

THE ROLE OF GAS IN THE JUST ENERGY TRANSITION



14 October 2021

The Petroleum Agency SA, PASA



PASA is the regulatory authority of the upstream oil and gas industry in South Africa. The Agency is designated in terms of Section 70 of the MPRDA by the Minister to perform the following key functions :

- **Resource Evaluation & Promotion** – Evaluating and quantifying onshore and offshore acreage, promoting South Africa's petroleum resource prospectivity. We do this using basin modelling from data that we have.
- **Regulatory & Licensing** – Processing applications for rights and permits and undertake compliance monitoring of operators in line with Section 6 of the MPRDA.
- **Data Management** – The Agency is the national custodian of all petroleum resource data.
- **Strategic Projects** – From time to time the Minister designates the Agency to undertake projects to better understand the petroleum resource of the country, support regulation, growth or development of the industry

Restriction Notice on Applications

As of the 28th June 2018, all new applications for Technical Cooperation Permits, Exploration Rights and Production Rights will be by invitation until further notice.

This affects:

- All acreage, both onshore and offshore
- It does not affect:
- Reconnaissance permits - i.e. spec surveys/multi-client surveys
- Applications made before the 28th June 2018
- Current permit and right holder's exclusive rights to apply for exploration rights (from a TCP) or production rights (from an ER)

Mineral and Petroleum Resources Development Act, No.28 of 2002.

Role of Petroleum Agency SA

Under section 71 of the above Act, Petroleum Agency SA has been appointed the designated Agency, with the following responsibilities:

- Promotion and regulation of exploration and production on and offshore
- Receive applications, evaluate and recommend the award of permits and rights
- Review, evaluate and recommend approval of EMPs
- Monitor compliance of licence conditions
- Maintain and add value to the national petroleum exploration and production database
- Acquire reconnaissance data
- Collect all prescribed fees

Permits and rights

The above Act defines the following permits and rights:

- Reconnaissance Permit - 12 months, non-exclusive
- Technical Cooperation Permit - 12 months, exclusive desk-top study, exclusive right to apply for Exploration Right
- Exploration Right - exclusive, transferable, 3 years, renewable for a maximum of 3 periods of 2 years each.
- Production Right - exclusive, transferable, 30 years, renewable.

KUDU GAS FIELD

BW Kudu (56%) Namcor (44%)
Discovered in 1974 by a Chevron / Agip / Sasol consortium. The reservoir comprises Burmian (Early Cretaceous) aeolian sandstones with average porosities up to 22 % at 4400m.

TOSACO

Prospects/leads mapped in the drift sequence

THOMBO / MAIN STREET PANORO / AZINAM

Preparing to drill the Ozanora Prospect

SUNBIRD (Operator) (76%) PETROSA (24%)

003PR

PETROSA (100%)

248ER

KOSMOS ENERGY (45%) SHELL (45%) OK ENERGY (10%)

274ER

IBHUBESI GAS FIELD

Ibhubesi gas field comprises fluvial type channels and lobes of Albian to early Cretaceous age. Currently, the production right is under a Gas Market Development Plan with an Integrated Field Development Plan (IFDP) ongoing.

SUNGU-SUNGU Petroleum (100%)

Reprocessed 2D seismic data. Currently evaluating prospectivity in the drift sequence

Total (40%) Shell (40%) PetroSA (20%)

224ER

E-E GAS FIELD (PetroSA 100%)

Originally the Sable oil field, gas is now being produced from this Apian age deep marine channel sandstone reservoir to supplement the feed to the Mossel Bay plant.

ORIBI/ORIX OIL FIELD (PetroSA 100%)

Submarine fan deposits of Albian (Early Cretaceous) age. Currently not in production.

PETROSA BLOCK 9

Ongoing exploration and appraisal of oil and gas discoveries.

F-A GAS FIELD & SATELLITES (PetroSA 100%)

Currently producing from Early Cretaceous shallow marine sandstone reservoirs. Separate 9 km pipelines convey gas and condensate to the PetroSA GTL synfuels refinery at Mossel Bay where petrol, diesel, kerosene, etc are produced. F-O Field, 4 wells drilled and currently 2 producing.

