



IGUA-SA

Industrial Gas Users Association - Southern Africa



ANNUAL REPORT 2023

INDUSTRIAL GAS USERS'
ASSOCIATION SOUTHERN AFRICA

MEMBERS

Current members and program participants at the time of writing include:





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Message from

THE CHAIRPERSON



THOMAS SHAW

IGUA-SA Chairperson

This IGUA-SA 2023 Annual Report comes after three very turbulent years in the global gas sector and the wider global energy markets. The Covid-19 pandemic lockdowns, with a brief period of excess supply and low prices, gave way to tight energy markets, extreme price volatility, and a compounding geopolitical challenge to energy security. At the time of writing, the ongoing Russia-Ukraine conflict has been affecting the flows of gas and has put Europe on a quest to diversify its energy and gas supply that is now opening a new paradigm in the energy sector.

The market has seen unprecedented volatility in gas prices over the past two years. TTF gas prices fell to record low levels of \$1.27 per GJ in May 2020, triggered by nationwide lockdowns and a pandemic-driven low-demand environment. US LNG cargoes were cancelled between April and July, as the market demand remained depressed. Prices recovered quickly in 2021 and rallied upward, as the pace of global economic activity picked up, and gas demand increased, outpacing capacity additions. Both the Asia Spot and TTF gas prices hit record highs, with the Asia Spot price peaking at \$58 per GJ, as Europe and Asia competed for LNG cargoes. The Russia-Ukraine conflict that started in February 2022 further exacerbated the already tight market, and the TTF Front Month contract was propelled to a new high of \$72 per GJ in early March. A significant price premium was observed for European cargoes for the first time, as Asian gas was traded at a relatively discounted price.

“ The global energy crisis triggered by the Russian invasion of Ukraine put gas supply security and market stability at the centre of policy interventions for many countries in 2022.

They included the introduction of more stringent storage regulations, LNG procurement mechanisms based on enhanced coordination, and wholesale market interventions aiming to reduce price volatility. The first quarter of 2023 is seeing a normalisation in market pricing for oil and gas as market interventions positively impact price volatility.

Whilst energy markets are less volatile now, oil and gas remain expensive. With the global economy slowing and energy prices remaining high, total energy consumption across the 69 countries covered by EIU’s Industry service will rise by just 1.3% in 2023. This will be the second consecutive year of sluggish consumption growth. In 2022 it is estimated that demand grew by only 0.9%, amid record-high prices and a contraction in gas and oil supplies from Russia. A reduction in energy supplies is also likely in 2023, as OPEC+ members are willing to cut production to prevent oil prices from dropping too far. Oil and gas output from Russia is also expected to fall further, with EU sanctions on oil entering full force by end-2022. Despite pricing pressures from supply-side issues, fears of a global recession are pulling oil and gas prices down.

The energy transition to a net-zero carbon world in 2050 requires substantial levels of investment across a wide range of energy value chains.

The implied level of investment in wind and solar capacity is set to accelerate markedly from recent levels. Despite declining levels of demand, continuing investment in upstream oil and natural gas is also required. The role of gas in decarbonisation is a complex and debated topic. On one hand, natural gas has several advantages as a transitional fuel that can help to reduce carbon emissions in the short to medium term. Gas-fired power plants produce significantly fewer greenhouse gas emissions than coal-fired power plants, and gas is also used as a feedstock in the production of many industrial products, such as chemicals and fertilizers.

Southern Africa is on the verge of profound transformations that will shape its energy future. Long dominated by Angola as a key gas-producing and exporting country, the region is seeing the entry of several new local and regional gas players. Mozambique, which has been a key supplier of gas to South Africa for two decades, has become an LNG exporter in 2022 and hopes to significantly ramp up its LNG export capacity by 2030. While export facilities are being developed in the north, the country's capital in the south could also house an LNG import hub serving the sub-region. But Mozambique is also focusing on its domestic economy, with several gas-to-power projects currently in development along with the growth of its domestic LPG supply.

For South Africa, gas has become the natural and practical alternative to move away from coal. Recent discoveries onshore and offshore are also providing the foundation to grow the gas value chain and serve already well-established manufacturing and transport industries. The country became a micro-LNG producer in 2022 and will seek to further develop its domestic reserves to supply industrial facilities and decarbonise its transport sector. Namibia is set to equal Mozambique in natural gas developments and export opportunities. Significant natural gas resources have been identified during the last year and with its

government determined for the Namibian economy to capitalise on these opportunities, it is extremely progressive in attracting global investment for the development of these significant resources.

South Africa is faced with unique challenges in that it is a developing nation and yet one of the largest carbon emitters globally. This calls for a careful review and implementation of a just transition to ensure that energy security, cost efficiency and employment are optimally balanced with South Africa's commitments under the Paris Accord. In South Africa, IGUA-SA subscribes to the National Business Initiative's (NBI) 2021 report titled "Climate Pathways and a Just Transition for South Africa" regarding energy in the coming decades to 2050. IGUA-SA had the opportunity to provide extensive inputs in terms of the current and future gas energy and infrastructure needs to ensure energy security and availability over the medium and long term.

However, the South African Government has no discernible and coherent plan to deliver on South Africa's energy security or policy plans, let alone its energy transformation imperative. Whilst various government bodies and entities have been tasked to deliver on energy security and transition towards low-carbon targets, there remains a dearth of integrated policy plans for electricity, natural gas, liquid fuels, etc. Despite chronic electricity shortages and known gas supply constraints, the South African Government has made no announcements on key infrastructure developments and plans to mitigate the energy crisis. Regulatory announcements have been made to mitigate the electricity crisis. However, in the absence of integrated and meaningful policy positions for energy, announcements on integrated infrastructure developments, the efficient mobilisation of government resources, coordinated infrastructure developments and carefully considered market reforms, the energy landscape in South Africa is likely to hold back economic growth for years to come.

Demand for gas already outstrips supply. IGUA-SA's analyses in the past year point to an even larger demand and reliance on gas from the power, industrial and petrochemical sectors. South Africa, therefore, is becoming more reliant on natural gas for its future energy requirements. On the other hand, the outlook for gas energy supply appears even more constrained. This does not bode well for economic prospects with the policy poverty that South Africa is experiencing. It is in this context that various large industries are continuing to review their investment and growth strategies for South Africa on the back of energy insecurity.

“ IGUA-SA will therefore continue with its mandate to advocate the efficient and expedient development of the gas economy in South Africa. This active, continued, and fact-based engagement with public and private stakeholders requires the support of all industries with interests in gas energy.

Industrial gas users and the private sector need to assume a commanding position if they are to ensure the viable security of the supply of gas energy. IGUA-SA will revisit its conventional mandate in the coming months to ensure that its members take a consolidated market position with a view on gas energy demand aggregation to provide the required outcomes on gas energy security.

As in previous years, IGUA-SA had the privilege to engage with multiple stakeholders throughout the year and had the opportunity to present its views across multiple forums and platforms. Stakeholder engagements are a continuous part of IGUA-SA's work and serve both as a platform for learning and sharing of information. These ranged from Government i.e. Departments of Minerals and Energy, Trade, Industry and Competition, National Energy Regulator of South Africa (NERSA), Central Energy

Fund, CSIR, Transnet; to social partners i.e. NEDLAC, BUSA, NEPAD; and business i.e. global oil and gas majors, financial institutions, leading legal firms, large energy users and suppliers.

