

An overview of South Africa's petroleum resources, reserves and exploration activity



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Petroleum Agency SA

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PETROLEUM AGENCY SA

- 1. promotes exploration** for onshore and offshore oil and gas resources
- 2. regulates** exploration and production activities
- 3. custodian of the national** petroleum exploration and production **database.**



OUTLINE

- Energy in SA
- Offshore oil and gas resources, exploration and production activity
- Onshore resources and activity
- New developments



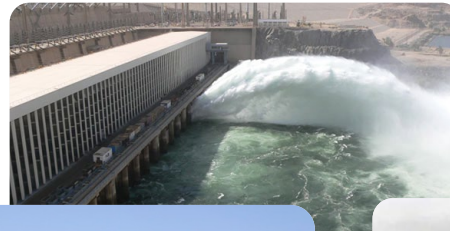
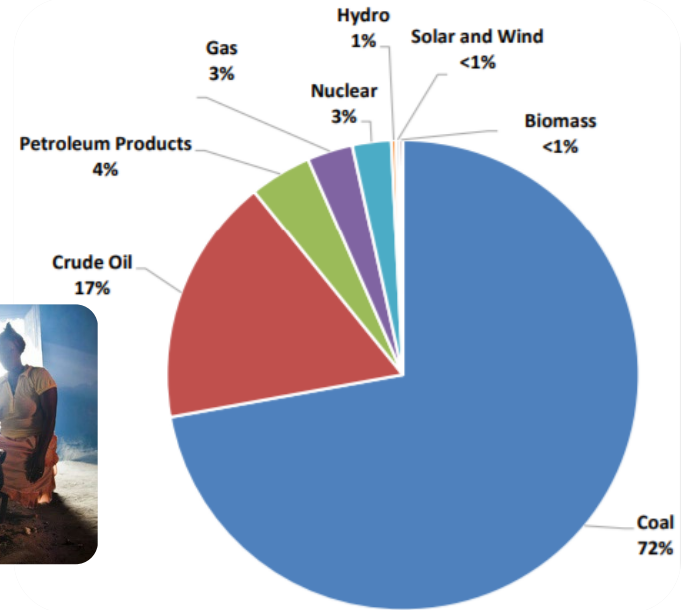
Energy in South Africa

Coal is number 1

- 77% of all primary energy in SA comes from coal
- ESKOM – 96% of all electricity
- 44 175 MW NIC – 38 545 MW coal stations
- 2 new power stations under construction
- Coal reserves for 200 years



Total Primary Energy Supply in SA 2014 [%TPES]



National Development Plan and Integrated Resource Plan - diversification

- The plan envisages that by 2030 South Africa will have an **adequate supply of electricity and liquid fuels** to ensure that economic activity and welfare are not disrupted, and that at least **95% of the population will have access** to grid or off-grid electricity
- The plan proposes that **gas** and renewable resources like wind, solar and hydro-electricity will be viable alternatives to coal and will supply at least 20 000 MW of the additional 29 000 MW of electricity needed by 2030.
- South Africa has committed to attain substantial **reductions in carbon dioxide** emissions by 2025



OFFSHORE SA – RESOURCES AND EXPLORATION ACTIVITY

Restriction on applications

EXPLORATION MAP

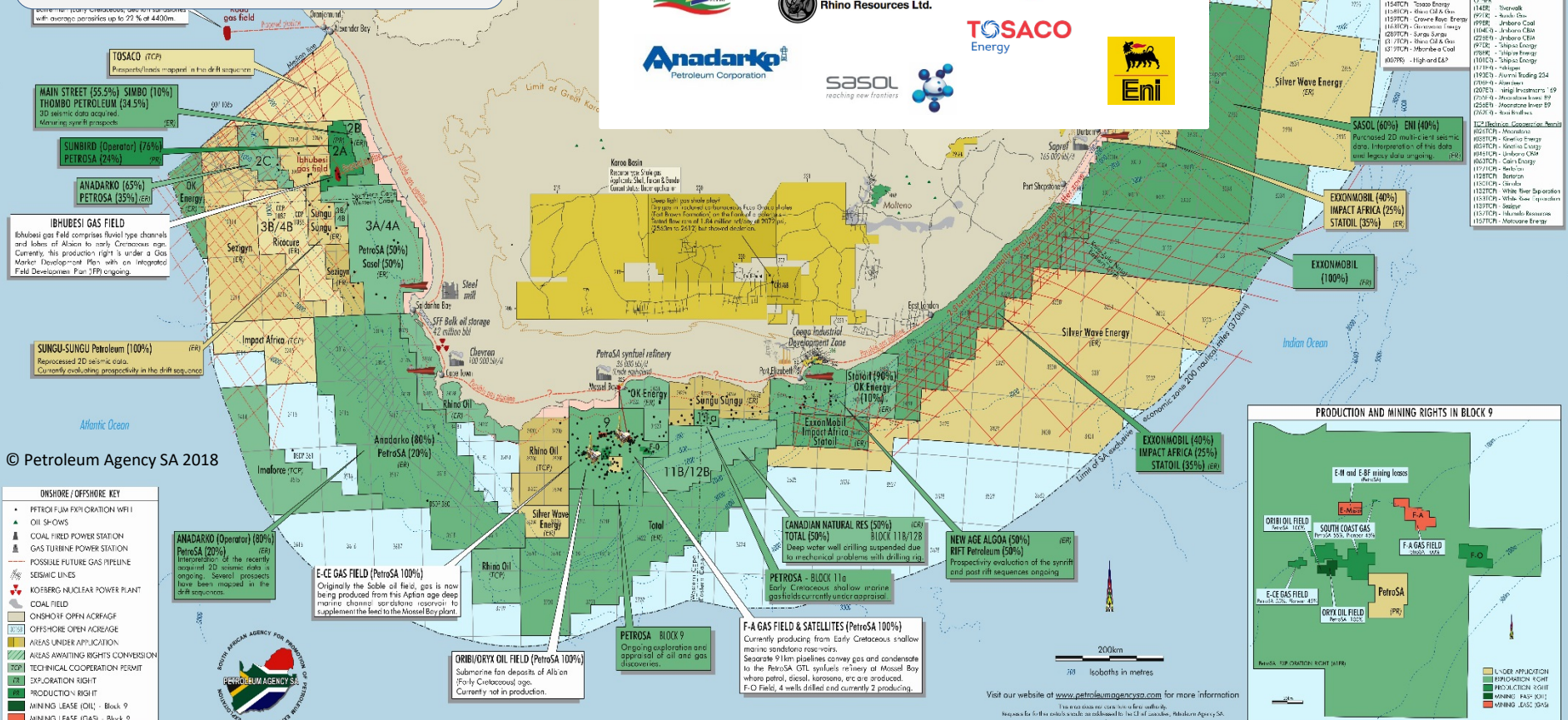
Current permit and right holders' exclusive rights to apply for exploration rights (from a TCP) or production rights (from an ER)

Offshore rights and permits:

- 6 Production Rights
- 15 Exploration Rights
- 2 Technical Cooperation Permits
- 1 Reconnaissance Permit
- Several applications/conversions in process

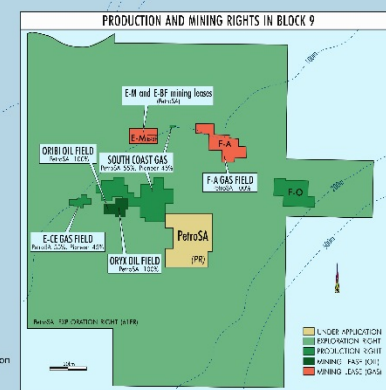
PANDE & TEHANE GAS FIELDS
Combined reserves in excess of 5.5 Tcf.
Now operated by SAG/ENP-partnership

