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A JUST ENERGY TRANSITION ("JET") FOR SOUTH AFRICA

Criticality of a holistic Just Energy Transition plan in South Africa

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Content

1. A Holistic Approach to JET
2. Case Study – Gauteng Province Energy Outlook
3. Concluding Remarks

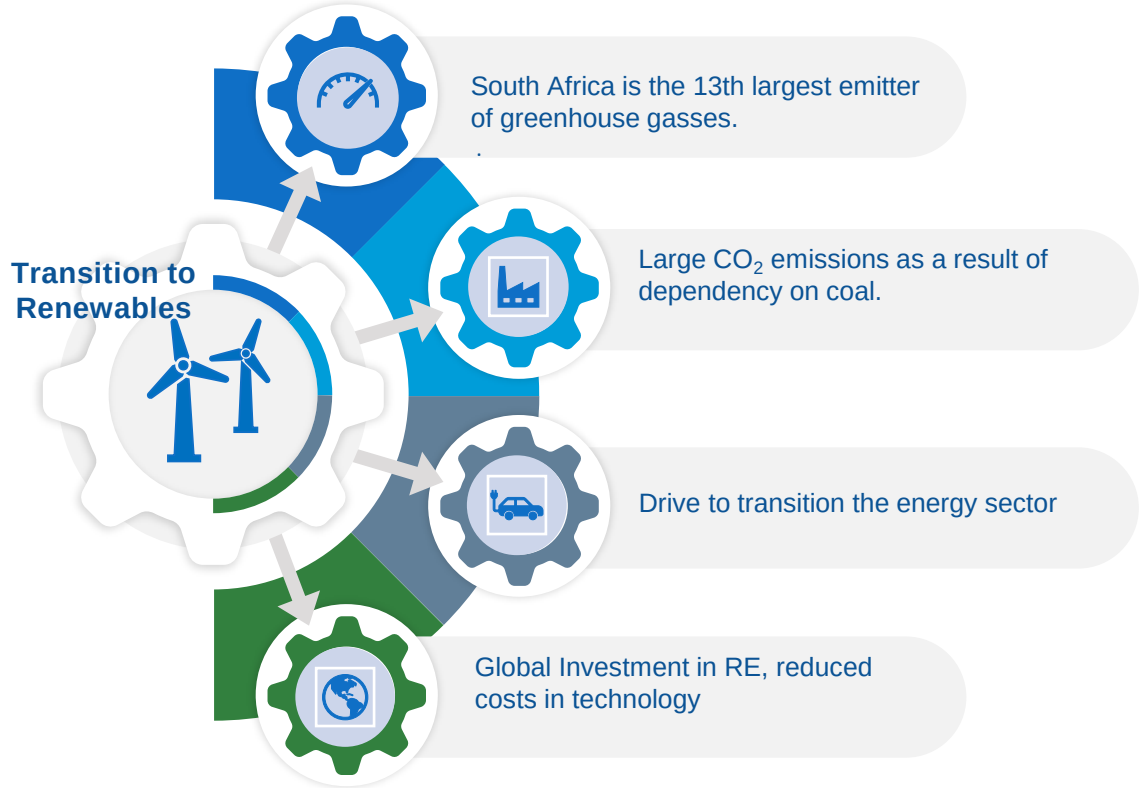
Background – Climate Change

- The world is now warming faster than at any point in recorded history.
- Global Warming and the emissions of greenhouse gasses (GHG's) will have disastrous effects if left unchecked.
  - Manufacturing Goods
  - Deforestation
  - Agriculture
  - Generating Power by burning fossil fuels
- Climate Change is a global issue and we all must do our part.

Our Planet our Problem

- We need to think green to combat climate change.
- Reduce Carbon emissions by switching to renewable energy solutions.
- Reducing the emissions caused by industry & transportation by opting for greener technologies
- Investing in more space-efficient forms of agriculture to reduce the deforestation of land.

CO_2 Emissions in South Africa



- Coal Based electricity is still the business of the day in SA.
- South Africa has committed to moving away from Coal powered generation.
- Prompted cause for a just transition into a greener energy sector.

Why a Just Energy Transition?

- A massive shift towards Renewable Energy to stave off climate change is needed and is inevitable.
- Coal value chain accounts for 5% of GDP and provides employment for about 200 000 workers
- Rapid increase in RE will cause the displacement of these people.
- Thus, a successful transition is a just transition
- No one should be left behind.

Who is most affected?

- Communities most impacted by the fossil fuel economy.
- Commonly marginalized segments of the black community.
- Employment in these sectors will half by 2045.
- These jobs are not necessarily accessible to workers and communities currently dependent on the coal sector.

What is a just transition?

- Everyone has access to affordable and clean energy.
- Communities democratically decide how this clean energy transition plays out for them.
- Policies are crafted that ensure the benefits of a clean energy economy are equitably distributed.
- New Financing options are developed that address and remedy the harmful practices of the past.
- Workers displaced by the transition are supported and prepared for a just transition.
- Impacts on people and environment are considered at every step and diverse ecosystems are protected.

A Holistic Approach to JET

- Establish the energy landscape to aid SMART planning.
- Understand the key drivers impacting future energy demand.
- Establish demand and energy forecast.
- Identify Renewable Energy and Energy Efficiency projects and opportunities.
- Establish a Financial Model and Funding Approach.
- Create a knowledge sharing platform.