I would like to conclude by saying that a significant amount of work has been completed over a relatively short period where IGUA-SA managed to establish itself as a credible, objective, and fact-based advocacy group. This does not simply materialise, and I would like to take this opportunity to thank Mr Jaco Human for working tirelessly to advance the mandate of our association as well as for his thought leadership and coordinating role he plays with various work streams. I also want to thank my fellow Exco members for their ongoing support and all our member organisations, who have all been involved and actively participated financially and otherwise, in the work of IGUA-SA. I also would like to commend the level of cooperation between our members with the work we do and the efficient way we reach decisions to advance our mandate.

Together with all IGUA-SA members and stakeholders, I look forward to an exciting new year within a rapidly changing energy environment that will no doubt challenge existing norms and bring out the best for South Africa.

Thomas Shaw
IGUA-SA Chairperson



Message from the EXECUTIVE OFFICER



JACO HUMAN

Executive Offer, IGUA-SA

South Africa's energy consumption is approximately 5 000PJ/a or some 25% of all energy consumed in Africa. The contribution to South Africa's total energy mix is approximately:



South Africa's historic and disproportionate reliance on coal makes it one of the largest carbon emitters globally.

The problem with the energy mix in South Africa is further exacerbated by decades of misguided policy development and implementation by the South African Government. **This results in a serious set of challenges unique to South Africa that include:**

Energy supply constraints: South Africa's electricity supply is constrained, leading to frequent power outages that have a negative impact on the economy and quality of life for citizens.

Dependency on coal: As mentioned earlier, South Africa has a high dependence on coal for electricity generation. This not only contributes to greenhouse gas emissions but also poses a challenge in terms of security of supply.

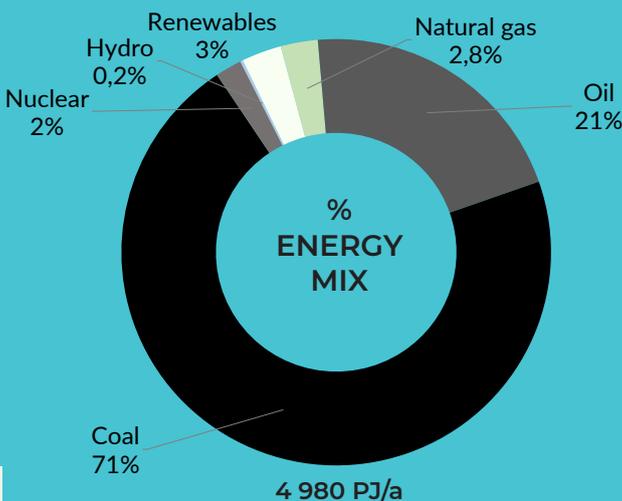
Aging infrastructure: South Africa's energy infrastructure is ageing and requires significant investment to modernize and maintain. This includes the power grid and other energy infrastructure such as pipelines and storage facilities.

Lack of investment: There has been a lack of investment in the energy sector in recent years, which has contributed to the challenges faced by the country.

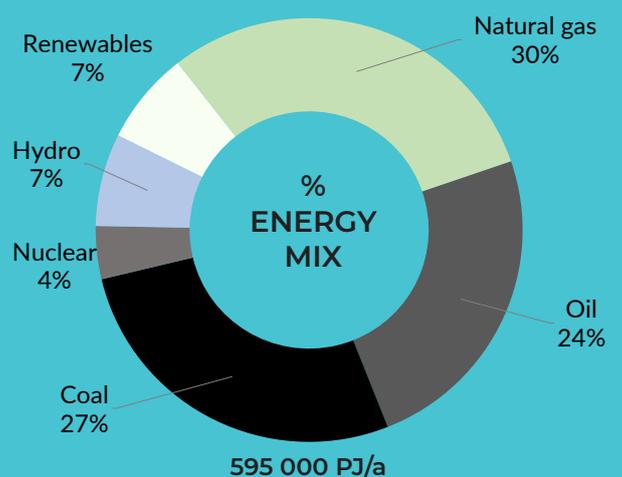
High energy costs: Energy costs in South Africa are relatively high compared to other developing countries, which can be a barrier to economic growth and development.

Energy poverty: A significant percentage of the population in South Africa does not have access to reliable and affordable energy services, which affects their quality of life and ability to participate in the economy.

SOUTH AFRICA



THE WORLD



Not only does South Africa need to address its energy security challenges, but it also must decarbonise its energy mix at the same time. Addressing these challenges will require significant investment in the energy sector, including the development of a diversified energy mix, modernising and maintaining infrastructure and improving energy efficiency. Decarbonising South Africa is a complex and challenging task that requires significant changes in various sectors of the economy.

Some of the key challenges that South Africa faces in decarbonising include:



ENERGY MIX AND DEPENDENCY ON COAL

South Africa has a high dependence on coal for electricity generation, accounting for over 80% of its energy mix. This poses a significant challenge in decarbonising as coal is a major contributor to greenhouse gas emissions.



COST OF TRANSITIONING TO RENEWABLE ENERGY

While renewable energy is an essential component of decarbonising, the cost of transitioning to renewable energy sources such as solar and wind power can be prohibitive, particularly for a developing country like South Africa.



ACCESS TO FINANCING

Given the cost of transitioning to renewable energy sources, access to financing is a critical issue that needs to be addressed to support the transition.



SOCIOECONOMIC IMPACTS

Decarbonising South Africa also needs to consider the socioeconomic impacts of the transition, particularly in terms of job losses and the impact on communities that are dependent on the coal industry.



INFRASTRUCTURE CHALLENGES

South Africa's infrastructure challenges, including an outdated grid system, can also pose challenges in integrating renewable energy sources into the grid.



POLICY AND REGULATORY FRAMEWORK

A robust policy and regulatory framework that incentivises the transition to renewable energy sources and penalises the use of fossil fuels is critical to achieving decarbonisation targets.



POLITICAL WILL

Finally, political will and leadership are essential for driving the transition to a low-carbon economy. This requires a commitment to decarbonisation targets, as well as the political will to push through the necessary policy changes and investments.

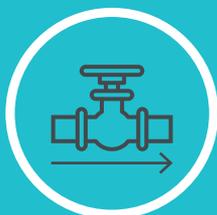
South Africa's unique energy position and associated challenges have been extensively studied. What is lacking is the policy instruments and environment to implement these solutions. This requires major and urgent economic and market reforms and a complete and frank appraisal of the role of the South African Government and State-Owned Entities.

South Africa has been constrained in gas energy access for years whilst the availability of gas is set to decline from 2025 onwards. Whilst the South African Government has not developed an Integrated Energy Plan nor a Gas Master Plan, any policy statements remain void of substance and plans for implementation. **Despite years of engagement with the South African Government, IGUA-SA will in the coming period focus on its role in the marketplace to facilitate the development of the gas market to ensure gas energy security.**



“ The electricity crisis in South Africa is well documented - the unfolding crisis for gas energy is not.

As stated in previous years, the founding mandate of IGUA-SA remains unchanged. IGUA-SA’s primary objective is to ensure the efficient availability of hydrocarbon gas in Southern Africa to meet significant and growing demand, both by organisations requiring more gas to expand and organisations wishing to switch to gas from costly and environmentally harmful alternative energy sources. It is the unassuming nature of this mandate that provides clarity and focus on three key areas of work:



GAS ENERGY AVAILABILITY



GAS ENERGY POLICY



GAS ENERGY PRICING

Gas energy **availability**

With regards to gas energy availability, IGUA-SA expects demand for gas to grow by up to 17% per annum to 2030 in an unconstrained environment. Demand for gas is increasing from previous years on the back of a growing realisation of the importance of gas as transitional energy and its role in overall energy stability and security in South Africa. This increased demand for gas stems from various sectors including the petrochemical, power, industrial and logistics sectors. Infrastructure remains totally inadequate to handle and deliver natural gas to demand nodes across South Africa.