ONSHORE APPLICATIONS (see Estimation)	ONSHORE RIGHTS
0112EN - Area 1	NEW RIGHTS GRANTED
1159R - Crocker-Kerr Energy	AMIS-2 OPERATIONS
2022R - Jamba Gas	01R - Crocker-Kerr
0701R - Area 07	02R - Wabanza 1
2028R - Nabors Oil & Gas	03R - Crocker-Kerr
0701R - Area 07	04R - Wabanza 2
0212R - Gold Ore Africa	05R - Wabanza 3
0213R - Gold Ore Africa	06R - Wabanza 4
0214R - Gold Ore Africa	07R - Wabanza 5
0215R - Gold Ore Africa	08R - Wabanza 6
0216R - Gold Ore Africa	09R - Wabanza 7
0217R - Gold Ore Africa	10R - Wabanza 8
0218R - Gold Ore Africa	11R - Wabanza 9
0219R - Gold Ore Africa	12R - Wabanza 10
0220R - Gold Ore Africa	13R - Wabanza 11
0221R - Gold Ore Africa	14R - Wabanza 12
0222R - Gold Ore Africa	15R - Wabanza 13
0223R - Gold Ore Africa	16R - Wabanza 14
0224R - Gold Ore Africa	17R - Wabanza 15
0225R - Gold Ore Africa	18R - Wabanza 16
0226R - Gold Ore Africa	19R - Wabanza 17
0227R - Gold Ore Africa	20R - Wabanza 18
0228R - Gold Ore Africa	21R - Wabanza 19
0229R - Gold Ore Africa	22R - Wabanza 20
0230R - Gold Ore Africa	23R - Wabanza 21
0231R - Gold Ore Africa	24R - Wabanza 22
0232R - Gold Ore Africa	25R - Wabanza 23
0233R - Gold Ore Africa	26R - Wabanza 24
0234R - Gold Ore Africa	27R - Wabanza 25
0235R - Gold Ore Africa	28R - Wabanza 26
0236R - Gold Ore Africa	29R - Wabanza 27
0237R - Gold Ore Africa	30R - Wabanza 28
0238R - Gold Ore Africa	31R - Wabanza 29
0239R - Gold Ore Africa	32R - Wabanza 30
0240R - Gold Ore Africa	33R - Wabanza 31
0241R - Gold Ore Africa	34R - Wabanza 32
0242R - Gold Ore Africa	35R - Wabanza 33
0243R - Gold Ore Africa	36R - Wabanza 34
0244R - Gold Ore Africa	37R - Wabanza 35
0245R - Gold Ore Africa	38R - Wabanza 36
0246R - Gold Ore Africa	39R - Wabanza 37
0247R - Gold Ore Africa	40R - Wabanza 38
0248R - Gold Ore Africa	41R - Wabanza 39
0249R - Gold Ore Africa	42R - Wabanza 40
0250R - Gold Ore Africa	43R - Wabanza 41
0251R - Gold Ore Africa	44R - Wabanza 42
0252R - Gold Ore Africa	45R - Wabanza 43
0253R - Gold Ore Africa	46R - Wabanza 44
0254R - Gold Ore Africa	47R - Wabanza 45
0255R - Gold Ore Africa	48R - Wabanza 46
0256R - Gold Ore Africa	49R - Wabanza 47
0257R - Gold Ore Africa	50R - Wabanza 48
0258R - Gold Ore Africa	51R - Wabanza 49
0259R - Gold Ore Africa	52R - Wabanza 50
0260R - Gold Ore Africa	53R - Wabanza 51
0261R - Gold Ore Africa	54R - Wabanza 52
0262R - Gold Ore Africa	55R - Wabanza 53
0263R - Gold Ore Africa	56R - Wabanza 54
0264R - Gold Ore Africa	57R - Wabanza 55
0265R - Gold Ore Africa	58R - Wabanza 56
0266R - Gold Ore Africa	59R - Wabanza 57
0267R - Gold Ore Africa	60R - Wabanza 58
0268R - Gold Ore Africa	61R - Wabanza 59
0269R - Gold Ore Africa	62R - Wabanza 60
0270R - Gold Ore Africa	63R - Wabanza 61
0271R - Gold Ore Africa	64R - Wabanza 62
0272R - Gold Ore Africa	65R - Wabanza 63
0273R - Gold Ore Africa	66R - Wabanza 64
0274R - Gold Ore Africa	67R - Wabanza 65
0275R - Gold Ore Africa	68R - Wabanza 66
0276R - Gold Ore Africa	69R - Wabanza 67
0277R - Gold Ore Africa	70R - Wabanza 68
0278R - Gold Ore Africa	71R - Wabanza 69
0279R - Gold Ore Africa	72R - Wabanza 70
0280R - Gold Ore Africa	73R - Wabanza 71
0281R - Gold Ore Africa	74R - Wabanza 72
0282R - Gold Ore Africa	75R - Wabanza 73
0283R - Gold Ore Africa	76R - Wabanza 74
0284R - Gold Ore Africa	77R - Wabanza 75
0285R - Gold Ore Africa	78R - Wabanza 76
0286R - Gold Ore Africa	79R - Wabanza 77
0287R - Gold Ore Africa	80R - Wabanza 78
0288R - Gold Ore Africa	81R - Wabanza 79
0289R - Gold Ore Africa	82R - Wabanza 80
0290R - Gold Ore Africa	83R - Wabanza 81
0291R - Gold Ore Africa	84R - Wabanza 82
0292R - Gold Ore Africa	85R - Wabanza 83
0293R - Gold Ore Africa	86R - Wabanza 84
0294R - Gold Ore Africa	87R - Wabanza 85
0295R - Gold Ore Africa	88R - Wabanza 86
0296R - Gold Ore Africa	89R - Wabanza 87
0297R - Gold Ore Africa	90R - Wabanza 88
0298R - Gold Ore Africa	91R - Wabanza 89
0299R - Gold Ore Africa	92R - Wabanza 90
0300R - Gold Ore Africa	93R - Wabanza 91
0301R - Gold Ore Africa	94R - Wabanza 92
0302R - Gold Ore Africa	95R - Wabanza 93
0303R - Gold Ore Africa	96R - Wabanza 94
0304R - Gold Ore Africa	97R - Wabanza 95
0305R - Gold Ore Africa	98R - Wabanza 96
0306R - Gold Ore Africa	99R - Wabanza 97
0307R - Gold Ore Africa	100R - Wabanza 98
0308R - Gold Ore Africa	101R - Wabanza 99
0309R - Gold Ore Africa	102R - Wabanza 100



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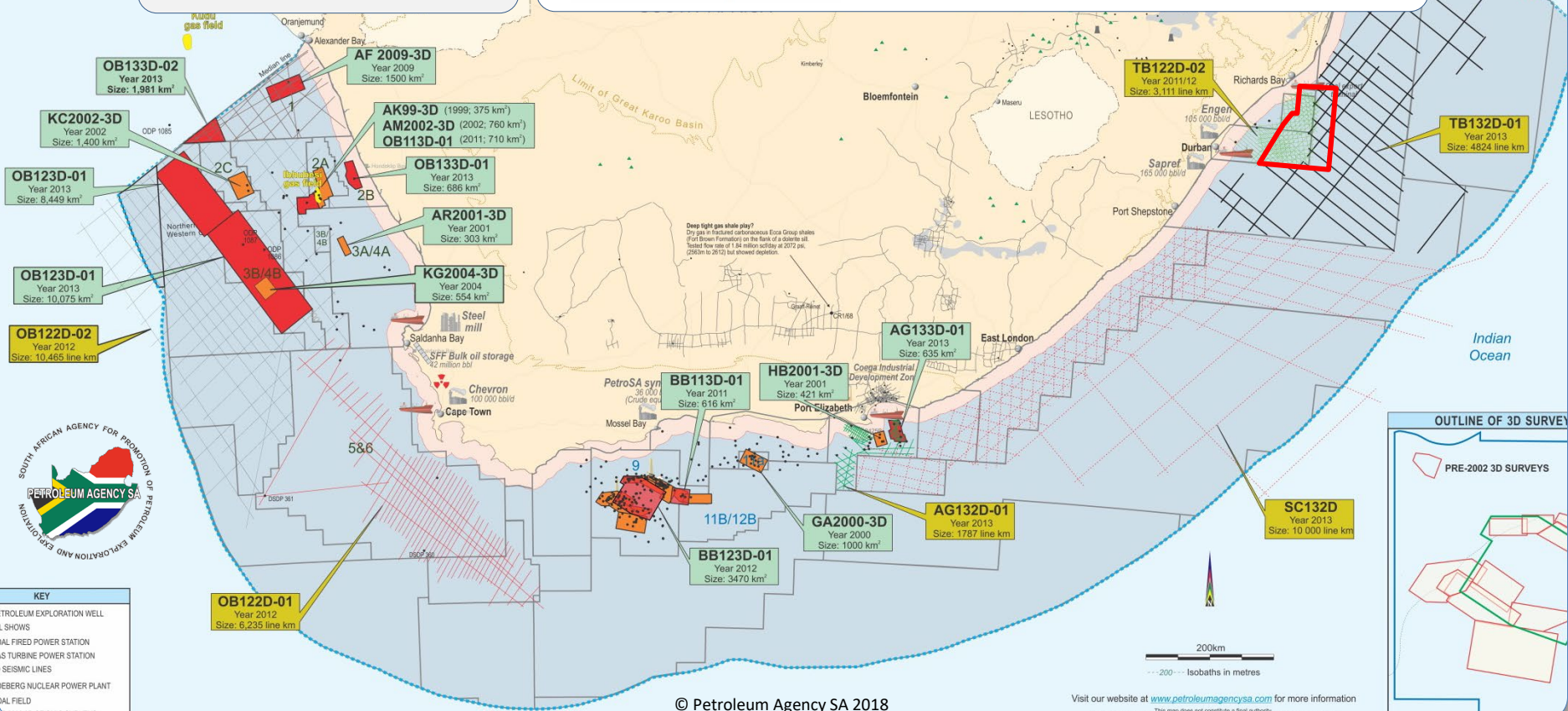
ONSHORE / OFFSHORE KEY	
▲	PETROSA FUM EXPLORATION WPI
▲	OIL SP-OWS
▲	COAL FIRED POWER STATION
▲	GAS TURBINE POWER STATION
—	POSSIBLE FUTURE GAS PIPELINE
—	SEISMIC LINES
▲	KOESBERG NUCLEAR POWER PLANT
▲	COAL FIELD
▲	ONSHORE OPEN ACREAGE
▲	OFFSHORE OPEN ACREAGE
▲	AREAS UNDER APPLICATION
▲	AREAS AWAITING RIGHTS CONVERSION
▲	TECHNICAL COOPERATION PERMIT
▲	EXPLORATION RIGHT
▲	PRODUCTION RIGHT
▲	MINING LEASE (DL) - Block 9
▲	MINING LEASE (DS) - Block 9