ONSHORE KEY

- PETROLEUM EXPLORATION WELL
- OIL SHOWS
- COAL FIRED POWER STATION
- GAS TURBINE POWER STATION
- POSSIBLE FUTURE GAS PIPELINE
- SEISMIC LINES
- KOBERG 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 (OL) - Block 9
- MINING LEASE (GAS) - Block 9

West Coast

0.5 Tcf (Proven)
22 Tcf (Prospective)

Shale gas

209 Tcf (Prospective)

South Coast

4 Tcf (Proven)
29 Tcf (Prospective)

Biogenic

139 Bcf (Proven)
1.3 Tcf (Prospective)

East Coast

8 Tcf Prospective

CBM

8.4 Tcf (Proven)
22 Tcf (Prospective)

PADE & TEMANE GAS FIELDS

Combined reserves in excess of 5.5 Tcf.
Now operated by Sasol/DNH partnership.

ONSHORE RIGHTS

12/2/171 TCP	Tetrad
12/2/002 ER	Anglo Operations
12/3/001 ER	Ongegas Gas
12/3/029 ER	Tetra4
12/3/032 ER	Tetra4
12/2/033 ER	Tetra4
12/3/030 ER	Alfa Energy
12/3/055 ER	Alfa Energy
12/3/064 ER	Tetra4
12/3/094 ER	Tetra4
12/2/210 ER	Gold One Africa
12/3/211 ER	Gold One Africa
12/3/212 ER	Gold One Africa
12/3/213 ER	Gold One Africa
12/3/270 ER	Alfa Energy
12/3/271 ER	Alfa Energy
12/3/272 ER	Alfa Energy
12/3/294 ER	Rhino Oil & Gas
12/3/295 ER	Rhino Oil & Gas
12/3/315 ER	Malawane Energy
12/4/007 ER	Tetra4

ONSHORE APPLICATIONS

12/2/191 TCP	Basin / Black Gold
12/2/192 TCP	Basin / Black Gold
12/2/193 TCP	Basin / Black Gold
12/2/194 TCP	Basin / Black Gold
12/2/195 TCP	Basin / Black Gold
12/2/197 TCP	Basin / Black Gold
12/2/198 TCP	Afri Dimes (Phy) Ltd
12/2/199 TCP	BlackGold
12/2/201 TCP	BlackGold
12/2/202 TCP	Gonswans Petroleum
12/2/048 ER	Badima Gas
12/3/049 ER	Badima Gas
12/2/202 ER	Bundu Gas & Oil
12/3/208 ER	Falcon Trading
12/2/219 ER	Shell Expl. Co
12/2/220 ER	Shell Expl. Co
12/3/221 ER	Shell Expl. Co
12/3/242 ER	Booi Brothers
12/3/288 ER	Twala Moyemando
12/3/316 ER	Malawane Energy
12/3/318 ER	Rhino Oil
12/3/320 ER	Alfa Energy
12/3/346 ER	Rhino Oil
12/3/350 ER	Rhino Oil
12/3/351 ER	Gonswans Energy
12/3/353 ER	Kingote Alumina
12/3/355 ER	Gonswans Exploration
12/3/356 ER	ORR Exploration
12/3/357 ER	Philone Prospecting
12/3/358 ER	Reconnaissance Northern
12/3/359 ER	Upington Exploration
12/3/360 ER	Voodhoff Prospecting
12/3/363 ER	Western Allen Ridge

SASOL (60%) ENI (40%)

Purchased 2D multi-client seismic data. Interpretation of this data and legacy data ongoing. 236ER

IMPACT AFRICA 100%

154ER

IMPACT AFRICA (90%) Silver Wave Energy (10%)

276ER

NEW AGE ALGOA (50%) RIFT Petroleum (50%)

Prospectively evaluation of the synrift and post-rift sequences ongoing

TOTAL (45%) QATAR PETROLEUM (25%) CNR (20%) MAIN STREET (10%)

Two deep water, gas and condensate Apt-Albian discoveries, commercialisation is currently under discussion

PETROSA - BLOCK 11a

061ER
Early Cretaceous shallow marine gas fields currently under appraisal

PRODUCE AND MINING RIGHTS IN BLOCK 9

E-M and E-BF mining leases (PetroSA)
E-C GAS FIELD (PetroSA 100%)
F-A GAS FIELD (PetroSA 100%)
ORIBI OIL FIELD (PetroSA 100%)
ORIX OIL FIELD (PetroSA 100%)
PetrosA E-BK
DOEP

Visit our website at www.petroleumagency.co.za for more information

Please refer further details should be addressed to the Chief Executive, Petroleum Agency SA.

