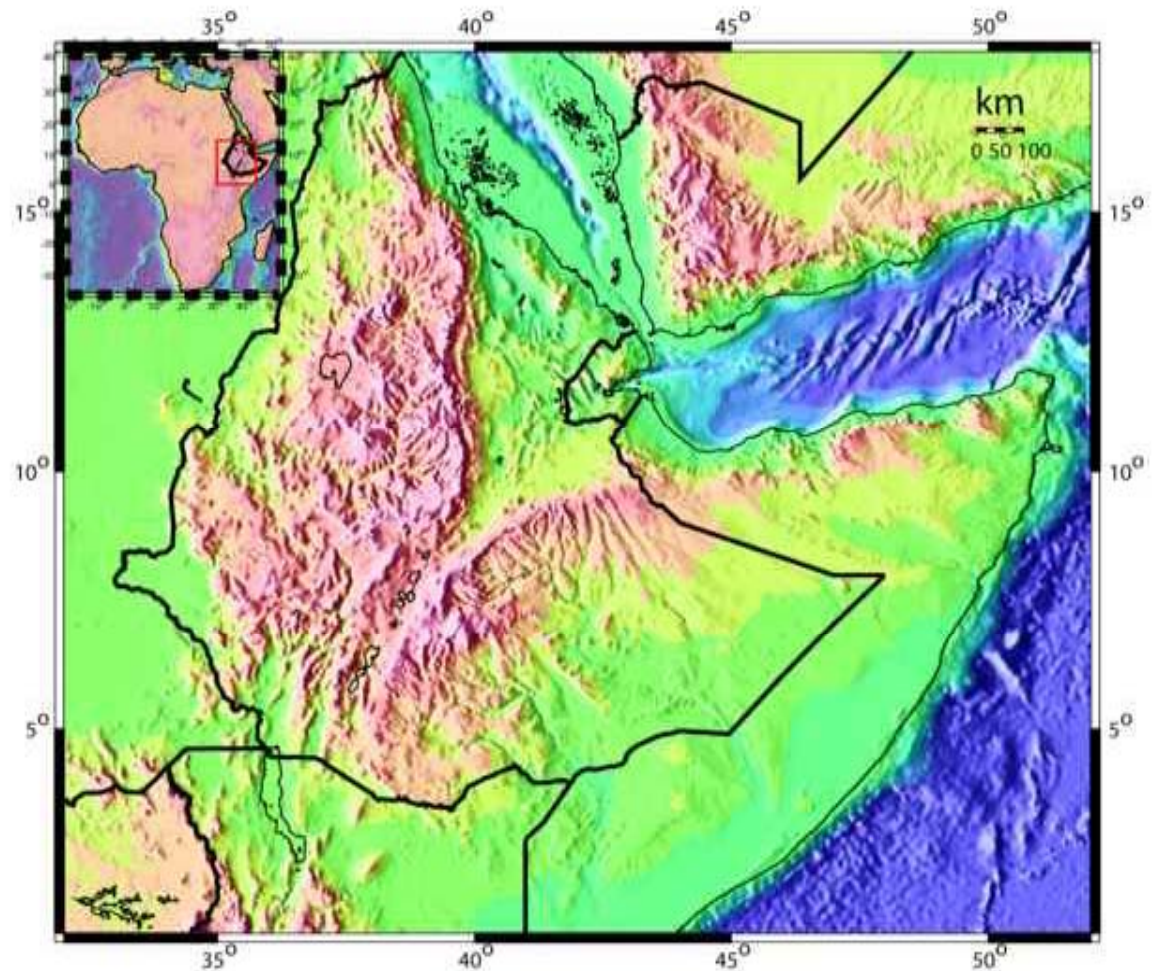


Petroleum Systems

- Traps
 - Structural traps
 - ★ Faults, drag folds, domal features
 - Stratigraphic traps
 - ★ Mesozoic beds
 - ★ Pinch outs
 - In the SW part of the Basin
- Seals
 - Urandab Formation (Shale), Middle Hamanlei (Shale intercalation)
 - Bokh Shale, Transition zone, the Hamanlei Carbonates

The Ethiopian Rift Valley

- The Ethiopian rift is the largest element of the East African rift system.
 - ~1000 km long from NE-SW
 - Width – from 80–300 km
- The Ethiopian rift
 - Provides new opportunities for oil and gas exploration