Gas energy **policy**

Concerning policy, an environment must be established for private sector investment in infrastructure, whether in upstream exploration or gas handling infrastructure such as pipelines and/or gas import terminals. This remains an imperative where the South African Government has a significant role to play in the urgent development and rapid implementation of a Gas Master Plan for South Africa. The policy environment needs to be aligned with the requirements of the economy.

In the current environment of policy poverty, industry is focused on how to avert a gas energy crisis, rather than building and developing the economy. This impedes economic development and unnecessarily reallocates scarce resources inefficiently. Whilst the South African Government has a role to play in the establishment of developmental infrastructure, it appears incapable of addressing the next energy crisis to impact the development of South Africa.

Gas energy **pricing**

As far as gas pricing is concerned, the past year also saw the expected impact of NERSA’s second Maximum Gas Price Methodology play out. The irrational outcome of the second price methodology manifested in Sasol Gas, as the sole bulk supplier of gas, implementing a price increase of 96% in August 2022. IGUA-SA once again had to turn to the authorities to mitigate the impact of NERSA’s second methodology. Following Sasol Gas’ 96% price increase, IGUA-SA turned to the Competition Tribunal with an urgent application to intervene in the matter. This follows an excessive pricing complaint in May 2022 and a High Court application in December 2021 to have the methodology set aside. NERSA, in a process to implement a new third maximum gas price methodology, also issued various consultation documents to address the “unintended consequences” of the second price methodology. A new third pricing methodology was approved by NERSA In February 2023.

The South African economy is entering the most challenging and critical period in its history. South Africa requires significant policy reforms and government interventions across sectors. With the increased importance of gas in the energy mix, South Africa cannot afford another energy crisis like that being experienced with electricity.

The gas energy sector faces 6 key challenges as a result of overall policy poverty that pose a risk to the South African economy:

1. SASOL SUPPLY OF GAS COMING TO AN END

The South African economy is reliant on two sources of gas:

Pande/Temane, Mozambique (majority-owned by Sasol) supplies est. 163PJ/a gas to South Africa through the Rompco and Sasol gas transmission pipelines. The available gas is expected to decline by 42% between 2024 and 2030. The PPA fields have produced at a plateau since 2015, and as of July 2022, available gas resources are ± 433 PJ or 2,5 years of production at current supply levels (PSA ± 166 PJ additional). Sasol is not extending any gas supply agreements beyond 2024 because of anticipated declines in available gas resources.

Methane-rich gas (MRG): As a by-product of its internal processes, Sasol supplies 30PJ/a MRG to KZN and Mpumalanga. However, to meet its own demand, Sasol will cease supplying MRG to 3rd parties in Kwazulu-Natal and Mpumalanga by 2026.

2. NERSA PRICING METHODOLOGY

A new methodology for the determination of gas prices was approved in July 2021, but it is deemed more irrational than the first method, with real and adverse implications for the South African economy. A new methodology is being considered.

3. LACK OF INTEGRATED GAS ENERGY INFRASTRUCTURE PLANS

The demand for gas exceeds the ability to supply, due to a lack of infrastructure plans. The DMRE's delay in developing an integrated Gas Master Plan has led to a backlog in gas energy infrastructure plans. Any plans being considered by the DMRE at present are 5-10 years off from implementation and largely focused on power generation.

4. LACK OF GAS ENERGY INDUSTRIALIZATION PLANS

There is currently no gas industrialization plan that will ensure fast-tracking and alignment of all regulatory requirements. The DTIC is better positioned than any other government department to ensure the development of a gas industrial plan and its implementation to fast-tracked projects that can mitigate immediate gas supply risks and meet future demand.

5. LACK OF INVESTMENT FRAMEWORK IN THE GAS ENERGY SECTOR (UP/MID/DOWNSTREAM)

Transnet/CEF/Eskom hold the key to any future development of the gas economy and ensuring gas energy security. Global interest in investing in the sector is significant but requires liberalisation of State policy to reduce the role of SSOEs and increase the role of the private sector.

6. LACK OF URGENCY AND MISALIGNMENT OF TIMELINES

South African demand for gas energy exceeds supply, and the current availability of gas will start to decline in 24-36 months. The unstable and increased cost of electricity in South Africa is viewed as critical to the industry to maintain operations and global competitiveness. There is a confidence deficit by business in the State's ability to urgently find solutions to the gas energy deficit.

I wish to thank an increasing membership base for the continued support and trust in the work that we perform. I wish to thank the IGUA-SA Exco and all members for their continued guidance, insights, and support throughout an unusual year. The natural gas landscape is faced with various challenges related to policy, availability, and pricing in the immediate future. These can only be effectively addressed through a collective and consensus-based approach on the back of a broad and active membership base.

Please allow me then, on behalf of IGUA-SA, to share some more in-depth views on gas energy availability, policy and pricing, together with details on our membership.

Jaco Human
Executive Offer, IGUA-SA

Review By

IGUA-SA

Gas Energy Availability – Supply and Demand

South Africa faces various challenges across the energy sector in the absence of an Integrated Energy Plan (IEP) by the South African Government.

The IEP is the overall energy plan for liquid fuels (petrol, diesel, paraffin), gas and electricity that considers demand and plans how to supply that demand over the long term. It requires regular reviews in a changing energy landscape globally. Significant gaps exist in the long-term planning of energy for South Africa and the South African Government has not progressed or produced any material plans that fully integrate the country's energy plans required to meet its economic development goals.

Economic growth in South Africa is adversely impacted by what can now be deemed as the chronic, erratic, and insufficient undersupply of energy.

Concerning natural gas, South Africa has experienced no growth in gas energy consumption since 2015.

Sasol, the only primary supplier of gas, supplies approximately 185PJ/a to South Africa consisting of approximately 125PJ/a for Sasol and 60PJ/a (40PJ/a natural gas; 20PJ/a methane-rich) to third-party industrial users.

“ There is an increased reliance on gas energy in South Africa. IGUA-SA now estimates that gas demand in 2030 will be 718PJ/a. This represents an increase of 20% compared to IGUA-SA's estimate a year ago that set gas demand in 2030 at 595PJ/a – an overall increase in gas demand of 123PJ.

IGUA-SA regularly updates its qualitative assessment based on the mid and downstream market for gas with feedback and information obtained from the gas user market, assessments of the South African Government's current policy towards gas energy, the IRP 2019, the RMIPPPP 2020 and recent gas market studies for South Africa, and certain views of global gas market trends. It further looks at the national supply and demand balances across four respective gas market complexes or nodes i.e.

- 1) Gauteng/Mpumalanga
- 2) KwaZulu-Natal
- 3) Eastern Cape
- 4) Western Cape



The gas-to-power sector is the key driver for the increased demand in 2030. This could be ascribed to the faster-than-anticipated decline in Eskom's baseload coal power plants, the need to eliminate load shedding, and the slower-than-anticipated renewable power penetration due to grid constraints.