2013 - 2016 EXPLORATION ACTIVITY

3D SURVEYS
>25 000 km²

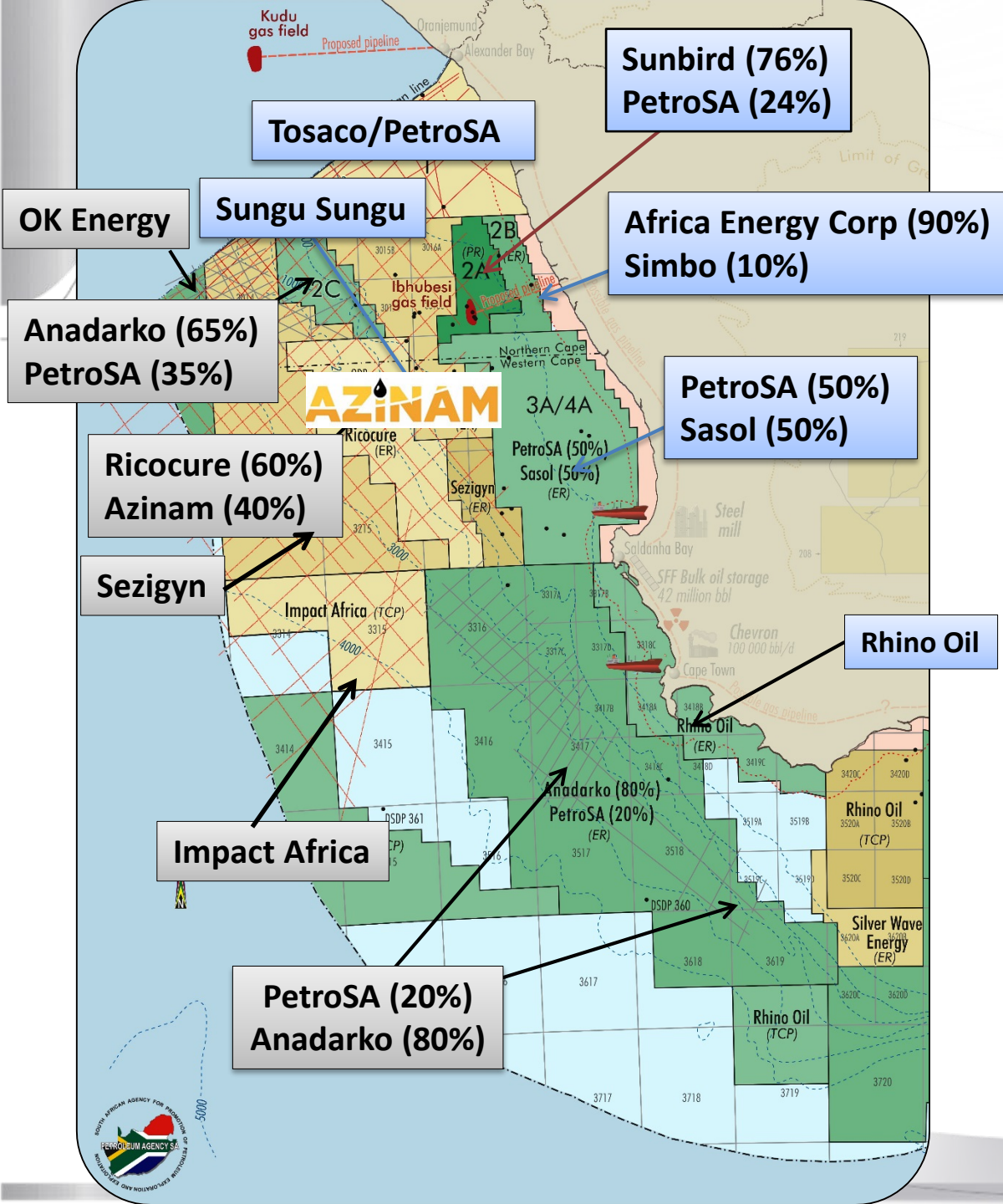
2D SURVEYS
>50 600 km



WEST COAST

Rights and major operators

- **Shallow-water** – AEC, Simbo, Sasol
- Sunbird - **Production right** around Ibhubesi
- **Mid-Basin** – Sungu Sungu
- **Deep-water** – Ricocure, Sezigyn, Impact
- **Southern basin** – Anadarko and PetroSA



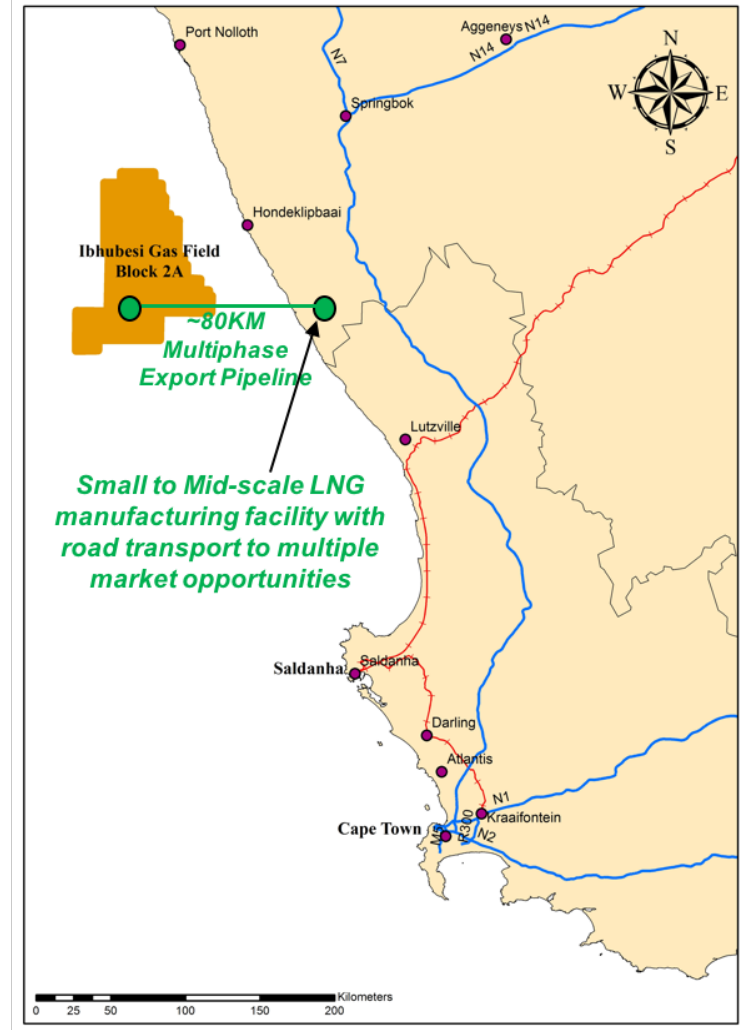
IBHUBESI GAS PROJECT

SUNBIRD ENERGY 76%

PetroSA 24%

New Concept: Mid-Scale Indigenous LNG

- Work continues with Eskom Ankerlig Power Station
- But proposing multiple sales and delivery points within 400 – 600 km radius
- **First gas deliveries 2021**
- Planned IGP LNG Production: 11 – 22million GJ/annum
- 1C (210Bcf) undeveloped resources → 10 to 20 years of Production depending on market
- Current negotiations **advanced** with significant potential off-takers
- Markets include power generation, industrial/mining and transportation