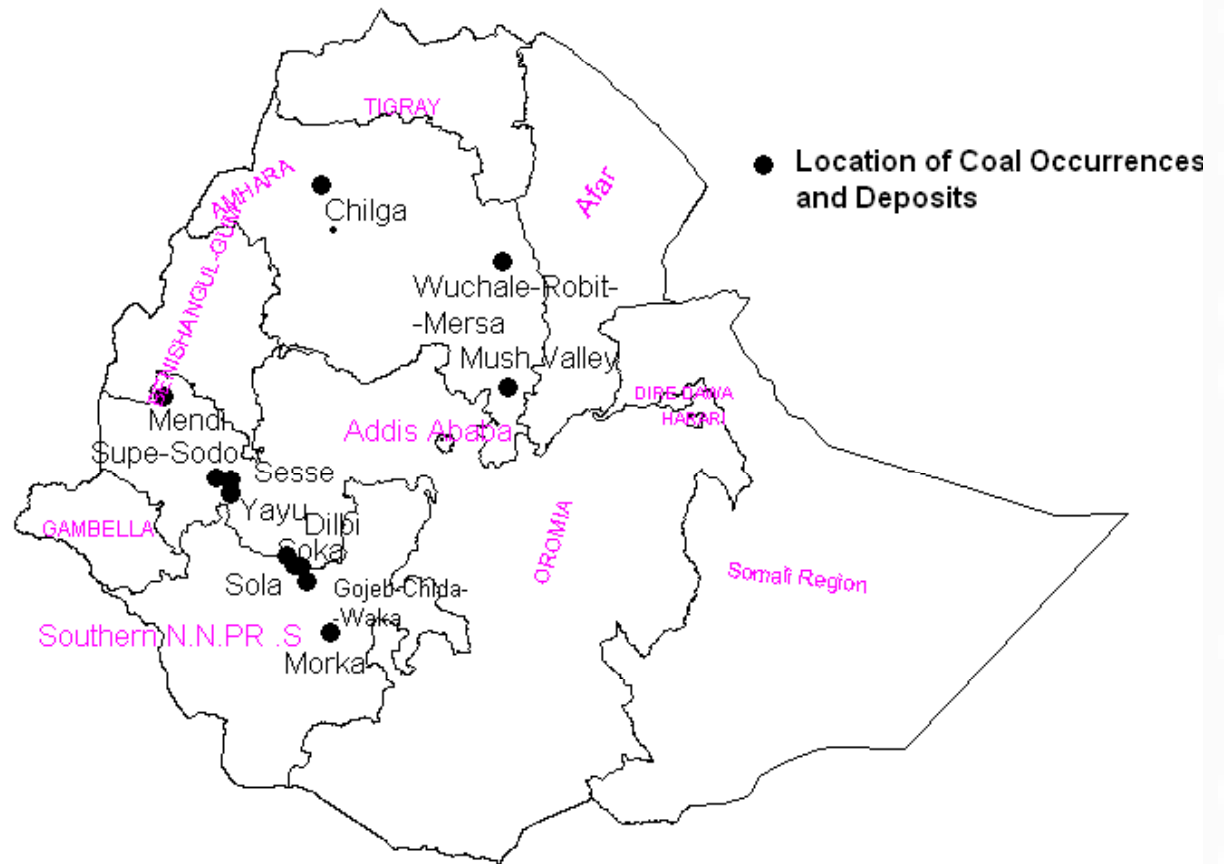


None conventional hydrocarbon potential

- Oil Shale
 - In different part of the country
 - High TOC – up to 55- 60%
 - Oil generated – detected in some bore holes
- Thick Shale formations
 - Urandab Shale - ~ 400 m thick
 - Bokh Shale- up to 800 m thick
 - Shale formation- with in Carbonate rocks
- Coal in different parts of the Country

Coal occurrences

- ~500 Million Ton reserve
- New deposits in other areas are also reported recently



Oil Shale Occurrence

- Miocene Oligocene
 - West South West part of Ethiopia
- Recent mapping results indicated outcrops in the northeast central part of Ethiopia
- ~1 billion Tons reserve





Fiscal regime

- The Petroleum Laws/Proclamations
 - The Petroleum Operations Proclamation – 295/1986
 - The Petroleum Income Tax Proclamation- 295/1986
 - The Petroleum Income Tax Proclamation (amendment) -226/2000
- Petroleum Production Sharing Agreements (PPSA)
- Petroleum Development Agreements (PDA)
- Joint Study Agreements (JSA)

Fiscal regime

- Exploration – Up to 4 years
 - Extension –Up to 4 years
- Production – 25 years
 - Extension – Up to 10 years
- Royalty –Negotiable
- Production Sharing – Negotiable – tier @ 50 - 60%
- All petroleum operation costs – 100% recoverable
- Income tax – 30% -fixed
- Training fund – Negotiable
- Community Development - Negotiable
- Annual land rent - Negotiable
- Bonus (Signature/Production) - Negotiable

Discoveries

- New discovery- Ogaden Basin
- Genale area – Block 4
- Stratigraphic trap
- New reservoir –Gumburo Sandstone
- Well –TD – 3005 m
- Reservoir
 - Primary – Gumburo – 96 m
 - Secondary – Calub –110 m
 - Porosity- 10 – 14%
- Estimated Reserve -766BCF