Gas demand results, expressed in PJ/a, are underpinned by realistic assumptions with the following sectoral drivers for demand and underlying dynamics within each sector:

LEGEND

IND:	refers to demand from the petrochemical sector (Sasol and PetroSA) and industry's demand growth linked to long term GDP growth at 3%/a and decarbonization targets.
PWR PVT:	refers to the demand for gas for embedded or private gas-to-power generation assuming 150MW/a.
PWR NEW:	balance of 5GW gas-to-power capacity required from PWR IRP and PWR RMIPPP to balance electricity demand.
PWR IRP:	refers to gas demand as a result of the IRP 2019 gas-to-power objectives assuming 1 000MW from 2027 in Coega, Saldanha Bay and Richards Bay respectively.
PWR RMIPPPP:	refers to gas demand for approximately 1 500MW gas-to-power under the RMIPPPP in Coega, Saldanha Bay and Richards Bay.
PWR CONV:	refers to gas demand from the conversion of coal and diesel fuel power stations and includes Kelvin, Eskom (Komatipoort/Ankerlig/Gourikwa), Avon and Dediza.
LOG:	refers to the demand for gas from the logistics and mining sectors seeking to displace diesel fuel with cheaper and cleaner gas fuel/LNG alternatives (diesel substitution).

Gas demand

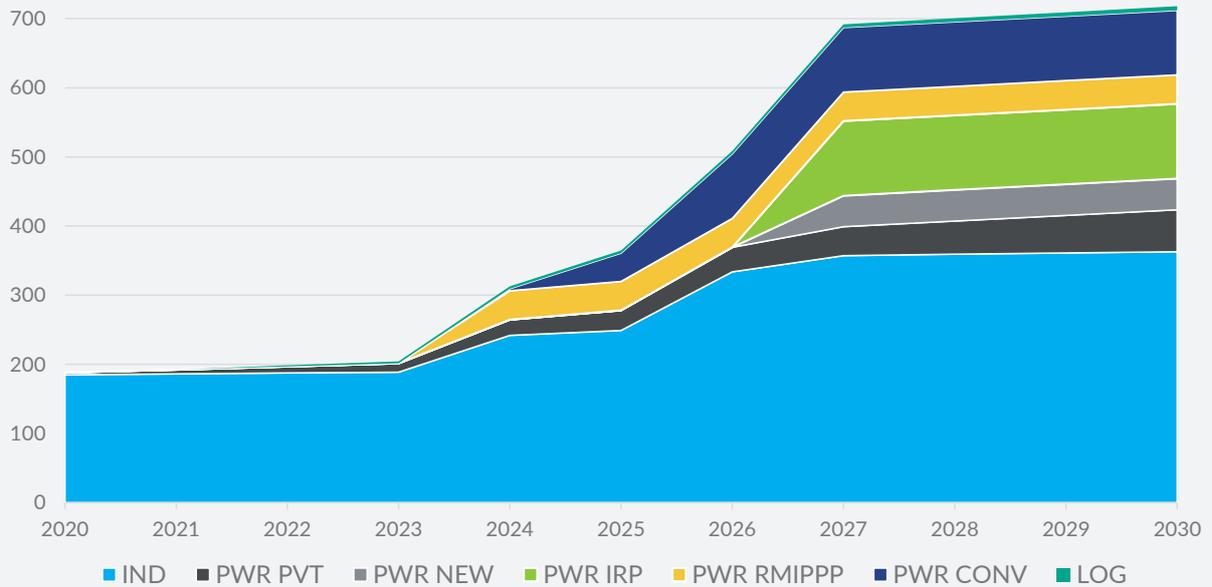
GAUTENG / MPUMALANGA	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
IND	165	166	167	167	218	219	220	221	222	223	224
Petrochem	120	120	120	120	170	170	170	170	170	170	170
Industry	45	46	47	47	48	49	50	51	52	53	54
PWR PVT	3	6	9	13	16	19	22	25	28	32	35
PWR NEW								15	15	15	15
PWR IRP								31	31	31	31
PWR RMIPPPP											
PWR CONV						25	75	75	75	75	75
LOG			0,25	1,00	1,10	1,21	1,33	1,46	1,61	1,77	1,95
Demand Total	168	172	176	181	235	264	318	369	373	377	381

KWA-ZULU NATAL	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
IND	20	20	21	21	21	22	22	23	23	23	24
PWR PVT					6	8	10	12	14	15	17
PWR NEW								15	15	15	15
PWR IRP								31	31	31	31
PWR RMIPPPP					12	12	12	12	12	12	12
PWR CONV					3	3	3	3	3	3	3
LOG & MIN			1,0	1,1	1,2	1,3	1,5	1,6	1,8	1,9	2,1
Demand Total	20	20	22	22	44	46	49	97	99	102	104

EASTERN CAPE		2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
IND							5	5	5	5	5	5
PWR PVT							0,32	0,63	0,95	1,26	1,58	1,89
PWR NEW												
PWR IRP									15	15	15	15
PWR RMIPPP						18	18	18	18	18	18	18
NC MINING												
PWR CONV								2,5	2,5	2,5	2,5	2,5
LOG					1	1	1	1	1	1	1	1
Demand Total		0	0	0	1	19	24	27	42	43	43	44

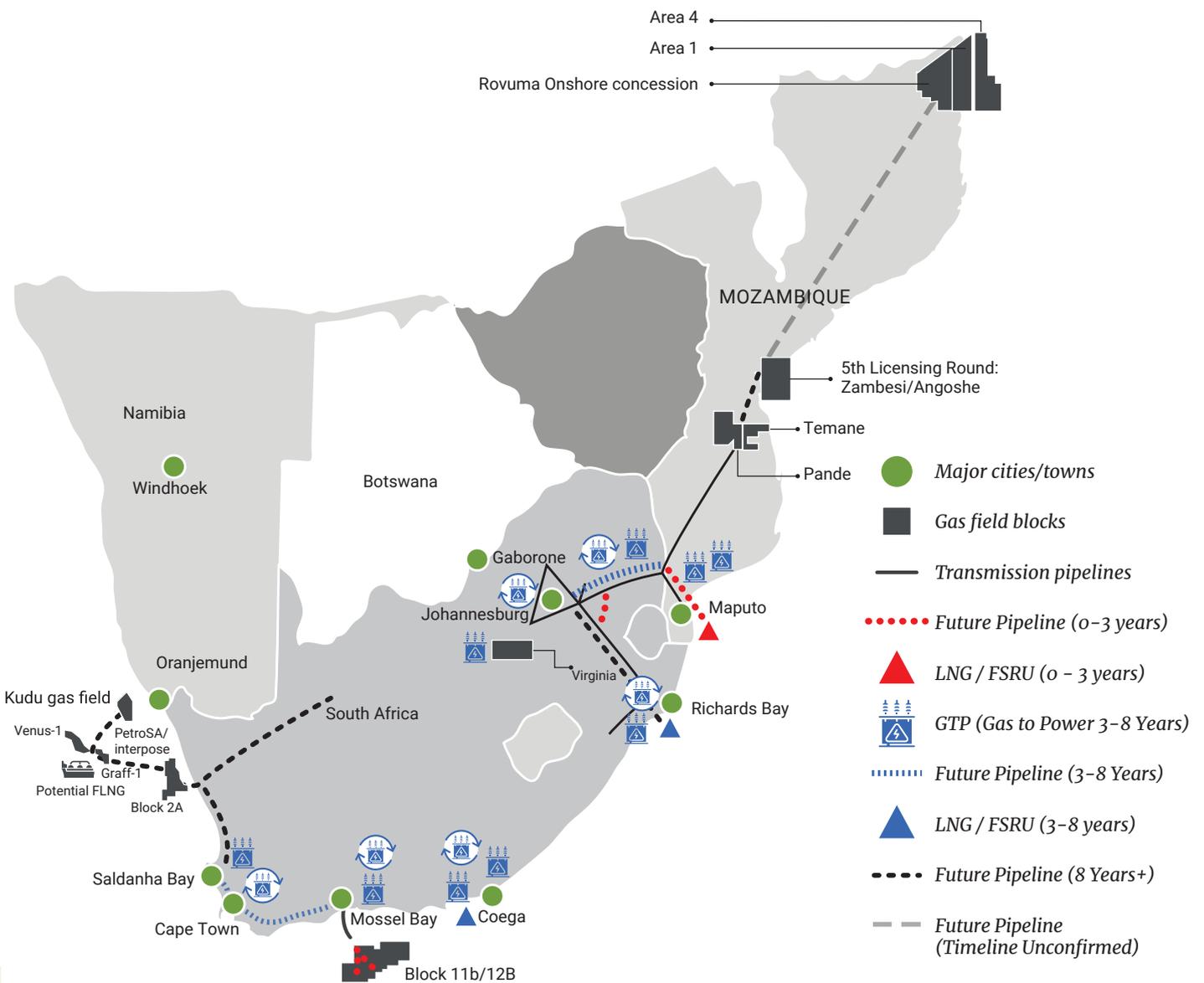
WESTERN CAPE		2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
IND		0	0	0,20	0,20	2	3	87	109	109	109	110
Petrochem								82,5	82,5	82,5	82,5	82,5
Industry				0,20	0,20	2	3	4	26	26	27	27
PWR PVT						1	2	3	4	5	6	7
PWR NEW									15	15	15	15
PWR IRP									31	31	31	31
PWR RMIPPP						12	12	12	12	12	12	12
PWR CONV							12,7	12,7	12,7	12,7	12,7	12,7
LOG				1	1	1	1	1	1	1	1	1
Demand Total		0	0	1	1	16	30	115	184	185	187	188