June 2021

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TOSACO	362E
Prospects/leads reported in the drift sequence	

THOMBO / MAIN STREET
PANORO / AZINAM
Preparing to drill the
Gozania Prospect **TOSER**

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Two deep water, gas and condensate
Apt-Albian discoveries, commercialisation

**NEW AGE ALGOA (50%)
RIFT Petroleum (50%)**
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and post rift sequences ongoing

CRETACEOUS - BLOCK 11a 061ER
Early Cretaceous shallow marine
fields currently under appraisal.

FIELD & SATELLITES (PetroSA 100%)
Producing from Early Cretaceous shallow
sandstone reservoirs.
17 km pipelines convey gas and condensate
to PetroSA GTL synfuels refinery at Mossel Bay
oil, diesel, kerosene, etc are produced.
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PANDE & TEMANE GAS FIELDS
Combined reserves in excess of 5.5 Tcf.
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12/3/271 ET	Alfa Energy
12/3/272 ET	Alfa Energy
12/3/294 ET	Rhine Oil
12/3/295 ET	Rhine Oil & Gas
12/3/315 ET	Motavone Energy
12/4/007 PK	Tetraf4

ONSHORE APPLICATIONS

12/27/91	TCP	Boston / Black Gold
12/27/92	TCP	Boston / Black Gold
12/28/92	TCP	Boston / Black Gold
12/29/94	TCP	Boston / Black Gold
12/27/95	TCP	Boston / Black Gold
12/27/97	TCP	Boston / Black Gold
12/27/98	TCP	Axi Jims (Pty) Ltd
12/27/99	TCP	BlackGold
12/28/99	TCP	BlackGold
12/28/99	TCP	Gondwana Petroleum
12/28/00	EPR	Rodino Gas
12/28/00	EPR	Rodino Gas
12/28/00	EPR	Banda Gas & Oil
12/28/00	EPR	Linda Treding
12/28/00	EPR	Suez Exp Co
12/28/00	EPR	Shell Exp Co
12/28/01	EPR	Shell Exp. Co
12/28/02	EPR	Boal Brothers
12/28/02	EPR	Toshi Mayevandana
12/31/00	EPR	Holovance Energy
12/31/00	EPR	Alita Energy
12/31/00	EPR	Alita Energy
12/31/00	EPR	Holovance Energy
12/34/00	EPR	Rhino Oil
12/35/00	EPR	Gondwana Energy
12/35/00	EPR	Kangaroo Kangas
12/35/00	EPR	Crossco Exploration
12/35/00	EPR	ORR Exploration
12/35/00	EPR	Pinnacle Prospecting
12/35/00	EPR	Reconnaissance North
12/35/00	EPR	Ugipitron Exploration
12/36/00	EPR	Windfield Prospecting

PRODUCTION AND MINING RIGHTS IN BLOCK 9

The map displays several offshore oil and gas fields in the Gulf of Mexico, with ownership status indicated by color and text. The fields and their ownership are as follows:

- E-M and E-BF mining leases:** Pending (Pink area)
- E-M:** 100% (Green area)
- E-CE GAS FIELD:** E-CP 100% (Green area)
- SOUTH COAST GAS:** Shell 100% (Green area)
- F-A:** 100% (Red area)
- F-A GAS FIELD:** PetroSA 100% (Red area)
- P-C:** 100% (Green area)
- ORIBI OIL FIELD:** PetroSA 100% (Green area)
- ORIX OIL FIELD:** PetroSA 100% (Green area)
- E-BK:** 100% (Red area)

The map also shows the coastline of Mexico and the Gulf of Mexico. A scale bar indicates 100 miles. A legend in the bottom right corner defines the ownership status:

- UNDER APPLICATION:** Yellow area
- REGULATIONS HIGH:** Yellow area
- REGULATIONS LOW:** Yellow area
- MINING LEASE (G):** Green area
- MINING LEASE (A):** Red area

Visit our website at www.petroleumagencyso.com for more information
This map does not constitute a final authority.
Requests for further details should be addressed to the Chief Executive, Petroleum Agency SA.

Sustainable development of the industry....