Case Study – Gauteng Province Energy Outlook Study

- Energy security is a major concern for the South African economy.
- Increased electricity shortages and the implementation of load shedding since 2008.
- Prompted the development of strategies such as Gauteng Integrated Energy Plan (GIEP) in 2008, Gauteng Integrated Energy Strategy (GIES) in 2010 and Gauteng Energy Security Strategy (GESS) in 2016 by the Gauteng Provincial Government (GPG).
- Energy Security identified as one of the 8 game Changers to fast-track economic growth.

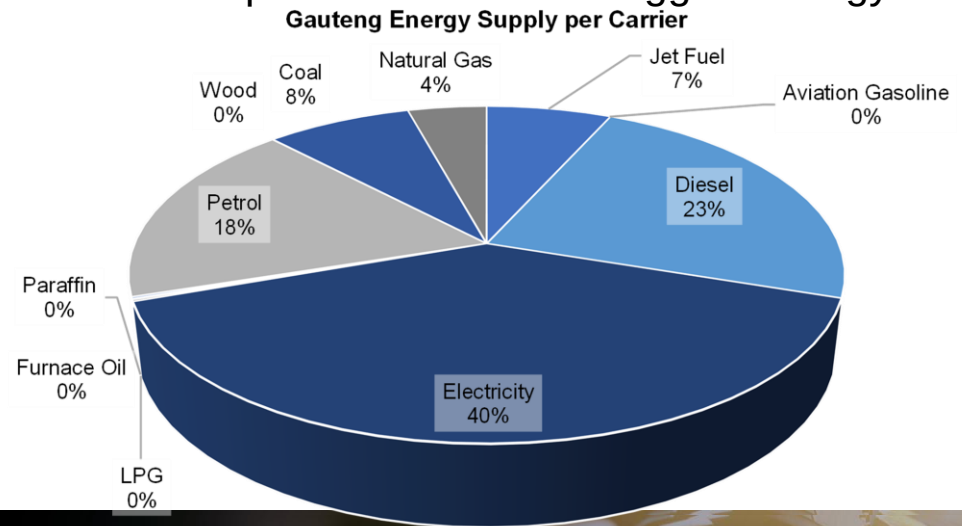
GESS Vision

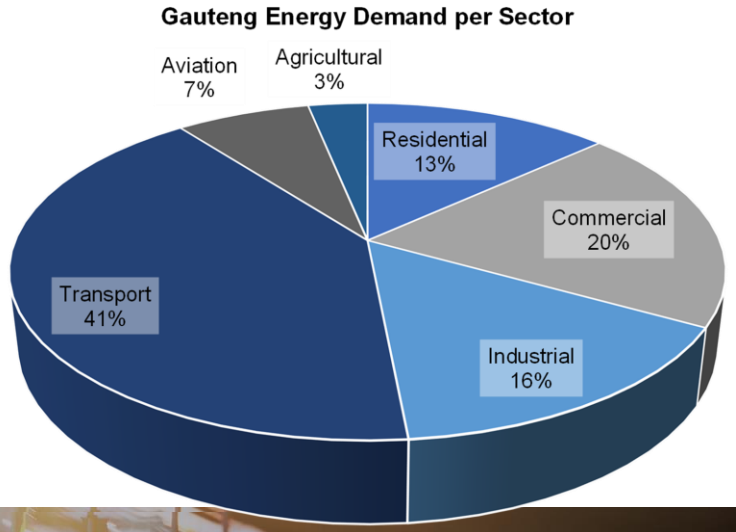
"*A resilient and energy secure province that invests in diversified low-carbon energy sources and innovative technologies, that delivers reliable and affordable energy services to all citizens and contributes to an economically transformed and modernized and re-industrialized Gauteng City Region" –*

Gauteng Integrated Energy Strategy

Gauteng Baseline Energy – Energy Supply & Demand

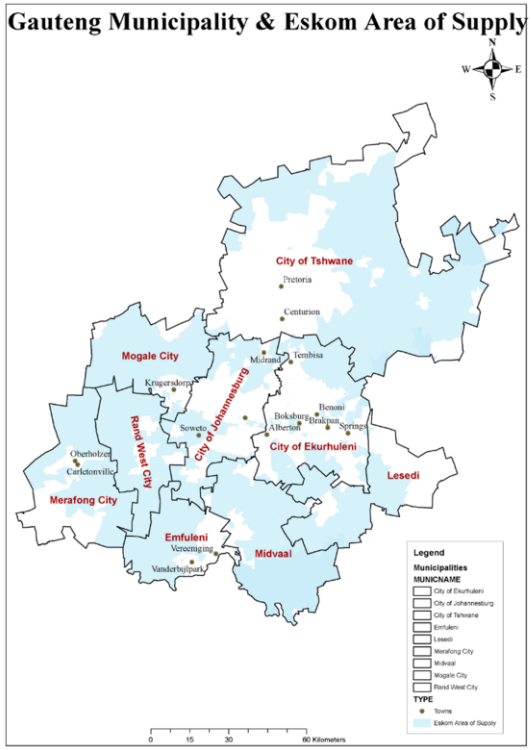
- It is critical to understand the holistic energy landscape to better plan for the JET.
- The GP energy supply is dominated by electricity (40%), followed by diesel (23%) and petrol (18%). The rest of the supply constitute for the other 19%.
- The transport sector has the biggest energy demand.