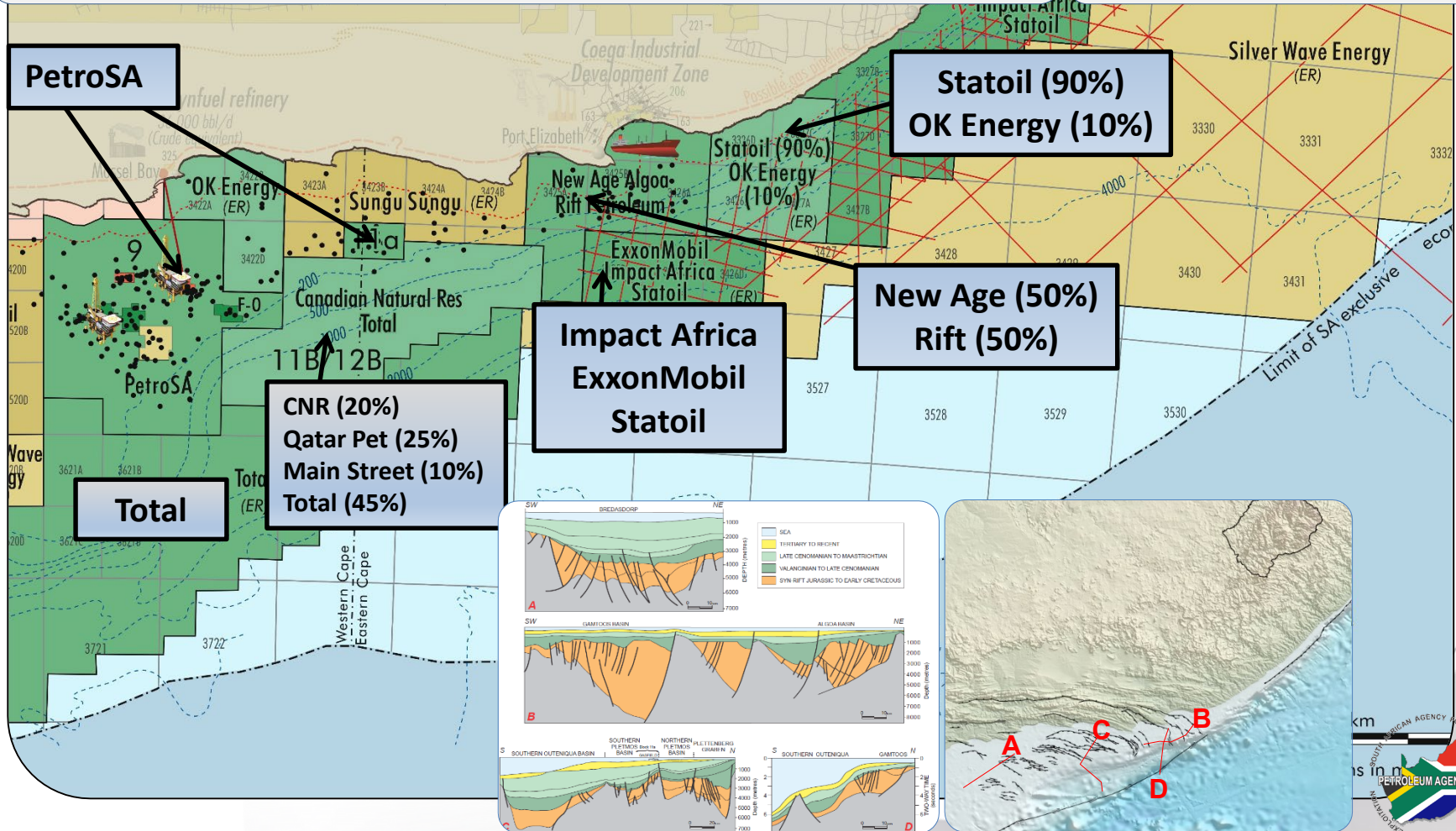


GREATER OUTENIQUA BASIN

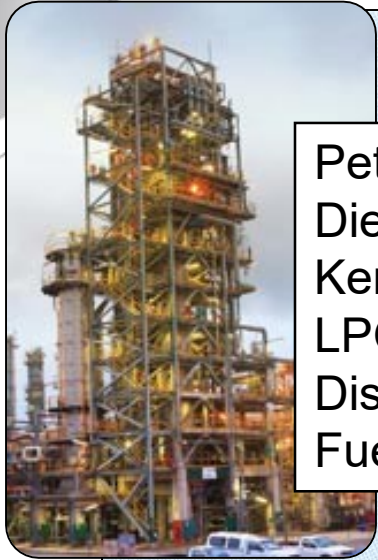
Bredasdorp, Pletmos, Gamtoos, Algoa and Southern Outeniqua sub-basins

PetroSA, NewAge with Rift Petroleum, ExxonMobil with Impact, Sungu Sungu and OK Energy and Statoil in shallower waters.
Total, CNR, Silverwave in the deep water

SOUTH COAST



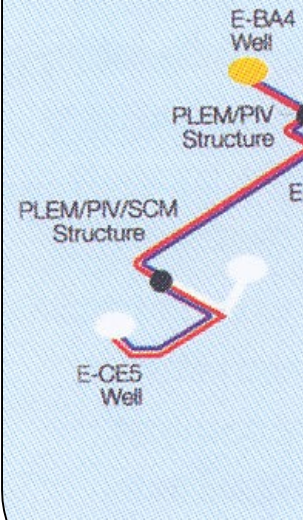
SOUTH COAST GAS PIPED TO GTL PLANT



Petrol
Diesel
Kerosene
LPG
Distillates
Fuel oil



1992 F-A gas field
and later E-M field



About 1 TCF
Operating for over 20 years 195MMscf/day
Supplemented through E-M and South Coast Gas
20 wells – 70MMscf/d single train
50 to 100 Bscf remains produceable

— Production/MEG Pipeline
— Control/Chemical Injection Umbilical



SOUTH COAST OIL PRODUCTION

1997 – Oribi field

2000 – Oryx field

Nearly 46MMbbls -
suspended



**Sable oil field: 2003 -
2008**

25 000 to 28 000 bbl/d

40 000bbl/d at peak

24 MMbbl produced

Original partners in Sable:

PetroSA 55 %

Pioneer 45 %

Now producing gas



2003 SABLE FIELD FPSO



Block 9 – PetroSA F-O gas field Project Ikhwezi

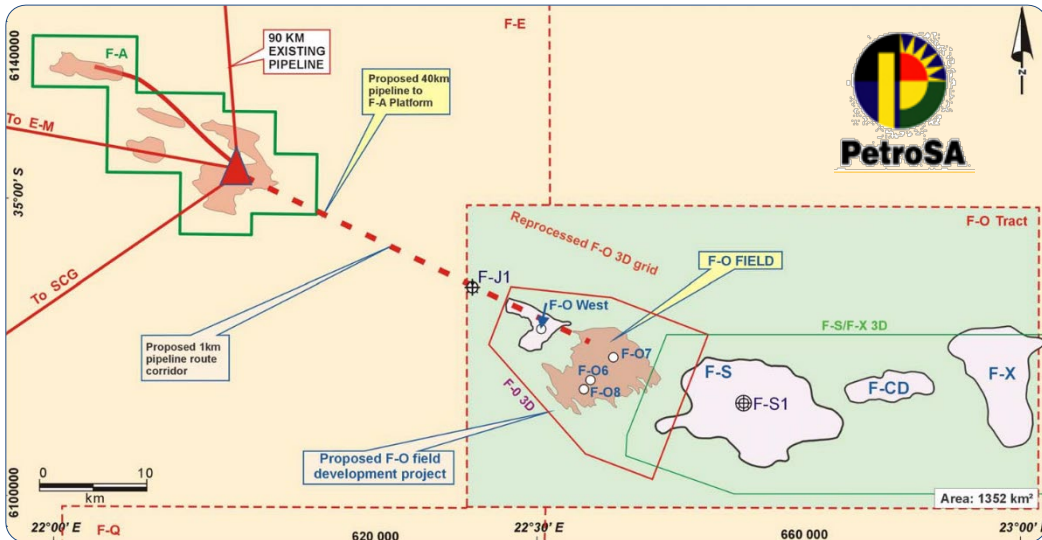
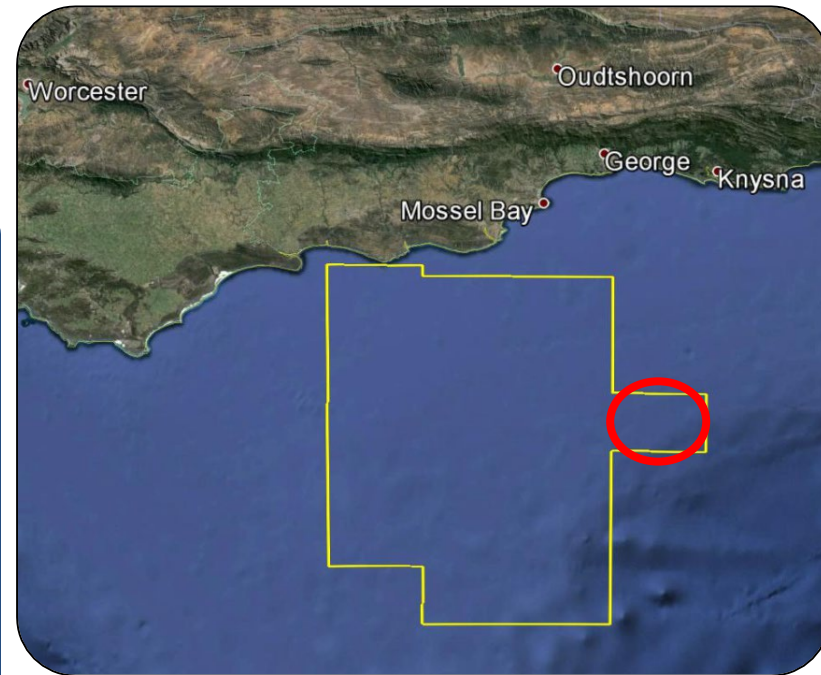
110km offshore, 40 km SE of F-A