In executing its mandate, the Agency is required to give effect to section 24 of the Constitution:

1. Nation's petroleum resources are developed in an orderly and ecologically sustainable manner while promoting justifiable social and economic development.
2. Petroleum applications are subjected to a:
 - rigorous environmental impact assessment,
 - stakeholder engagement, and
 - appeal and review process.
3. Oil and gas activities go through to multi- environmental permitting processes



Natural Gas is itself a greenhouse gas

- Natural gas (methane) is a greenhouse gas and is 18 - 25 times more potent than carbon dioxide at trapping heat in the atmosphere
- There are difference sources of methane emissions to the environment:
 - Landfill sites emit methane (and carbon dioxide)
 - Seepage of biogenic gas e.g. some of the Mpumalanga gas fields
 - Fugitive gas emissions from upstream E&P activities
 - Boil-off during LNG transportation and storage

Natural Gas as a fuel

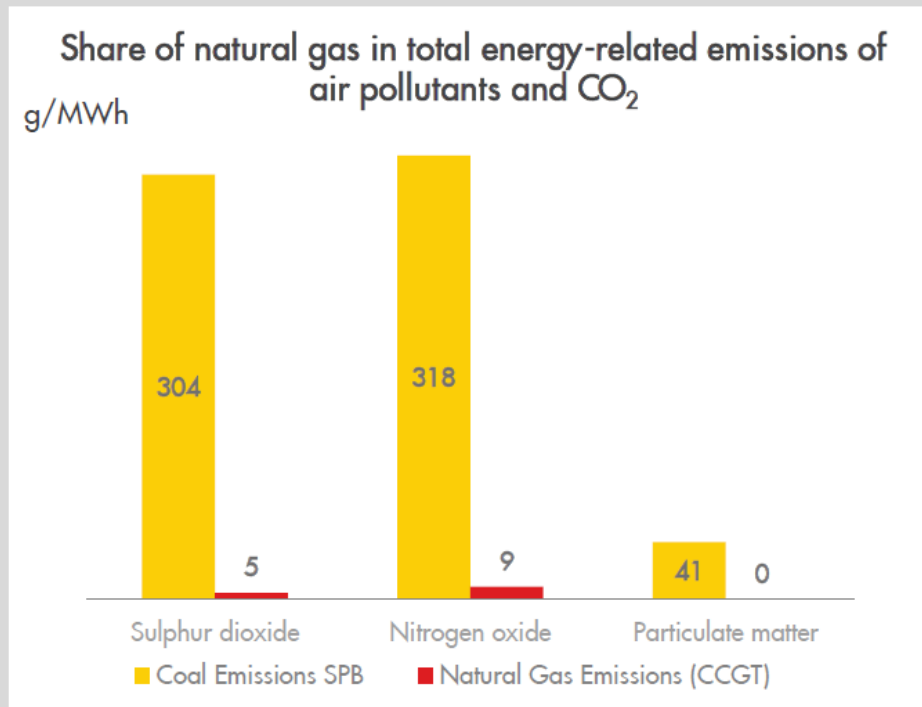
Complete Combustion



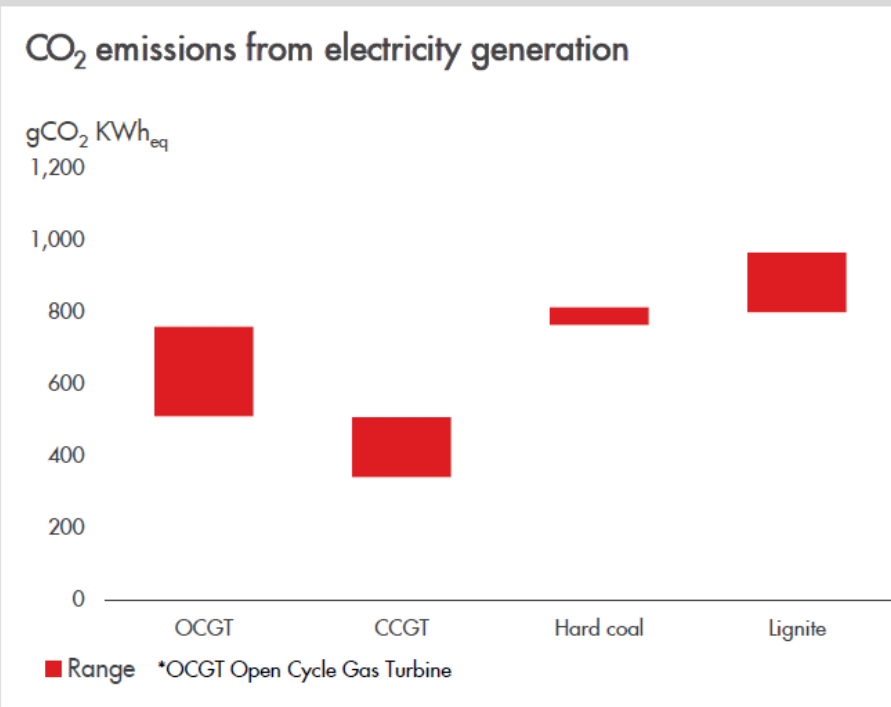
- The CO_2 emissions produced per unit of energy (electricity, transport km) is significantly less than that produced from the other fossil fuels
- For example, the landfill gas to power project in Johannesburg is a CDM project as it is an emission reduction project