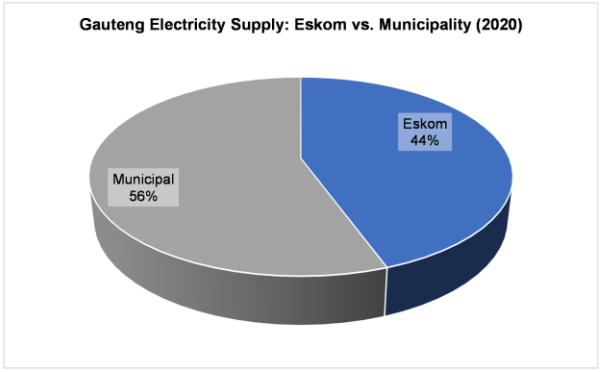


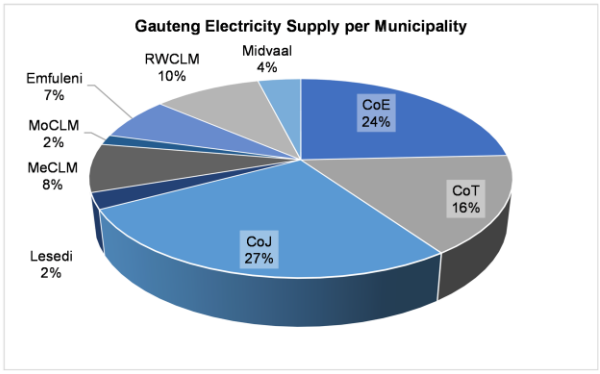


Gauteng Energy Landscape – Electricity Supply

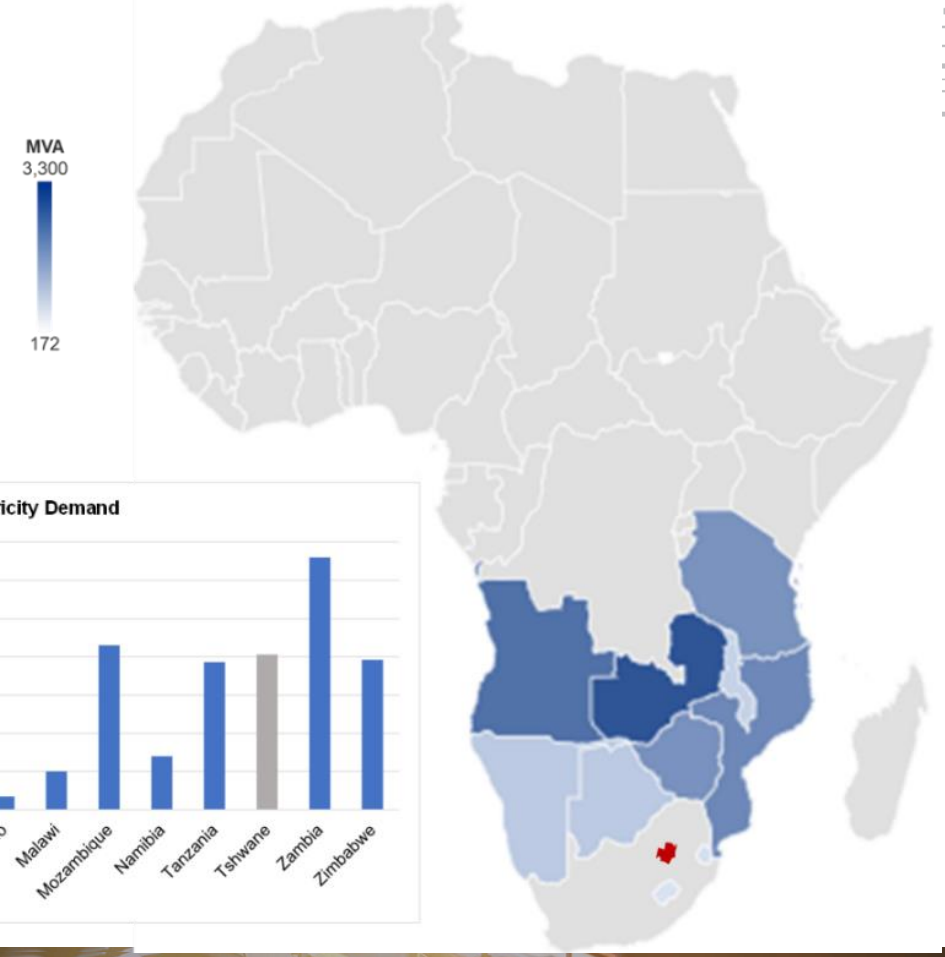
- Electricity in GP is split between Eskom and Municipal areas.
- The three Metros, CoE (24%), CoJ (27%) and CoT (16%) make up two-thirds (67%) of Gauteng's Electrical Demand.
- If considering only the municipal areas of supply, these three Metros make up 91% of the electrical demand.