SOUTH AFRICA		2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
IND		185	186	188	189	242	249	334	357	359	361	363
PWR PVT		3	6	9	13	23	29	35	42	48	54	61
PWR NEW		0	0	0	0	0	0	0	45	45	45	45
PWR IRP		0	0	0	0	0	0	0	108	108	108	108
PWR RMIPPP		0	0	0	0	42	42	42	42	42	42	42
PWR CONV		0	0	0	0	3	41	93	93	93	93	93
LOG		0	0	2	3	3	4	4	5	5	6	6
Demand Total		188	192	199	205	313	365	509	692	700	709	718



Infrastructure to meet gas energy demand remains wholly inadequate. This is exacerbated by the expected 10-15% per annum decline of Pande/Temane gas volumes from 2025 and the reallocation of methane-rich gas from KZN and Mpumalanga to Sasol in Secunda.

To mitigate the gas energy shortages and to ensure that demand is met, South Africa's gas landscape needs to appear as follows by 2030:



Stakeholders have referenced the development of various gas resources and supply options for the South Africa and the region:

Namibia Orange Basin (Kudu, Venus, Graff, etc.)– Kudu was discovered in 1974 off the coast of Namibia it is estimated to hold some 1,3TCF gas ($\pm 1,5$ billion GJ), whilst more recent offshore discoveries include Graff, Venus and Jonker estimated to hold 43,5TCF gas (± 46 billion GJ). Namibia is set to become a major global gas player within the next decade with key stakeholders such as NAMCOR, QatarEnergy, Shell, TotalEnergies, Impact.

Blocks 9 and 11 – Block 9 supplies gas to the Moss gas Refinery was commissioned in 1992, and is virtually depleted with some 0,2TCF (± 234 mGJ) gas available. A 2015 drilling campaign to increase the reserve base was unsuccessful. PetroSA gas supply from Block 9 came to an end at the end of 2020, whilst it considers various options to extend gas supply from bordering blocks i.e. the importation of LNG to sustain future operations. PetroSA also owns Block 11 with limited gas resources estimated at some 0,5TCF (± 590 million GJ).

Karoo shale gas – appears to have sizeable potential, but these estimates are highly uncertain and environmentally controversial. Sources previously estimated reserves at a staggering 485TCF, but recent estimates (September 2017) showed much less potential. More realistic reserves range around 13 TCF (± 14 billionGJ) with environmental concerns associated with them. The South African Government in 2020 proceeded with drilling for further research purposes. Through the Council of Geosciences and PASA, the shale gas research project in the Karoo is at an advanced stage with the ultra-deep drilling 3 500m vertical borehole being drilled. Even if development did occur, it is unlikely that any sizeable output would be produced by 2035 given the shale reserves' dispersed nature and the need to develop infrastructure and a supply value chain (which is likely to take more than a decade).

Kinetiko – exploration development to date in the Amersfoort area of South Africa points to a gas resource of 1,5TCF ($\pm 1 580$ millionGJ) with first production expected in 2024/5 with further exploration being planned.

Blocks 2A, 2B, 3B, 4B – considering the proximity to Namibia significant potential exist to explore the Orange Basin on the South African side of the border holding similar potential for gas exploration and development. Block 2A (PetroSA) was already discovered in 1987 off the West coast of South Africa, it is estimated to hold some 1,5TCF gas ($\pm 1,7$ billion GJ). These developments hold the potential to serve the gas demand in the southwestern economic cluster of South Africa.

Block 11B/12B Brulpadda – TotalEnergies announced, in February 2019, a significant gas condensate discovery on the Brulpadda prospects, located on Block 11B/12B in the Outeniqua Basin, 175 kilometres off the southern coast of South Africa. The Brulpadda well encountered 57 meters of net gas condensate pay in lower cretaceous reservoirs. Following the success of the main objective, the well was deepened to a final depth of 3,633 meters and has also been successful in the Brulpadda-deep prospect. Following the success of Brulpadda and confirmation of the play potential, Total and its partners plan to acquire 3D seismic this year, followed by up to four exploration wells on this license.

In addition, Total announced in October 2020 a promising gas condensate discovery at the Luiperd prospect, the second in the block after Brulpadda. When the well's flow rates have been established, Total will work on development studies and engage with the South African government on gas commercialisation. First gas production could be as soon as 2025-2027 and could service markets, with the most obvious potential being Petro-SA's Mossel Bay facility, the Gourikwa 740MW power station and Coega and play a key role in the establishment of large-scale gas to power generation on the back of domestic gas availability and utilisation in terms of the IRP 2019.

Virginia – Renergen/Tetra4 has been exploiting small quantities of gas for the compressed natural gas market (mainly transport) since 2016 and since 2022 has been producing LNG on a small scale for industrial applications. Phase 2 will commence in 2023 and involves drilling more wells, construction of additional natural gas gathering pipelines, the construction of a much larger processing and liquefaction facility, and the associated road tanker distribution and downstream customer dispensing facilities. Phase 2 is expected to produce about ± 12 mGJ/a of LNG and around 1 500t/a of liquid helium once in full production.

CBM (Mamba/Lesedi/Lephalale fields) – CBM or coal bed methane gas reserves are present in Botswana. The concession is owned by Tlou Energy and is estimated to hold around 0,2TCF ($\pm 200\text{mGJ}$) of gas.

Panda/Temane – majority owned by Sasol it supplies some $\pm 193\text{mGJ/a}$ gas at present since 2004 to South Africa ($\pm 163\text{mGJ/a}$) and Mozambique ($\pm 30\text{mGJ/a}$) under a Petroleum Production Agreement (PPA) through the Rompco and Sasol gas transmission pipelines. Available gas is expected to decline some 42% between 2024 and 2030. The PPA fields have produced at plateau since 2015 with minimal development expenditure.