- As a fuel in electricity generation and transport, gas compared to coal and diesel has 50% less CO₂ emission with almost no SO_x and NO_x emissions

Emissions advantage – air quality and CO₂



Source: Agora Energiewende 2017



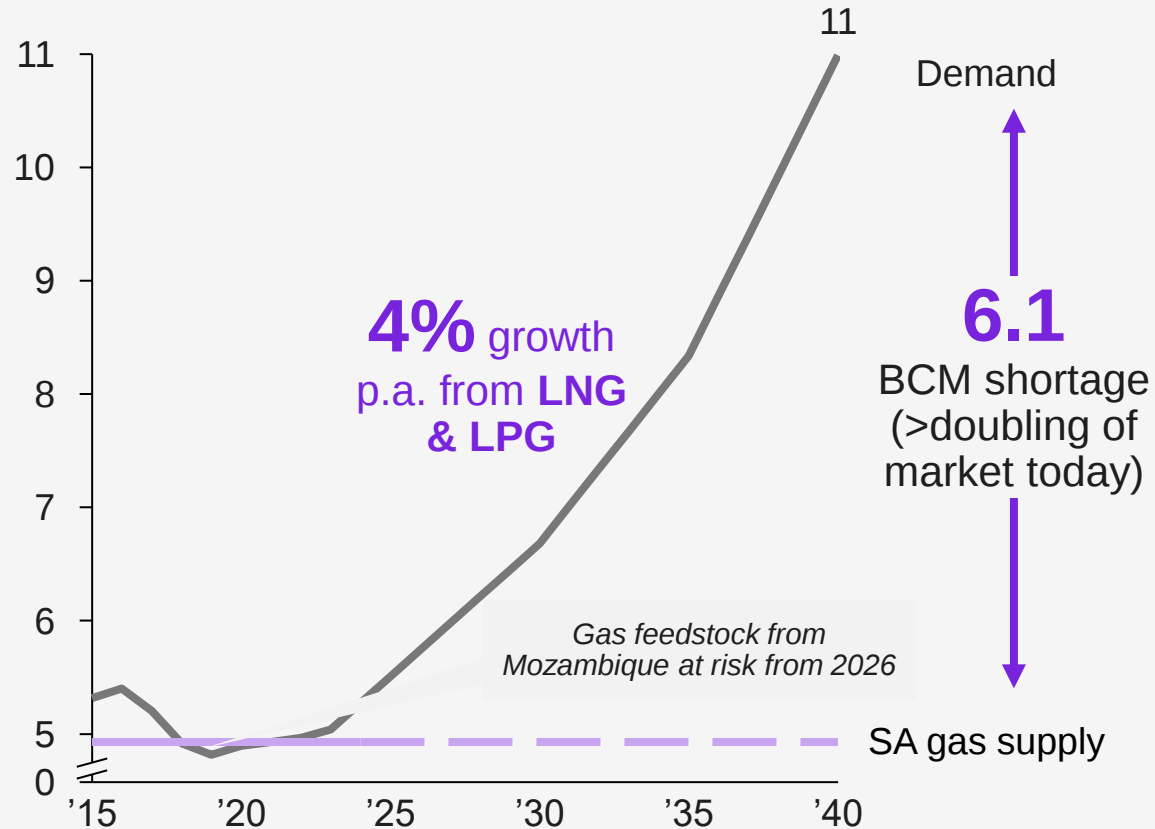
Gas is set to play a significant role in South Africa moving forward; however, risk is raised around a serious supply shortage driven by a lack of infrastructure

3

ENERGY TRANSITION

SA gas demand vs. production

BCM¹



Not meeting this demand will severely depress South African economic growth through its impact on large industrials