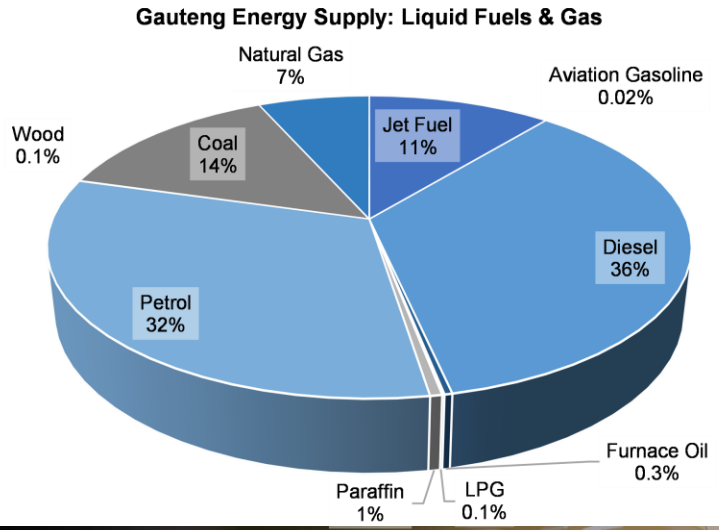


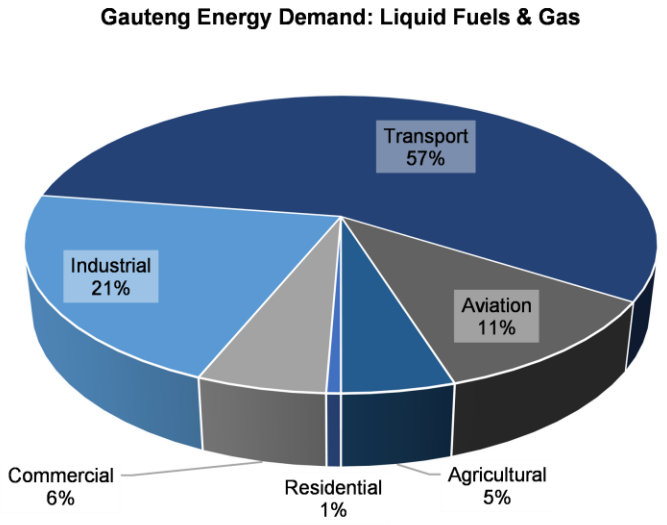
Gauteng Energy Landscape – Peak Electricity Demand Benchmark



Gauteng Energy Landscape – Liquid Fuels & Gas Supply

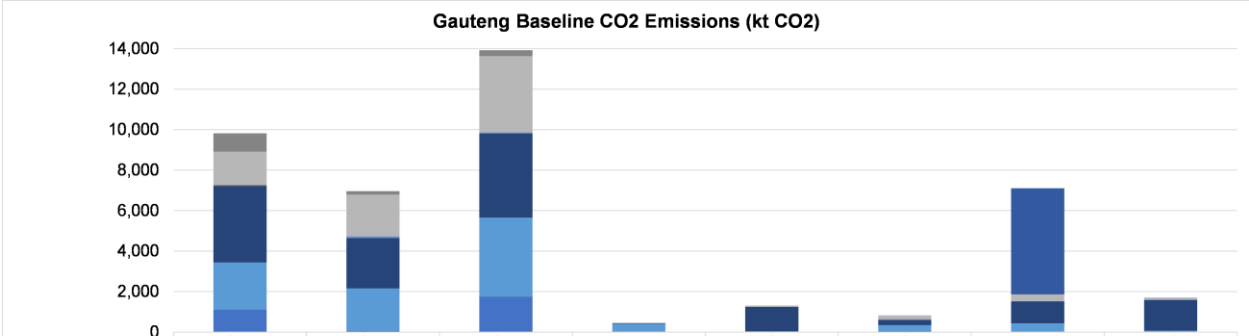
- Diesel and petrol dominate the liquid fuel and gas supply in GP.
- Transport sector dominates liquid fuels and gas energy demand in GP at 57% consumption.





Gauteng Energy Landscape – CO_2 Emissions

- The CO_2e emissions show the three metros (CoJ, CoE, and CoT) and Emfuleni municipality to have the greatest contribution to the emissions.
- Emfuleni municipality - due to high industrial activity (especially steel making).



	CoE	CoT	CoJ	Lesedi LM	MeCLM	MoCLM	Emfuleni LM	RWCLM
Natural Gas	905	159	284	0	0	0	0	0
Coal	2	0	0	0	0	0	5,238	0
Wood	0	0	0	0	0	0	0	0
Petrol	1,645	2,068	3,771	26	40	182	340	96
Paraffin	14	74	23	0	0	18	7	0
LPG	4	4	15	0	0	1	0	0
Furnace Oil	46	10	20	0	0	14	3	3
Electricity	3,760	2,486	4,157	27	1,217	255	1,086	1,514
Diesel	2,324	2,091	3,899	390	32	298	429	71
Aviation Gasoline	0	0	2	0	0	1	1	0
Jet Fuel	1,120	67	1,752	0	0	41	0	0