4 wells drilled, 3 tied back and
producing to feed GTL plant

SOUTH COAST

F-O Gas Field

*Produced 26Bscf to date – remaining
possible from wells 30Bscf
P50 800Bscf GIIP*



SOUTH COAST DEEPWATER DRILLING

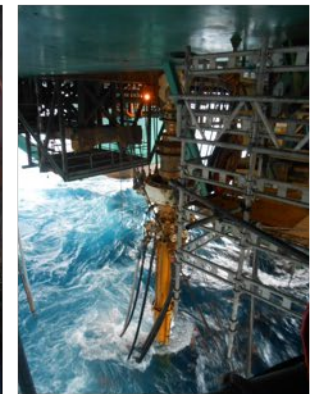
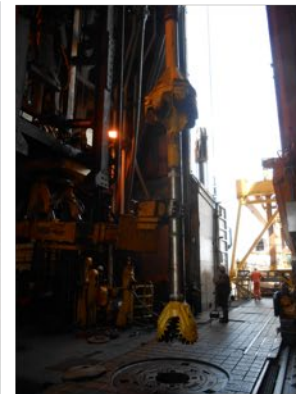


Total's Brulpadda-1AX well in Block 11B/12B was spudded on 21 July 2014

The well was drilled to 1835m (~500m below mud line)

Suspended on 27 September

Odfjell's Deepsea Stavanger semi-sub June 2018 to April 2019



SOUTH COAST DEEPWATER DRILLING



**Total 45% Qatar Petroleum 25% CNR 20% Main Street 10%
Drilling first 1/4 2019 – Odfjell's Deepsea Stavanger**

**Year of construction 2010
Type Semi-submersible
Design GVA 7500
South Korea
Water Depth Capacity
10000 ft
Accommodation 190**