The Pande and Temane legacy fields have and continue to underpin the area's production. However, both fields are becoming increasingly mature. The neighbouring PT5-C licence, where a two-well exploration campaign was completed, appears to hold insignificant gas resources. Success would have provided a development upside from its PPA which could mitigate the expected decline from Pande/Temane.

Despite its ongoing plans to mitigate gas supply risks, Sasol remains unclear as to its ability and willingness to supply the South African gas market from 2025 onwards. LNG imports remain the only option to bridge the gap between reduced Pande/Temane gas energy supply from 2026 and demand, provided that such a project is executed in time and located where the demand for gas energy could be serviced. IGUA-SA's current view is that four LNG terminals can be considered of which only three could materially service industrial demand for gas energy. The required development of South Africa's gas industry and supply infrastructure are anchored on the demand for gas provided by the IRP 2019's proposed gas-to-power programme i.e. 3 of 1 000MW gas-to-power plants. The development of the gas sector is heavily dependent on the location of a 1 000MW gas-to-power plant in each of the ports at Coega, Richards Bay and Saldanha Bay as it has the potential, as an economic aggregator, to be the catalyst for extensive gas pipeline and import infrastructure developments.

This requires careful consideration by Government as to the location of the intended gas-to-power plants to balance the supply capability with gas energy demand to mitigate medium term gas energy security risks.

Zambesi/Angoshe/Buzi – with ENI and ExxonMobil involvement in Zambesi/Angoshe the potential to supply gas from these resources is some 3-5TCF (approximately equal in size to the Pande/Temane resource) and is considered to be in a very early exploration phase. Further exploratory drilling has commenced in Buzi which is majority owned by Energi Mega Persada Tbk PT of Indonesia. Although very well located for linking into the Rompco network, the potential monetisation of these resources remains unclear.

Rovuma – this basin holds significant gas resources on a global scale. Proven resources are estimated to be some 121TCF across Area 1 (63TCF, TotalEnergies) and Area 4 (58TCF, ENI) with potential for further development. First gas in LNG form (3,4MTPA) flowed in November 2022 from the Coral 1 FLNG platform. The development of Coral 2 (3,4MTPA) is expected to be commissioned at the beginning of 2024. Onshore LNG production includes Mozambique LNG (12,9MTPA) with commissioning by 2027; Rovuma LNG (18MTPA) commissioned by 2028; and future development of an additional 18MTPA to be commissioned around 2023.

For South Africa to benefit at all from these developments, it will first need to develop LNG-receiving infrastructure. Long-distance ($\pm 1\,700\text{km}$) pipeline development from Rovuma linking into the existing Rompco remains an alternative over the long term say beyond 2035, but is subject to regional demand aggregation, economic development, and regional inter-governmental political and investment coordination initiatives.

Coega LNG – the DMRE announced in 2019 its plans to establish an LNG import terminal at Coega that is likely to be coupled to future gas-to-power programmes as contemplated in the IRP 2019 which is, however, unlikely before 2030. IGUA-SA remains of the view that Coega is of no consequence to materially meet the imminent and current gas supply shortfall for gas energy consumers in Kwazulu-Natal, Gauteng and Western Cape where the demand for gas is much larger. The RMIPPPP will result in the early and temporary establishment of LNG handling and receiving infrastructure at Coega from 2025 onwards potentially servicing some regional demand in addition to gas-to-power requirements.

Richards Bay LNG - an ideal location for LNG infrastructure to leverage existing pipeline infrastructure and demand nodes and to meet existing gas supply shortfalls. The establishment of LNG handling infrastructure could optimise the Lily pipeline by doubling the capacity to 40mGJ/a whilst making available an additional 20mGJ/a of gas energy inland (methane-rich gas currently supplied by Sasol in the Lily). As with Coega, the development of such a facility could be feasible if anchored on at least 1 000MW gas-to-power as envisaged by the IRP 2019.

Saldanha Bay LNG – as reflected above, the Western Cape region suffers from the largest gas supply shortfall making the development of LNG infrastructure most feasible from an investment perspective when, as with Richards Bay and Coega, it is anchored on the development of at least 1 000MW gas-to-power as intended by the IRP 2019 or the conversion of Ankerlig to natural gas power generation.

Matola LNG - the Mozambique Government in 2019 granted the concession for the establishment of an LNG floating storage and regasification unit (FSRU) in the port of Matola (Maputo) with unlimited gas importation allowances. The development of this facility will be critically important to mitigate the expected decline of natural gas supply from Pande/Temane from 2026 onwards and also to meet the increased demand for natural gas in South Africa. TotalEnergies in consortium with regional partners are looking to reach final investment decision in 2023 with commissioning in 2026 on the back of firm demand.

Matola LNG remains the only discernible LNG infrastructure project to mitigate gas shortfalls from 2025 onwards. Critical to ensuring gas energy security, the Rompco pipeline need to be connected to the Lily pipeline.

The following are critical measures to be implemented to mitigate a gas energy crisis over the short and medium terms:

- **Short-term risk mitigation measures (0-3 years), in the context of imminent gas energy shortages, including:**
 - a. Ensuring the timeous development of LNG import infrastructure at Matola. To ensure investment and development, gas-to-power-plant decisions require developments along the Rompco pipeline.
 - b. The linkage of the ROMPCO and Lilly pipelines to ensure gas energy security and optionality for Kwazulu-Natal.
 - c. Developing and implementing appropriate bilateral agreements between South Africa and Mozambique to facilitate the above.

- **Medium-term risk mitigation measures** that include the careful coordination of the development and location of planned gas-to-plants with current and new gas infrastructure developments to optimally leverage gas infrastructure development costs at Coega, Saldanha Bay whilst prioritising Richards Bay to ensure gas energy access and security.

“ Gas energy availability is a business risk to the efficient operations of members of IGUA-SA and the growth prospects of the South African economy. South Africa has very limited gas energy supply options available over the short term i.e. within the next 2-3 years to avoid a crisis. The South African Government has a key role to fulfil if it is to ensure that the electricity crisis is not repeated in the gas sector and IGUA-SA continues its call to the South African Government for constructive and progressive dialogue.

Review By

IGUA-SA

Gas Energy Policy

The South African Government's view on gas energy is limited and largely informed by the outdated IRP 2019 which calls for 3 000 MW gas-to-power by 2027. The IRP 2019 is set to be updated in the coming year, but other than that not much else exists in the gas energy policy space from the South African Government.

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Natural gas plays a critical part in the development of South Africa within the industrial and power generation sectors and is viewed as a key transitional energy source towards decarbonising the economy.

For South Africa to reach its development objectives, it urgently needs to address its power and energy crises. The country is experiencing surging energy prices, and real and looming energy shortages across the electricity, natural gas, and liquid fuels sectors – this is in the absence of an integrated energy plan for the country.

Natural gas today is extensively used in various industrial processes with demand for gas significantly exceeding supply across various economic sectors that include steel, petrochemicals, glass, construction, ceramics, paper & pulp, mining, automotive, FMCG and others.

Despite the significant increase in demand for natural gas for industrial and power generation needs, the

domestic gas energy sector has stagnated and will decline in its current state in the years to come. The availability of current gas energy will see significant declines from 2024/25 due to resource depletion, whilst in Mpumalanga and KwaZulu Natal the availability of Methane Rich gas (MRG) will end in 2026.

The resultant risks to the economy are exacerbated by the absence of a clearly defined Gas Master Plan and the subsequent lack of any discernible and coordinated policy and infrastructure developments by the South African Government.