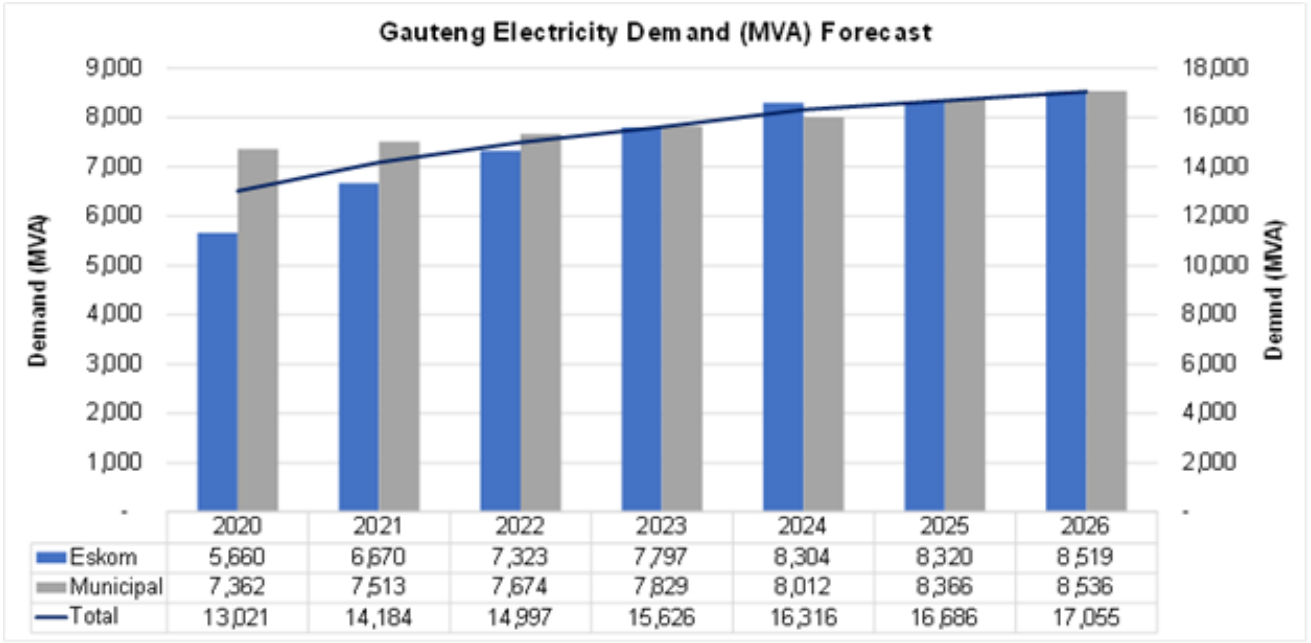
Key Drivers Impacting Future Energy Demand in GP

1. Gauteng is an economic and financial hub (contributing >33% of SA's GDP in 2017)
2. Gauteng is a place of opportunity with highest percentage of population in the country.
3. Gauteng is a gateway to surrounding provinces.
4. High number of developments

To facilitate development in a structured and coordinated manner, the province has developed plans and strategies that inform change and growth. These are: Gauteng Spatial Development Framework, 2030; Gauteng Spatial Perspective, 2030; Gauteng Integrated Transport Master Plan, 2013; The Development of an Industrial Policy for Gauteng Province, Draft 2010; Gauteng Growth Management Perspective, 2014; Five developmental corridors of Gauteng; The Mega Cities.

GP Electricity Demand Forecast

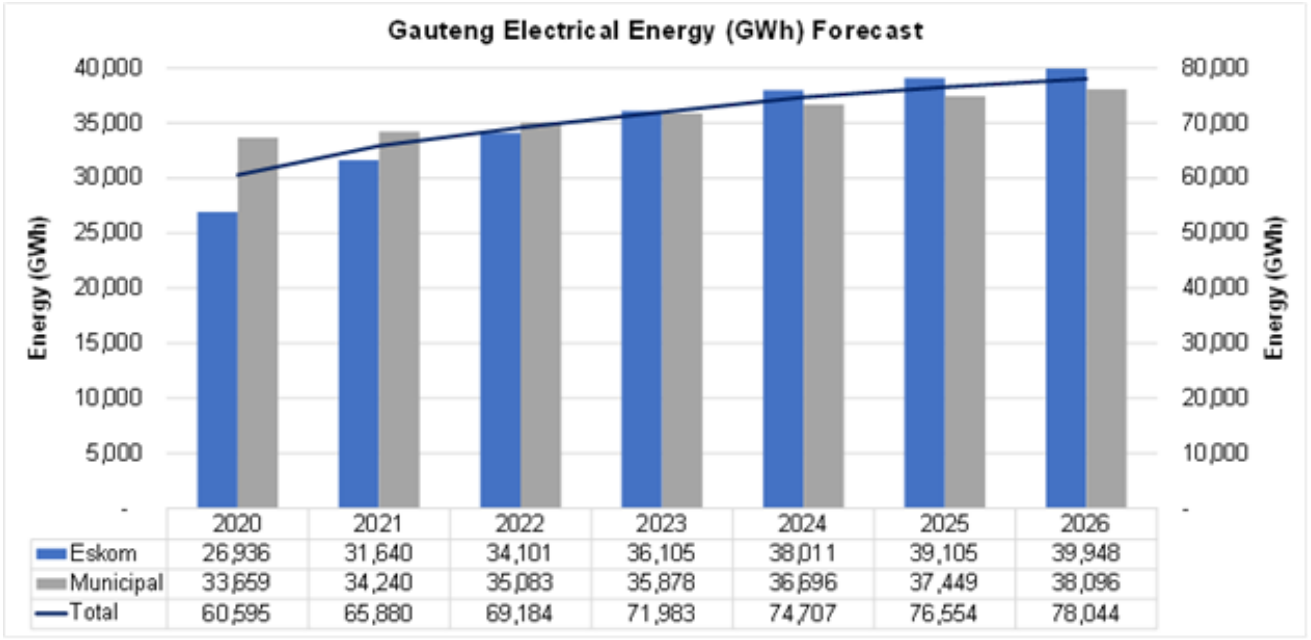
- Electricity is expected to continue to be the biggest contributor to GP's future energy outlook.
- GP electricity demand is expected to grow from 13,021 MVA in 2020 to 16,686 MVA in 2025.