EAST COAST

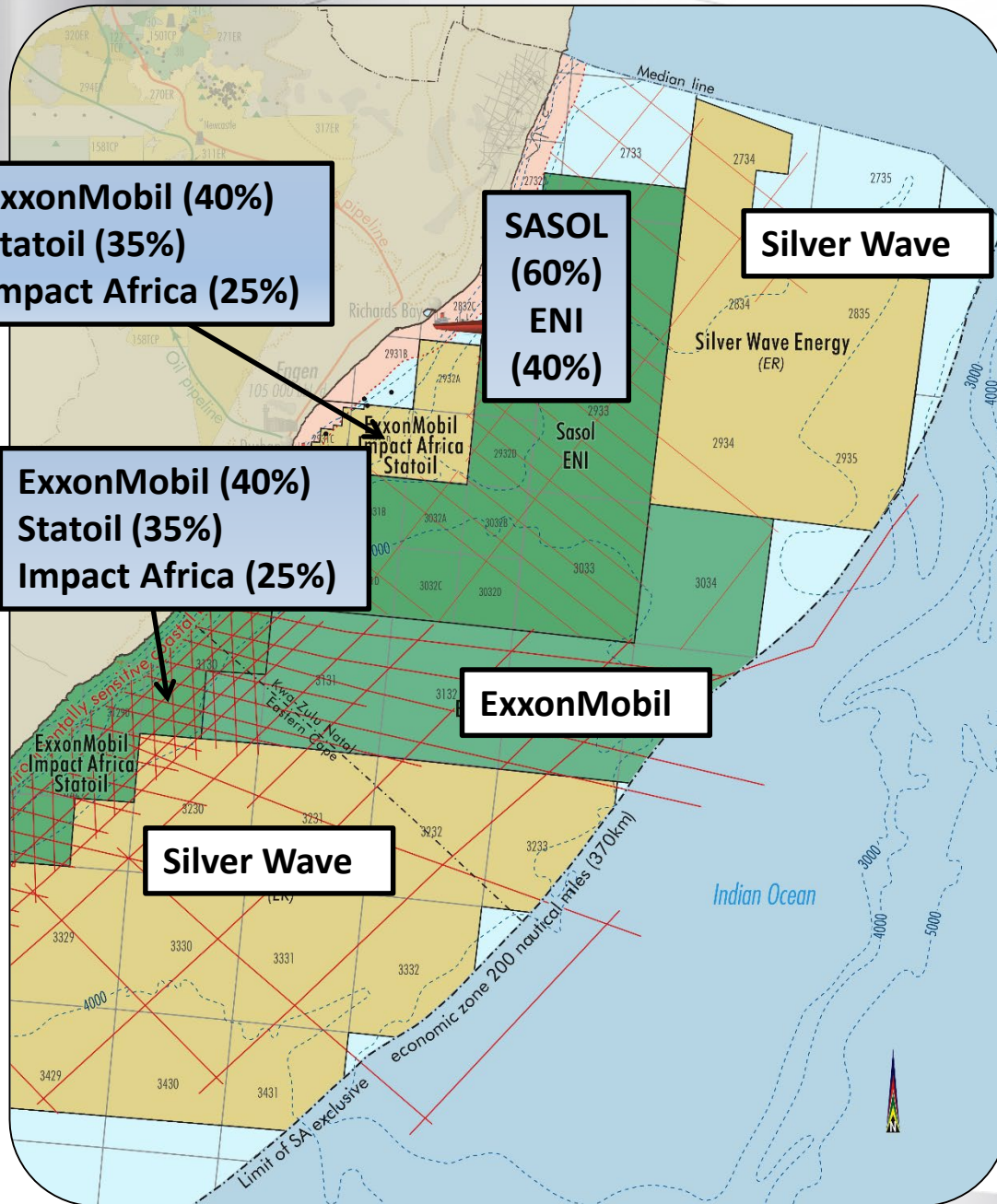
Rights and major operators

Shallower water –

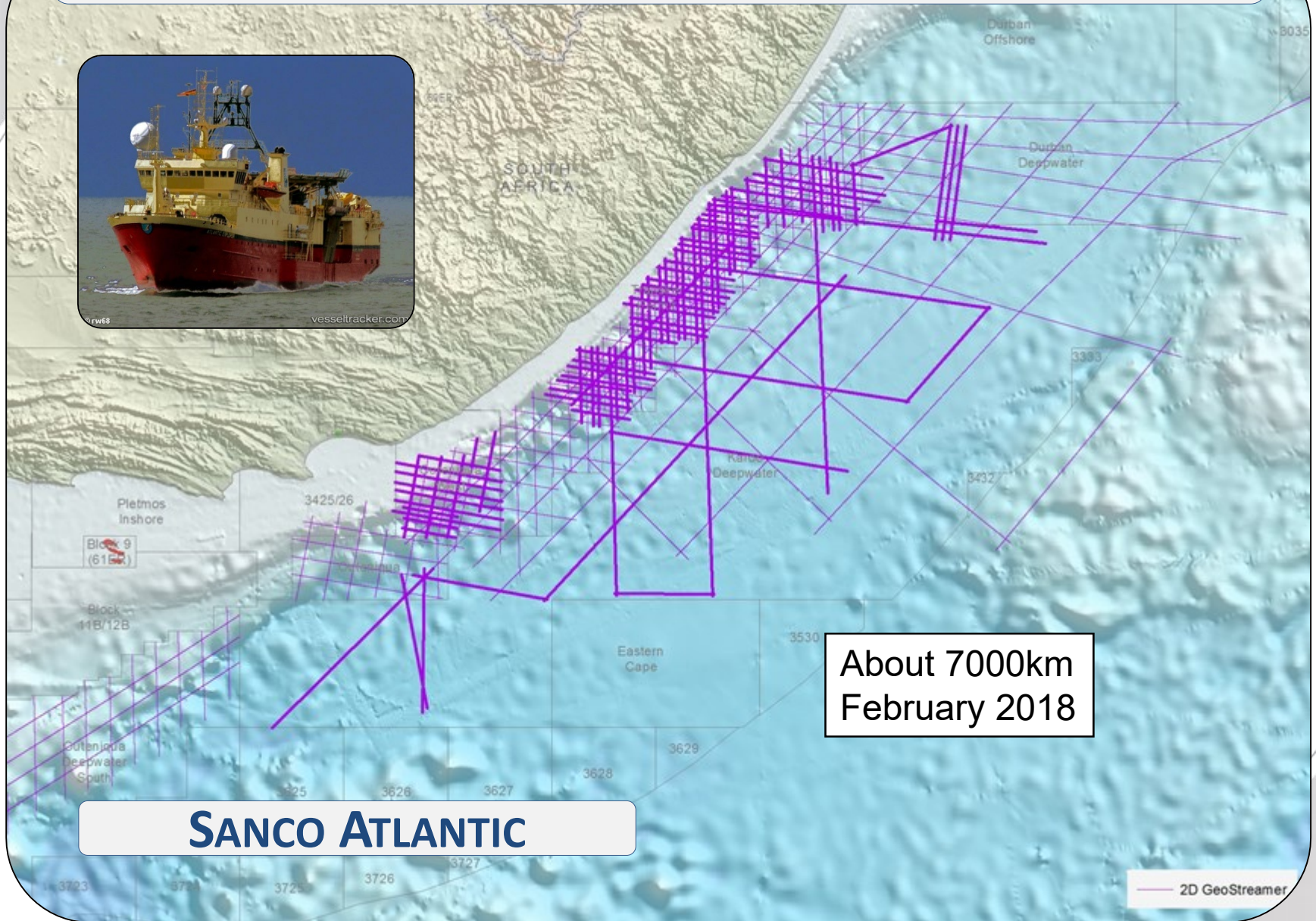
ExxonMobil, Statoil and Impact - 2 ERs

Sasol and ENI – ER in **deep water**

Silver Wave and ExxonMobil in the **ultra deep water**



PGS EAST COAST 2D MULTI-CLIENT ACQUISITION



About 7000km
February 2018

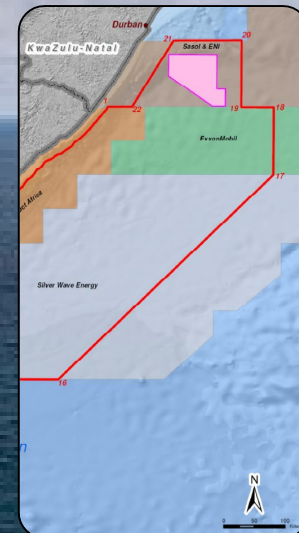
SANCO ATLANTIC

— 2D GeoStreamer

EAST COAST 3D ACQUISITION

RAMFORM SOVEREIGN

About 4600km²
February 2018
Sasol ENI block

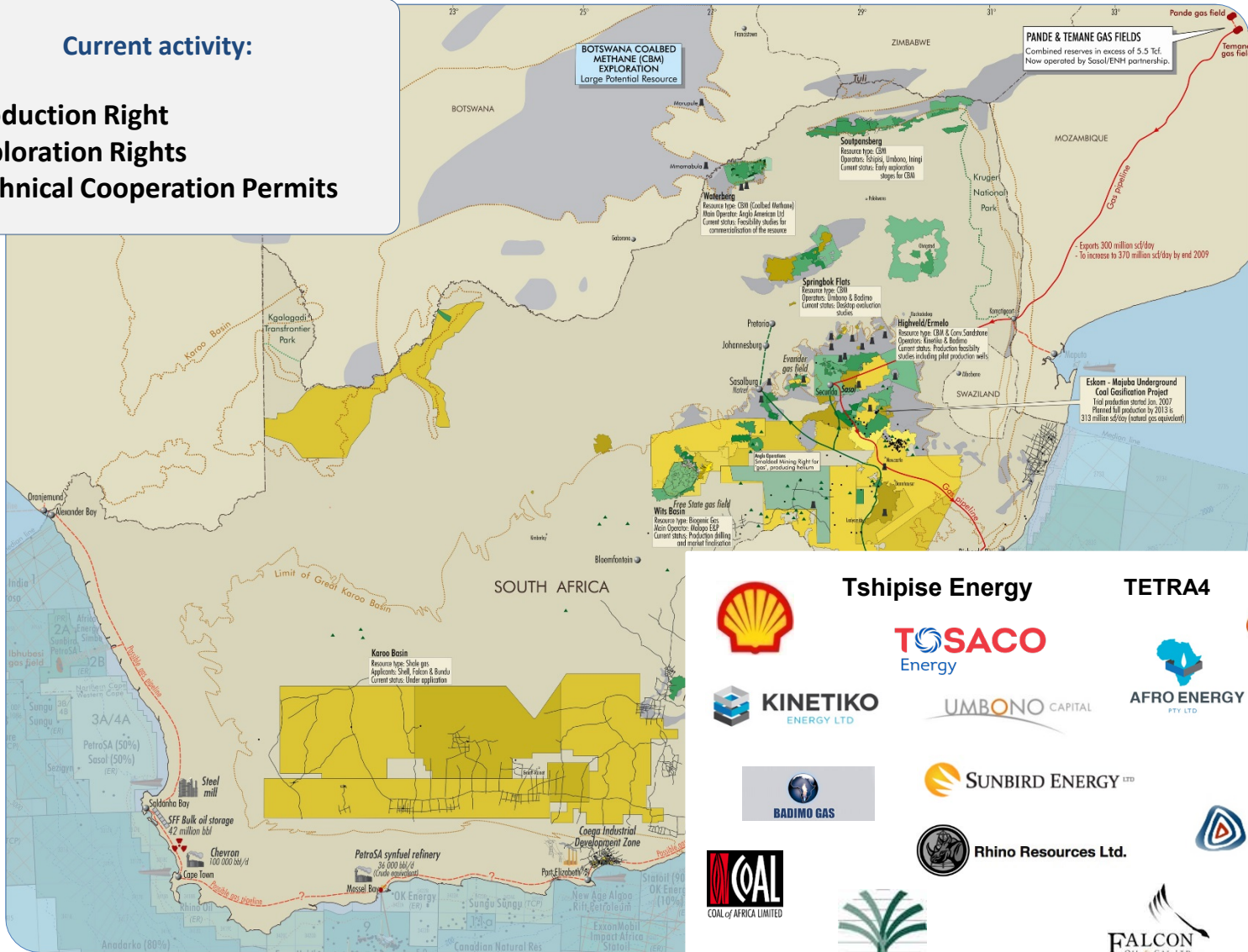


ONSHORE SA - EXPLORATION ACTIVITY AND DEVELOPMENTS

CURRENT ONSHORE ACTIVITY

Current activity:

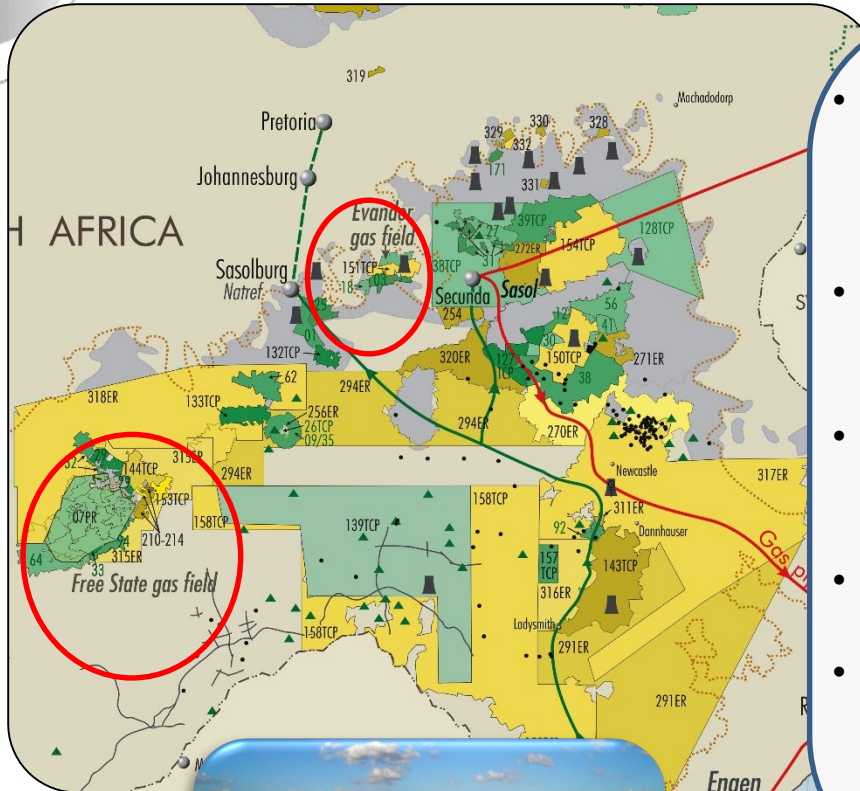
- 1 Production Right
- 7 Exploration Rights
- 5 Technical Cooperation Permits