As South Africa grapples with the revitalisation of its economy and copes with the need to rebuild the capacity of the State and its institutions, it must start rebuilding and transforming its economy to make it resilient and relevant in a decarbonising world.

While a transition towards a net-zero emissions economy will create new economic opportunities for South Africa, it is also a transition away from coal towards natural gas, liquefied petroleum gas (LPG) and renewable energy, which without careful planning and new investments, will put many jobs and value chains at risk in the short-term, and exacerbate current socio-economic challenges.

IGUA-SA sees natural gas as a key enabler for an effective and efficient energy transition that balances energy security with socio-economic and environmental needs that are unique to South Africa. Natural gas is critical to the current economic activity and is key for the sustainability of all gas-dependent industries. The equitable transition to renewable energy requires increased use of natural gas and LPG as transitional energy types.

Yet, there are insufficient fixed investments for gas energy infrastructure developments in South Africa from the private sector and the South African Government. Plans that are being considered are mainly linked to future power generation with no focus on industrial needs for natural gas.

The current natural gas supply is entirely dependent on a rapidly depleting resource in Mozambique. Longer-term upstream gas exploration opportunities exist on the East Coast and West Coast (Orange Basin) regions. Whilst Luiperd/Brulpadda represents the only significant short-term upstream development opportunity for gas supply to the petrochemical sector (PetroSA), it will not mitigate the risk of imminent gas shortages elsewhere in South Africa.

Over the short term, South Africa will be reliant on the only discernible, LNG import terminal project at Matola, Mozambique. Over the medium term the potential, although not apparent at present, exists for LNG import terminals at Richards Bay, Coega and Saldanha Bay.

Current gas pipeline capacity, mainly the Rompco and Lilly, is limited and requires coordinated long-term planning and upfront investment now to balance future gas demand and capacity. Whilst a significant focus is placed on the role of gas-to-power in the IRP 2019 and Eskom's future reliance on gas for power generation, limited attention is given to the associated gas infrastructure requirements to enable gas energy security and availability.

Gas demand is apparent across all 9 provinces in South Africa, whilst only Gauteng, Mpumalanga and KwaZulu-Natal have access to limited quantities of gas. The industrial sector remains the biggest single driver for natural gas demand, followed by the power sector as represented by the needs of Eskom, the IRP2019, coal power station conversions and private power generation.

Gas security and availability are at risk as the current gas supply is set to decline within the next 30 months. Gas availability is already limited to 180PJ/a, whilst current gas demand is estimated to be more than 300PJ/a across the petrochemical, manufacturing, power generation and logistics sectors with significant demand growth expected over the next 15 years. Long-term gas demand is expected to exceed 700PJ/a peaking at around 2035-40 with the increased use of renewable energy and adoption of clean energy technologies.

IGUA-SA supports the coordination and implementation of the following interventions to ensure gas energy security, keep gas energy affordable and unlock the economic development potential of the South African economy:

1. **Short-term risk mitigation measures**, in the context of imminent gas energy shortages, including:
 - Ensuring the timeous development of LNG import infrastructure at Matola,
 - The linkage of the ROMPCO and Lilly pipelines to ensure gas energy security and optionality for Kwazulu-Natal.
 - Developing and implementing appropriate bilateral agreements between South Africa and Mozambique to facilitate the above.
2. **Medium-term risk mitigation measures** that include the careful coordination of the development and location of planned gas-to-power plants with current and new gas infrastructure developments to optimally leverage gas infrastructure development costs at Coega, Saldanha Bay whilst prioritising Richards Bay to ensure gas energy access and security.
3. **The fast-tracked development and implementation of an integrated Gas Master Plan** that addresses gas requirements for all sectors in the up, mid and downstream markets and provides for a conducive policy and regulatory environment to support investment for gas energy infrastructure.
4. **The urgent development by the DTIC of a Gas Energy Industrialisation Master Plan** to spur and leverage sectoral growth opportunities that include the development of an investment framework for the up, mid and downstream markets that includes local manufacturing and development of gas equipment and infrastructure.
5. **Addressing the lack of urgency and misalignment of timelines in the gas energy sector** brought about by policy poverty and uncertainty.
6. **Redefining the role of SOEs in the gas energy sector** to provide investment certainty and clarity for the private sector.
7. **Streamlining the regulatory inhibitors for gas exploration, and infrastructure developments** by coordinating intra-governmental functions to enable gas energy security, access to gas energy and growth.
8. Ensuring that NERSA's maximum pricing methodologies **incentivise gas energy sector investment and rely on free-market principles**

IGUA-SA sees access to natural gas as a key enabler for an effective and efficient energy transition that balances energy security and energy mix with the socio-economic and environmental needs of South Africa.

Review By

IGUA-SA

Gas Energy Pricing and Regulation

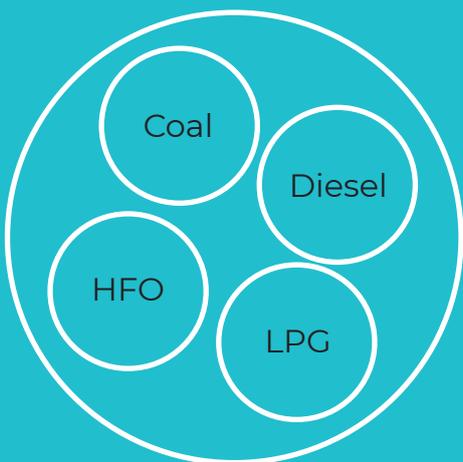
IGUA-SA actively engages NERSA on behalf of its members on a range of matters that include gas energy pricing, tariffs, licensing and responding formally to NERSA's various public consultation processes from time to time. IGUA-SA performs regular and ongoing analyses on gas energy and tariff applications that are considered by NERSA and responds where deemed necessary.

NERSA has since 2014 set three maximum pricing methodologies for gas:

Methodology 1 - Weighted Average Approach

Methodology 1 (2014) calculated a weighted average of the prices of a basket of alternative fuels: coal; diesel; electricity; heavy fuel oil ("HFO"); and liquified petroleum gas ("LPG").

This methodology was set aside in 2019 by the Constitutional Court as unlawful and irrational. The Constitutional Court ruled that NERSA had acted irrationally and unlawfully, holding not only that NERSA had failed to constrain Sasol Gas' pricing, but that the first methodology made it impossible for NERSA to choose a reasonable allowable level of profits, as is required by the Gas Act, for Sasol Gas which meant that NERSA could not even know the extent to which it might have constrained Sasol Gas' pricing. NERSA was required to devise a new way of approving maximum gas prices, for the period 2014–2021 (when Sasol Gas' piped-gas prices had not been constrained since NERSA's first attempt at regulation had been irrational), as well as for the future.



Methodology 2 - International Benchmarking Approach

Methodology 2 (2020) adopted a new price formula that applies an international-benchmarking approach, where the maximum gas price is calculated as a weighted average of the prices associated with the US Henry Hub ("HH"), the Dutch Title Transfer Facility ("TTF") and the UK National Balancing Point ("NBP"). In the formula, the HH, TTF and NBP prices are given weights of 40%, 50% and 10%, respectively. It then checks whether the resulting price is above Sasol Gas' marginal acquisition cost (namely the cost that Sasol Gas faces when acquiring an additional unit of gas from its upstream entity) and below the price of another fuel, namely liquified natural gas ("LNG"), sold in Japan.

Maximum pricing for LNG imports was set at JKM.