	2020	2021	2022	2023	2024	2025	2026
Eskom	5,660	6,670	7,323	7,797	8,304	8,320	8,519
Municipal	7,362	7,513	7,674	7,829	8,012	8,366	8,536
Total	13,021	14,184	14,997	15,626	16,316	16,686	17,055

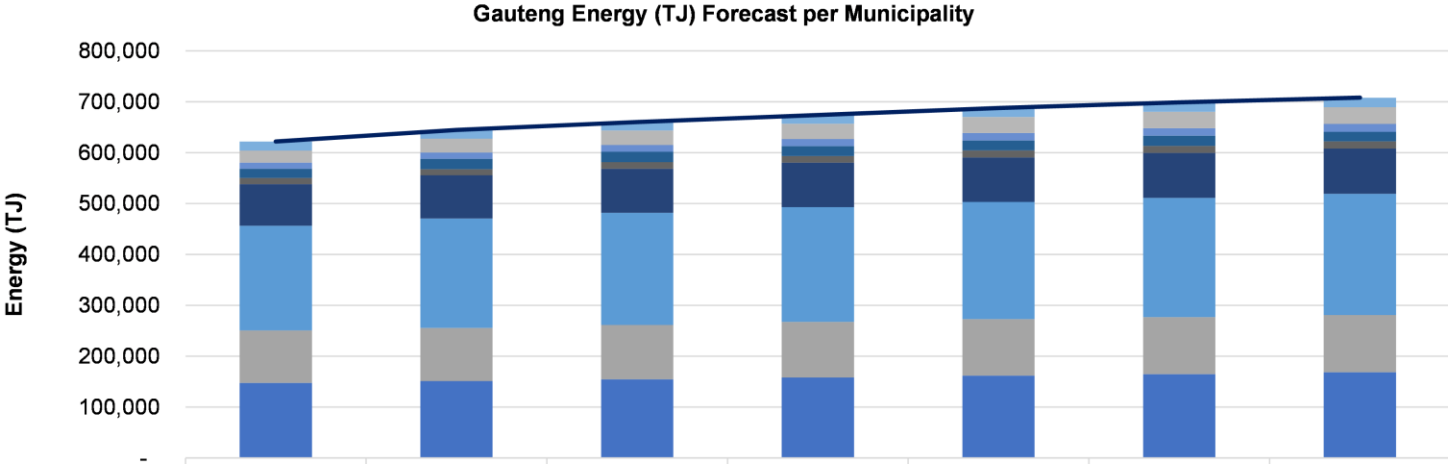
GP Electrical Energy Forecast

- Electrical energy is forecasted to grow at a higher rate for Eskom's areas of supply than for the municipalities.
- Largely, municipal areas of supply have reached saturation, and there is limited land available for future developments.



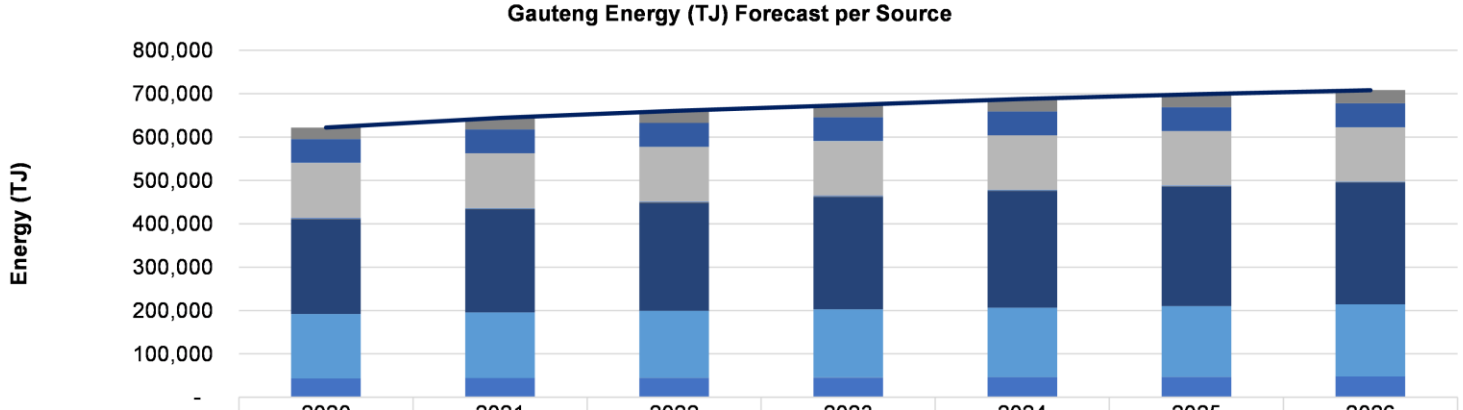
	2020	2021	2022	2023	2024	2025	2026
Eskom	26,936	31,640	34,101	36,105	38,011	39,105	39,948
Municipal	33,659	34,240	35,083	35,878	36,696	37,449	38,096
Total	60,595	65,880	69,184	71,983	74,707	76,554	78,044