Logos of various energy and gas companies:

- Shell
- Tshipise Energy
- TETRA4
- SACO Energy
- Bundu Gas & Oil Exploration Pty Ltd
- KINETIKO ENERGY LTD
- UMBONO CAPITAL
- AFRO ENERGY PTY LTD
- BADIMO GAS
- SUNBIRD ENERGY LTD
- BADIMO GAS
- Rhino Resources Ltd.
- ANGLO AMERICAN
- COAL OF AFRICA LIMITED
- FALCON OIL & GAS LTD
- SOUTH AFRICAN AGENCY FOR PROMOTION OF PETROLEUM EXPLORATION AND PRODUCTION

BIOGENIC GAS



- Gas shows were discovered in the **Free State** and **Evander goldfields** and are the most promising targets for biogenic gas at present
- First onshore natural gas **Production Right** awarded in September 2012
- Renergen's **TETRA4** - Compressed natural gas used to power Megabus local service
- Independent reserve valuation* of ZAR 6.6bn
- Assets in Virginia in the Free State - 2P 127.4 Bcf



1 well producing to plant – 11 further wells to be connected

RENERGEN

TETRA4



BIOGENIC GAS

- **First phase** completed
 - First phase consisted of constructing the pilot plant at the first well and supplying CNG to first customer, Megabus
- **Second phase** underway
 - Completion of Environmental Impact Assessment to construct a pipeline to join all 12 wells
 - Construction and commissioning of pipeline
 - Bringing power generation online
 - **IDC loan 218M**
- **Third phase** to commence following completion of pipeline
 - Construction and delivery of LNG and helium liquefier
Estimated 2019
- Continued drilling throughout all phases to increase production