Recent Success

- New discovery - Increased reserve
- Previous discoveries –Ogaden basin
 - Calub -2.7TCF
 - Hilala – 1.3 TCF
- Several prospects and leads are delineated





Current Activities

- Nine Companies
 - 16 agreements
- One Block under negotiation
- An area under joint study
- Open blocks for PPSA
- Three seismic crews working in the country

Various Community Development

GELADI HIGH SCHOOL HAND OVER December 14/2010



GELADI HIGH SCHOOL HAND OVER December 14/2010



GELADI HIGH SCHOOL HAND OVER December 14/2010

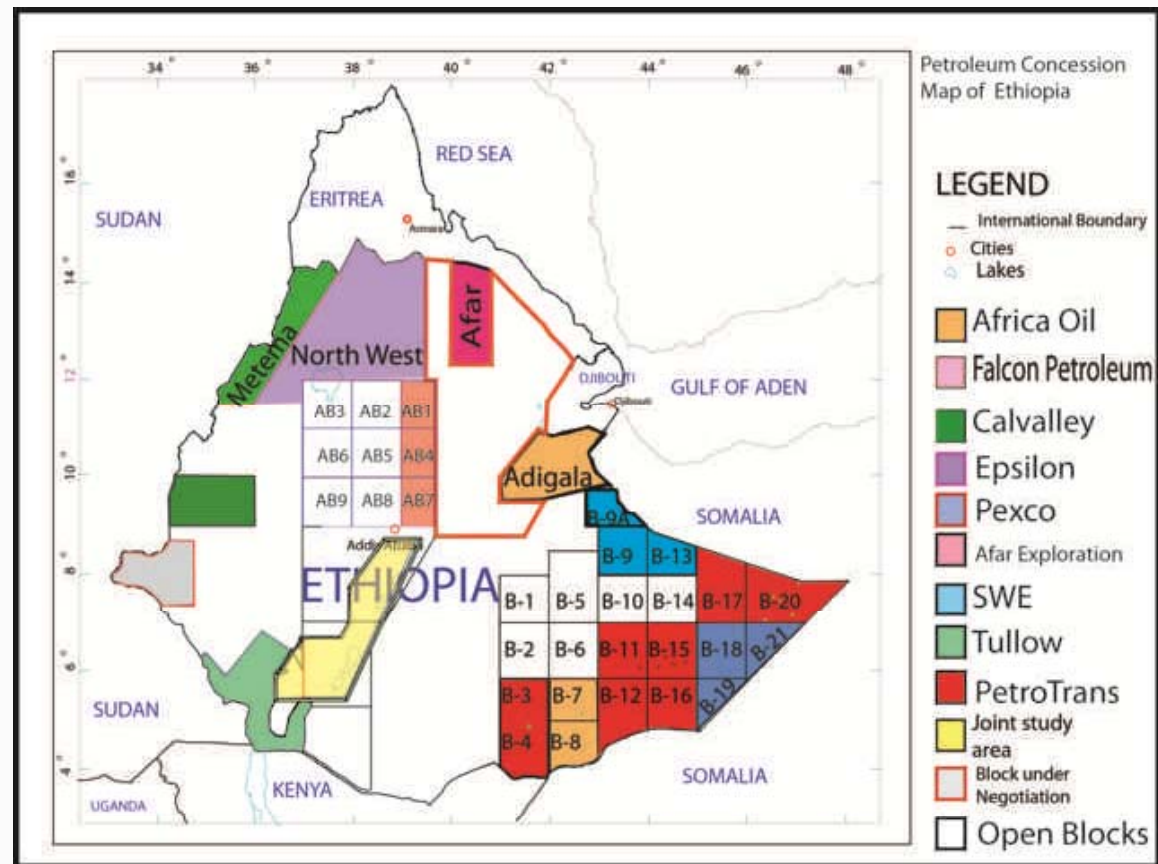


GELADI HIGH SCHOOL HAND OVER December 14/2010



Available Opportunities

- The Afar area
- The Segen rift basin
- Abay basin – 6 blocks
- The Ogaden basin -6 Blocks



Down stream Activities

- More local and International players are increasing in number



United Biherawi
Petroleum
(Yetebaberut)



TOTAL

OiLibya

Kobil

Summary

- Currently 9 companies are working under 16 different agreements
- Three gas discoveries in different places in the Ogaden basin
- Few exploratory wells are drilled mainly in the Ogaden basin
- Many of the exploratory wells indicated oil shows and oil and gas shows at different levels.
- Only three wells were drilled on the right structures.
- More geological and geophysical data are required to ascertain the petroleum potential of Ethiopia in many of the sedimentary basins.



Thank You