GP Energy Forecast per Municipality



	2020	2021	2022	2023	2024	2025	2026
Midvaal LM	17,726	16,904	16,708	17,280	17,798	18,254	18,849
RWCLM	23,915	27,044	28,512	30,136	31,452	32,182	33,102
MoCLM	11,890	12,749	13,401	14,004	14,476	14,998	15,372
MeCLM	18,238	20,169	20,299	19,479	19,577	19,732	18,701
Lesedi LM	11,879	12,181	12,707	13,029	13,807	14,109	14,324
Emfuleni LM	81,721	84,999	86,679	87,257	87,751	88,108	88,524
CoJ	205,961	214,788	220,387	225,373	230,132	234,194	238,225
CoT	103,085	104,663	106,817	109,263	111,089	111,948	112,445
CoE	147,417	151,015	154,649	158,265	161,768	165,027	168,531
Gauteng	621,832	644,512	660,159	674,088	687,850	698,552	708,073

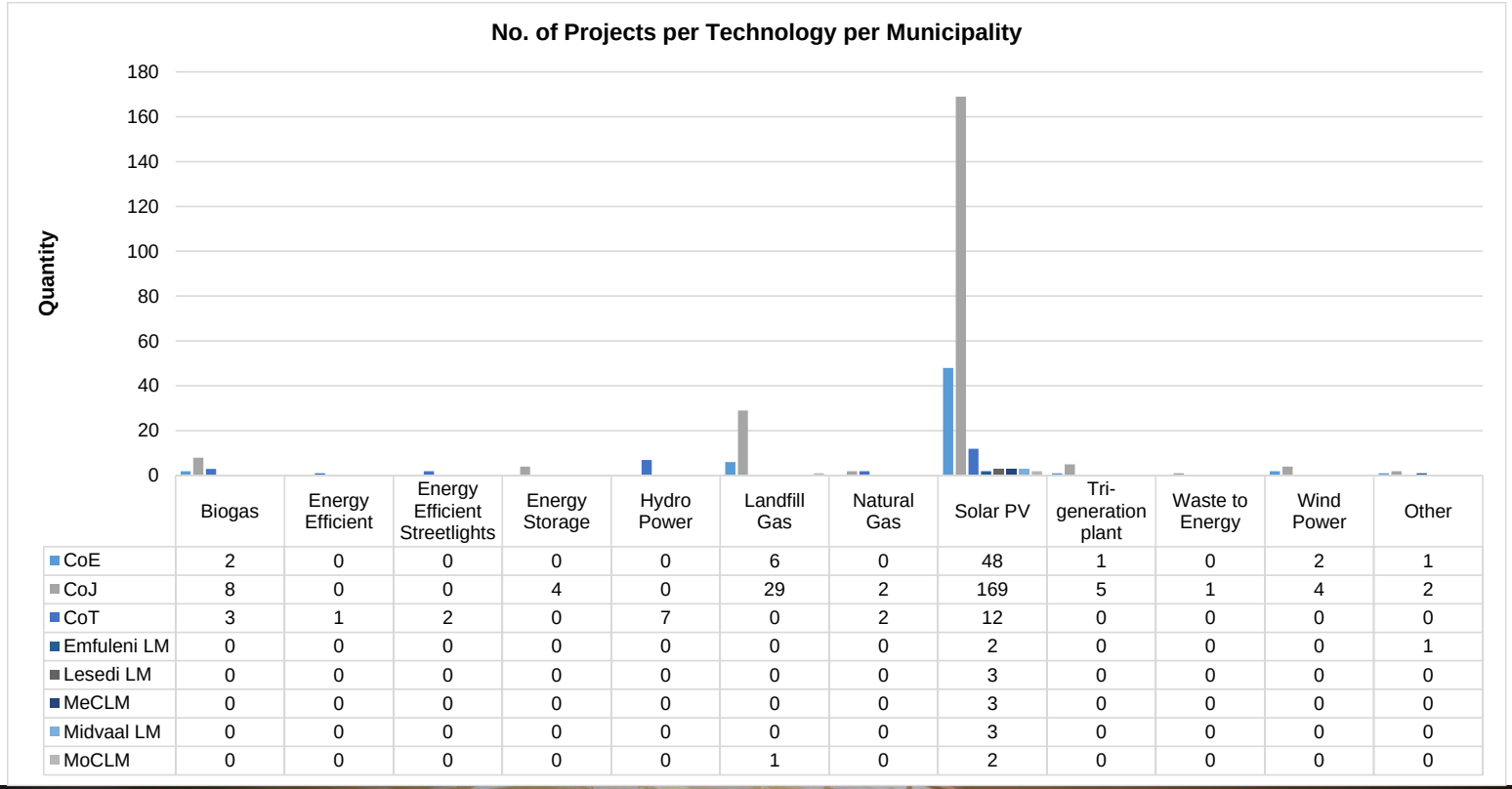
GP Energy Forecast per Source