Although the Constitutional Court required NERSA its objective should be to regulate Sasol Gas' prices so that they would mimic the prices that would arise in a competitive market, the maximum gas prices generated by the second methodology bear no relationship to any reasonable proxy for competitive prices. NERSA nevertheless approved the methodology and Sasol Gas' pricing application to price at the maximum allowable level. The resultant pricing allowed Sasol to charge R68/GJ for the gas year up to June 2022.



Methodology 2 (cont...)

IGUA-SA forewarned NERSA, without any outcome, of the perverse price outcomes of its third methodology and its shortcomings in law and economics further exacerbated by events globally that were unrelated to South Africa, IGUA-SA turned to the High Court again to set the second NERSA methodology aside. Price forecasts for July 2022 indicated price levels over R300/GJ.

NERSA in February and March 2022 published two consultation documents intending to develop a third maximum gas price methodology. The first consultation document characterises itself as enquiring into the impact of the implementation of uniform pricing by Sasol Gas, discontinuing volume discounts, which reveals NERSA's own concerns over the consequences of Sasol Gas' decision to charge a uniform price equal to the maximum price approved through the NERSA decision.

In the second consultation document, **“on the impact of the surge in international gas prices into the South African gas prices, interim methodology and review of the methodology”**, NERSA expresses the concern that the second methodology produces piped-gas prices that are considered too high. The nub of the concern that NERSA expresses in the second consultation document was: **“The key question that has triggered this consultation process is that the natural gas price spikes in America, Europe and Asia may have unintended consequences to the South African gas prices. The energy crisis in Europe, Asia, America and other parts of the world has resulted in energy price increases in Africa, to which South Africa has been adversely affected. However, NERSA**

may not fold arms and leave natural gas customers to be unfairly exposed to the global energy crunch and surge in hub prices that will negatively impact gas prices in South Africa. Global transmission of the price spike is inevitable through the key hub prices that are drivers of the natural gas price regime in South Africa.”

IGUA-SA members during May 2022 decided to approach the Competition Commission and lodged an excessive pricing complaint against Sasol. The outcome of this complaint is expected during the second quarter of 2023.

Despite these developments, Sasol Gas proceeded in August 2022 to implement a 96% price increase in gas pricing on the basis that it was allowed to do so by NERSA's maximum gas price methodology.

In response, IGUA-SA turned to the Competition Tribunal for an urgent application to interdict Sasol from implementing price increases until the Competition Commission has completed its investigations. This application was opposed by Sasol Gas on the grounds that the Competition Commission does not have jurisdiction over price determinations by NERSA. Following a hearing in February 2023, the Competition Tribunal concluded that NERSA and the Commission have concurrent jurisdiction with regard to aspects of the pricing of gas. NERSA determines the maximum price of gas, and the Commission investigates and addresses allegations of inter alia excessive pricing in respect of gas.



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Methodology 3 - Cost-Plus Approach

Methodology 3 (2023), after NERSA’s consultation processes referred to above, was approved by NERSA. NERSA refers to its new methodology as a “cost plus” approach. For gas supplied by Sasol Gas, it assumes the cost of acquisition of gas by Sasol Gas from Sasol (effectively allowing the monopoly company to determine its own price), then proceeds to add a trading cost and profit margin, plus another profit margin of 46% that is linked to certain foreign entities that trade in gas and other energy types, to derive a maximum gas price. Third-party gas traders use this basis, after receiving a marginal discount from Sasol, as the cost of acquisition and apply the same formula to derive a price that is exponentially higher than that of Sasol Gas.

Maximum pricing for LNG imports is now set at JKM or 12% of Brent.

Although NERSA characterises the third methodology as a “cost-plus” methodology, it is “cost-plus” only in name as was highlighted by IGUA-SA in its submission to NERSA in September 2022.

The cost problem exists in the methodology in that it is equated to the licensee’s acquisition cost. To that, a profit percentage is added. However, in the case of Sasol Gas, its acquisition cost is the price it pays to acquire the gas molecule from its upstream subsidiary in Mozambique. In other words, it is an internal transfer price. Under the third methodology, the vertically integrated monopolist can simply increase its cost of acquisition in turn to ratchet up the maximum price of piped gas. Put differently, the regulated price to which it should be subjected – as an act of regulation by NERSA – is fundamentally within its own control.

There are also fundamental difficulties with the “plus” component of the third methodology. NERSA allows Sasol Gas to add a “margin” to its acquisition

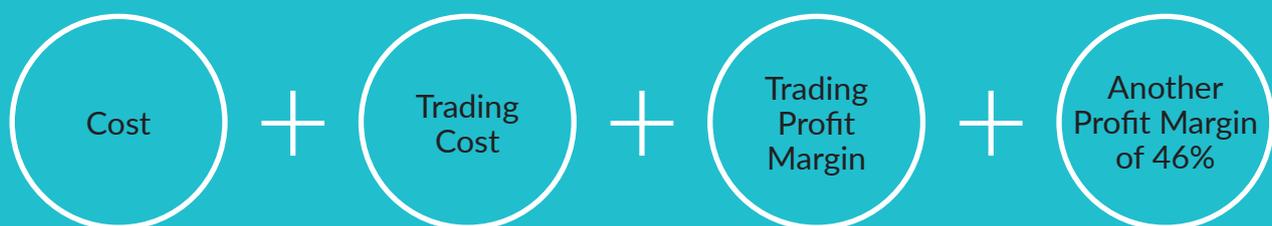
cost, after adding a trading cost that already includes a profit consideration, of 46% based on the average of the EBITDA margins earned by several foreign energy firms. No evidence has been produced to suggest that those firms undertake comparable activities to those of Sasol Gas, which is to transfer the gas molecule from its upstream subsidiary downstream to its retail subsidiary.

On this basis, IGUA-SA expects a price increase in excess of 25% in the coming year. This will simply be a result of NERSA’s third new maximum price methodology that again has little or no relevance to the underlying costs and competitive market outcomes that a regulatory price methodology is required to consider in law and economics. through the key hub prices that are drivers of the natural gas price regime in South Africa.”

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MEMBERSHIP

IGUA-SA membership continues to grow. During the past year, a new category of membership was established to provide small and medium enterprises and gas users the opportunity to join IGUA-SA.

Current members and program participants at the time of writing include:



The IGUA-SA is governed by a formal constitution as adopted by its founding members and provides for a formal platform to conduct its business.

IGUA-SA engages various other gas users and interested parties continuously to deliver on its primary objective to ensure the efficient availability of hydrocarbon gas in Southern Africa. This takes place in the context of a growing demand for natural gas - both by organisations requiring more gas to expand and organisations wishing to switch to gas from costly and environmentally harmful alternative energy sources.

IGUA-SA's membership is open to the broader gas value chain and includes various tiers of membership:

- **Gas user membership** – non-vertically integrated gas end-users (current & future) who have voting rights, are represented on the Exco and who reserve right of admissions
- **Industry membership** - new gas suppliers, gas traders, new gas transmission/distribution organisations
- **Associate membership** – consultants and professionals in the operating, financial, marketing, and legal communities; and others who provide services to the natural gas industry
- **Affiliate membership** - international organisations that are interested in natural gas activities in Southern Africa.

The natural gas landscape is faced with various challenges related to policy, availability, and pricing in the immediate future. These can only be effectively addressed if more organisations participate in IGUA-SA's work.

Stakeholders are therefore implored to join IGUA-SA to collectively address these challenges and to jointly share in the knowledge and participate in the strategic actions undertaken by IGUA-SA. Appropriate resources are being deployed and utilised on an ongoing basis. A broader participation in membership will not only assist in achieving IGUA-SA's strategic objectives but will also assist in efficiently meeting its financial obligations through a wider membership base.



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