TETRA4

RENERGEN



COALBED METHANE

Lephalale Project



- Recoverable 1 Tcf

The Mopane Project

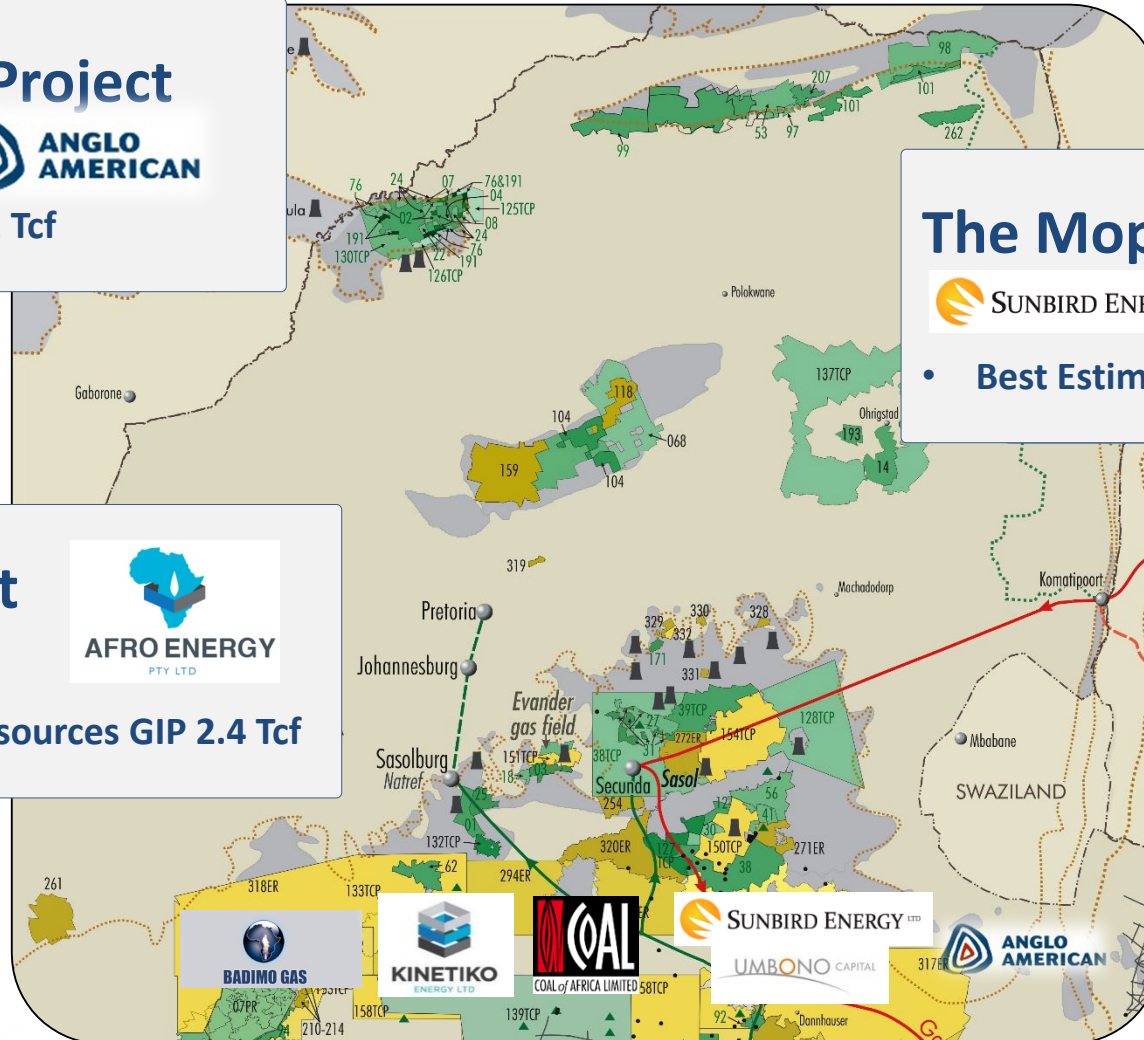


- Best Estimate GIP of 1.9 Tcf

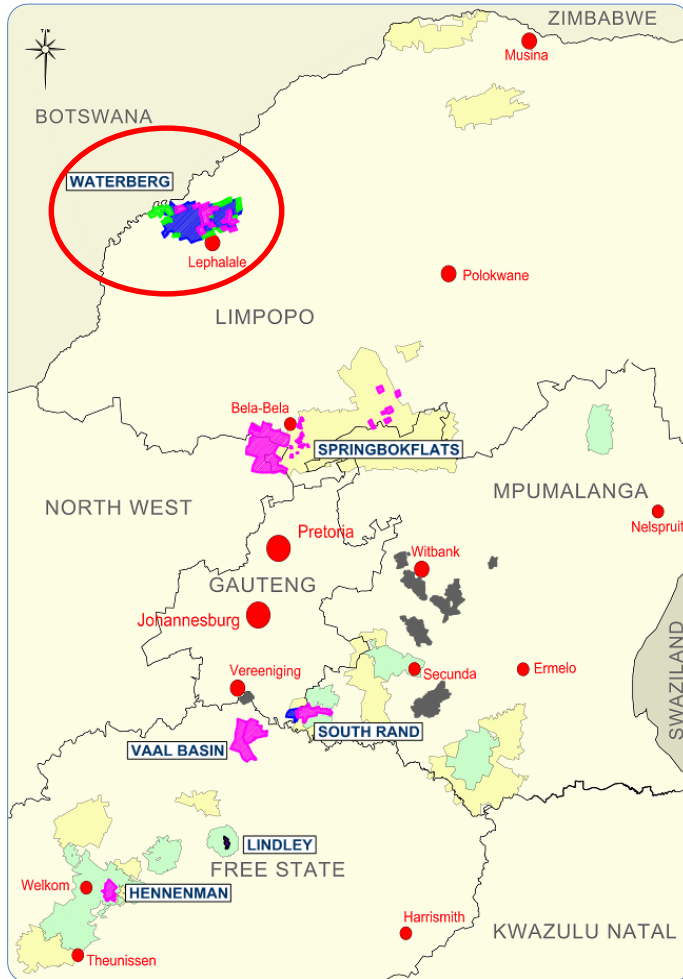
Amersfoort



- Contingent resources GIP 2.4 Tcf



COALBED METHANE



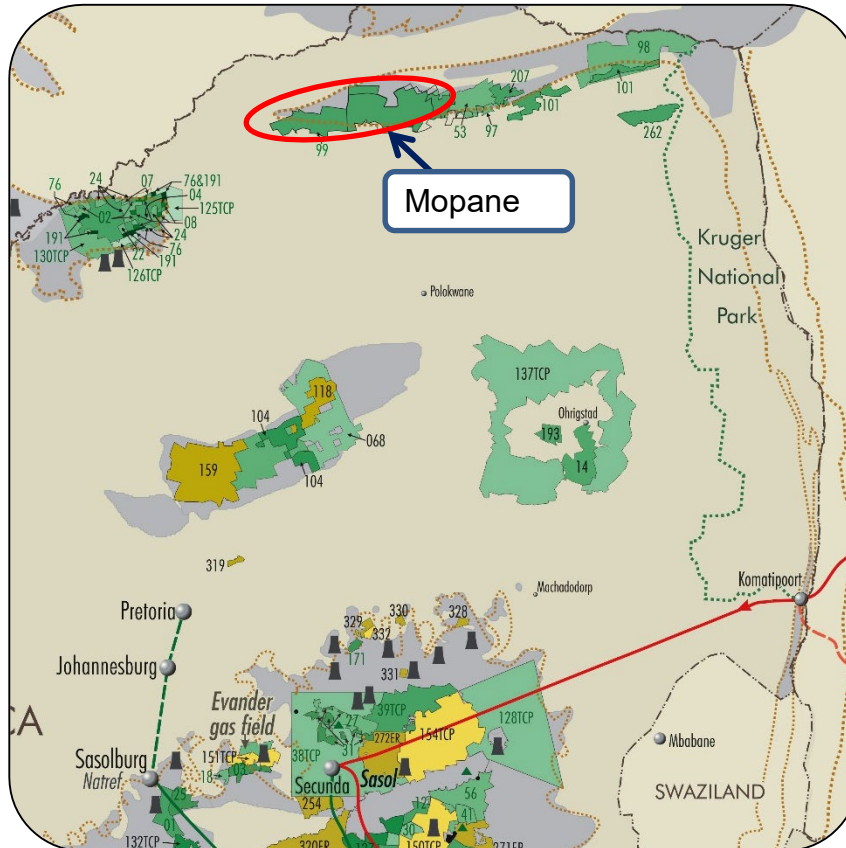
Lephalale CBM Project

- Waterberg Coalfield - Grootvlei
- More than 100 wells drilled
- Single 5-spot production test
- Testing initiated in 2004, gas was flowing but this has been shut-in.

Total Recoverable
~1 Tcf published



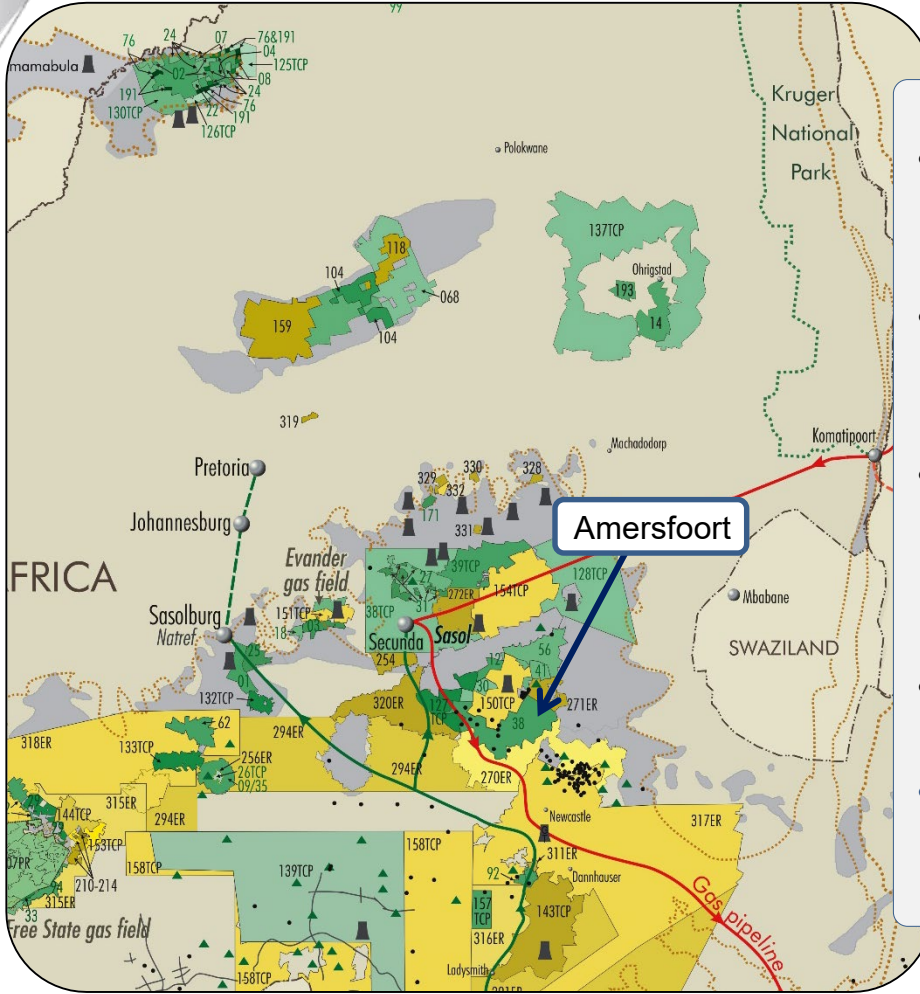
COALBED METHANE



The Mopane Project

- 420km NE of Johannesburg covering an area of $\pm 1577\text{km}^2$
- Operation and drilling was completed
- **Best Estimate GIP of 1.9 Tcf from early estimates**

COALBED METHANE



- JV between Badimo Gas and Kinetiko Energy - **AfroEnergy**
- The JV covers two exploration rights in Amersfoort Coalfield
- Considered highly prospective for CBM and also gassy sandstones overlying the coal horizons
- Initial drilling complete
- **Contingent resources at P50 level of 2.4Tcf GIIP**



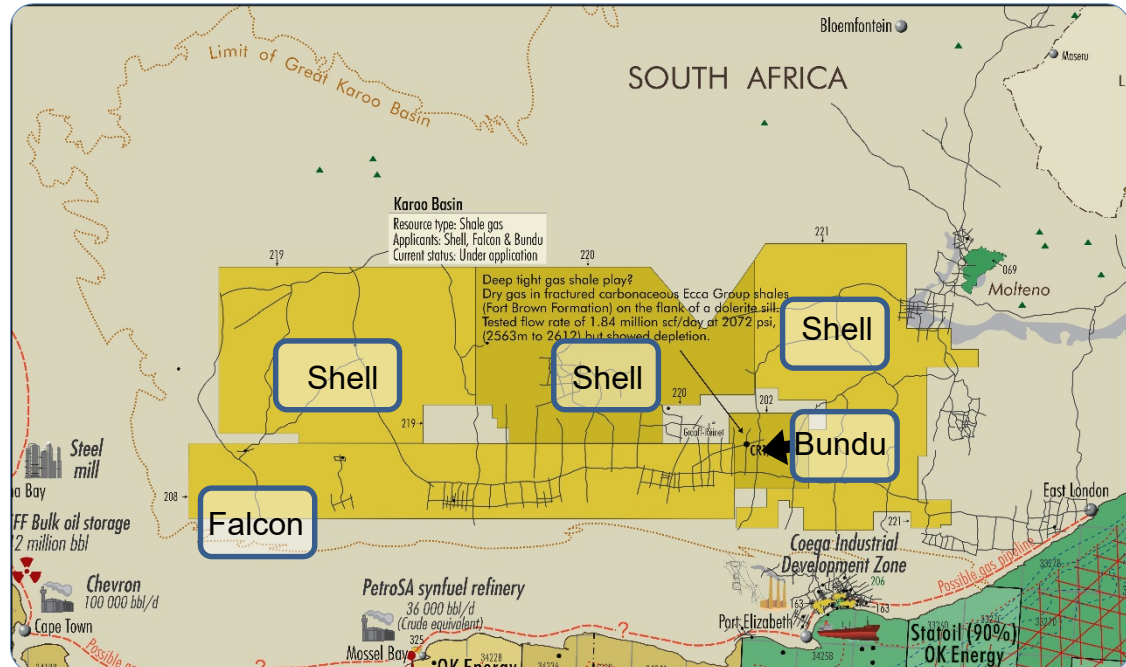
SHALE GAS

Play fairway in southern part of basin

EIA: reporting 370 Tcf (2015)
Petroleum Agency SA's conservative
Previous Best estimate 36 Tcf
recoverable (Whitehill only)

Revised to **205 Tcf** recoverable

- All target formations
- Additional legacy data – prospective area increased 3 fold
- Estimates now include adsorbed as well as free gas
- Detailed basin modelling



NEW DEVELOPMENTS

- MPRDA **amendment withdrawn**, original MPRDA in force as it was prior to amendments
- Plans to introduce **separate oil and gas legislation** – clarity on terms, formalise socio-economic requirements, local participation and local content

NEW DEVELOPMENTS CTD.

- Shift in licensing regime – moratorium allowing **all new licensing by invitation**
 - Manage acreage allocation
 - Inclusive, equitable
 - Relinquishment

Does not affect the rights of current holders – eg TCP to ER, renewals, ER to Production

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