1. BCM: billion cubic meters
Source: PASA website; Kearney

Local gas market drivers

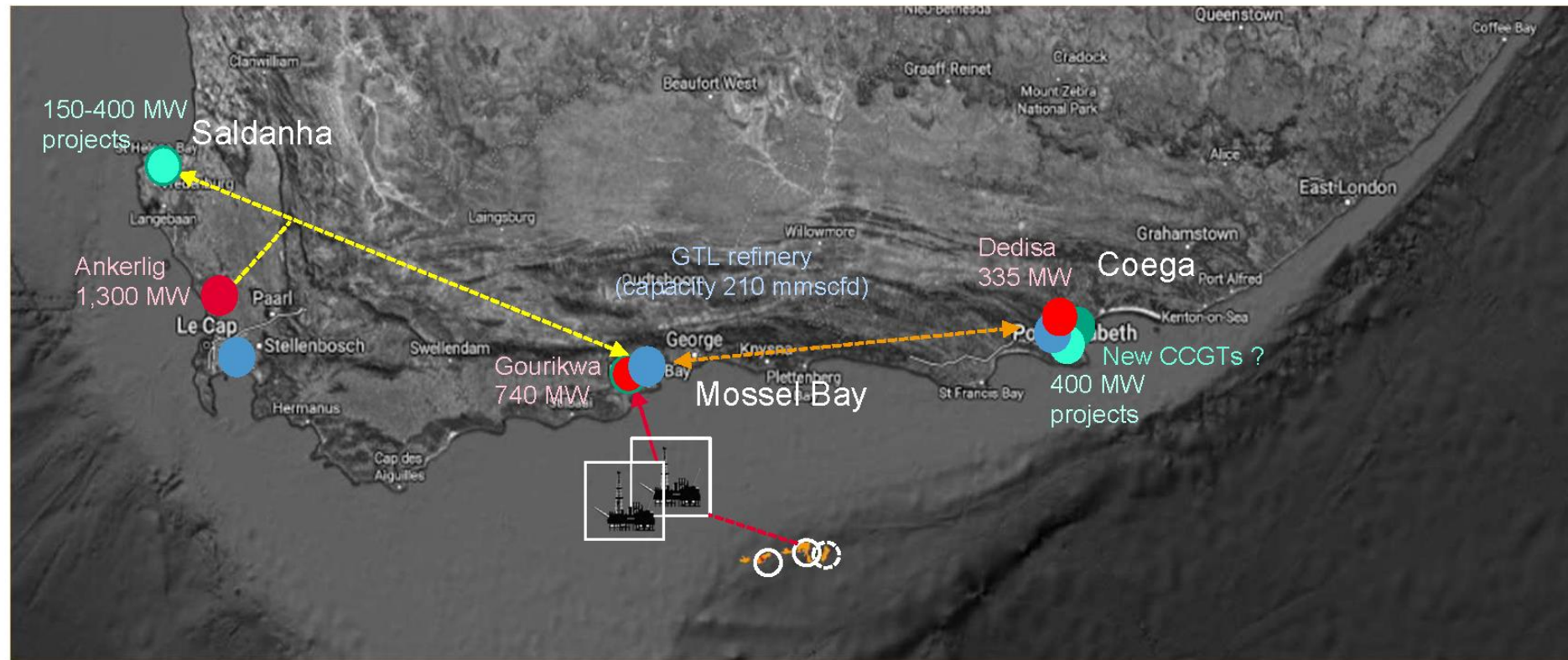
1 Regional feedstock availability

2 'Cleaner' transitional fuel

3 Electricity generation

4 Energy supply for local consumption

From 2025...we could replace over 2000MW of diesel generation with natural gas



- | | | | | | |
|--|------------------------|--|--|--|---|
| | Emergency Power tender | | Existing Gas Pipelines | | Projected Gas Pipelines to be developed by South African Authorities seen as necessary |
| | New CCGT ? | | Projected Gas Pipelines Part of Padavissie Development | | Projected Gas Pipelines to be developed by South African Authorities seen as potential |
| | Industrial Gas Demand | | | | |
| | CCGT | | | | |

Indigenous gas can provide an environmental and an economic benefit to SA



- Electricity generation from gas provides the much needed grid flexibility and reliability as South Africa grows its renewable energy generation
- Replacing coal and diesel generation with natural gas lowers the GHG emissions, NO_x, SO_x and particulate matter emissions.
- Indigenous gas provides affordable feedstock to support the country's economic recovery
 - For the Gas-to-liquids (GTL) refinery in Mossel Bay which is at threat of being closed which would lead to over 1200 direct and 3000 indirect jobs being lost
 - For the proposed gas-to-power generation and other manufacturing projects in Coega
 - Blue hydrogen production?