	2020	2021	2022	2023	2024	2025	2026
Natural Gas	26,305	26,949	27,608	28,284	28,977	29,686	30,413
Coal	54,729	54,729	54,729	54,729	54,729	54,729	54,729
Wood	290	274	258	244	230	217	205
Petrol	126,446	126,150	125,855	125,560	125,266	124,973	124,681
Paraffin	2,002	1,826	1,666	1,519	1,386	1,264	1,153
LPG	394	413	432	452	474	496	519
Furnace Oil	1,314	1,289	1,265	1,241	1,217	1,194	1,171
Electricity	218,142	237,169	249,063	259,139	268,947	275,594	280,958
Diesel	148,860	151,635	154,464	157,347	160,286	163,282	166,335
Aviation Gasoline	60	61	62	63	64	65	66
Jet Fuel	43,290	44,018	44,757	45,509	46,274	47,051	47,842
Gauteng	621,832	644,512	660,159	674,088	687,850	698,552	708,073

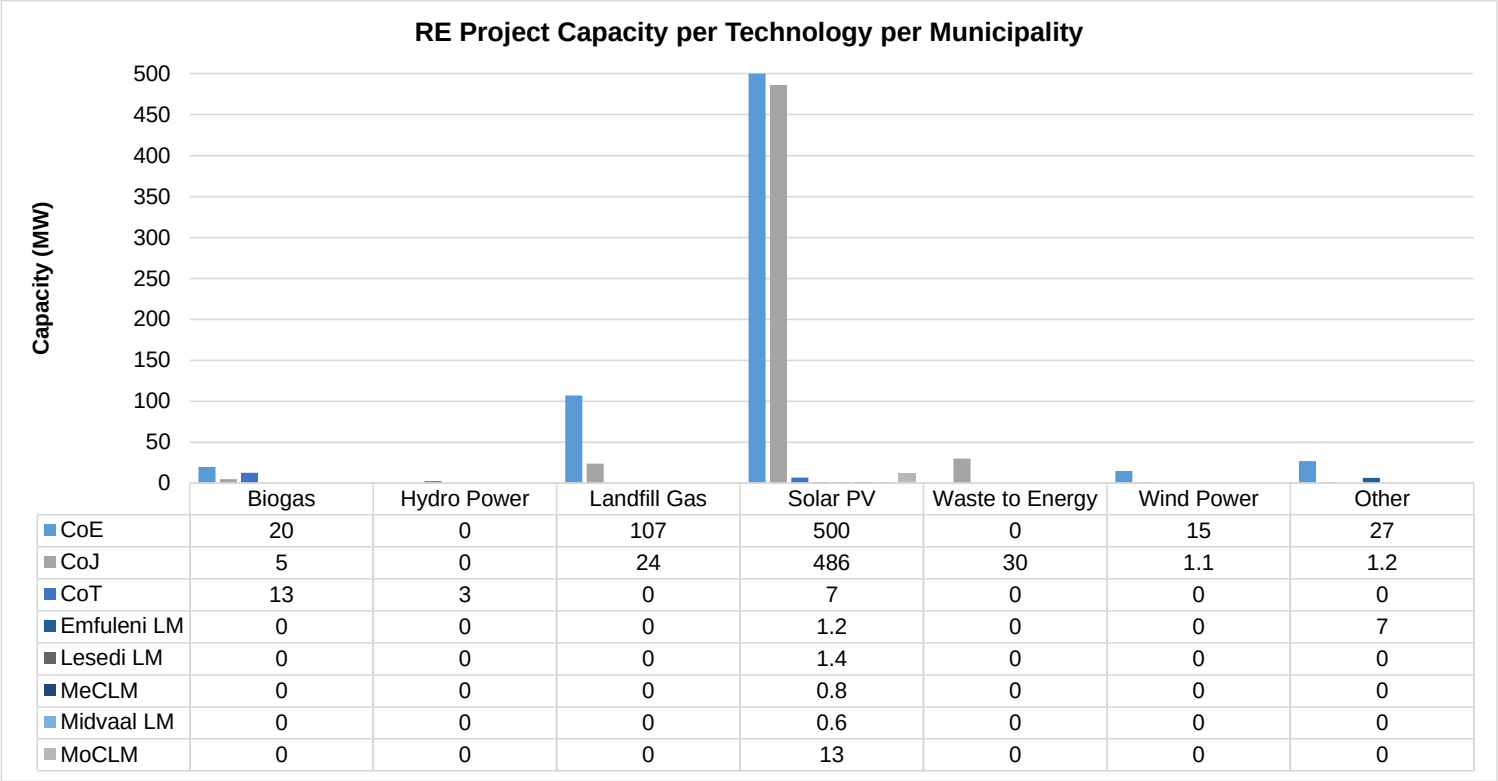
GP Recorded Energy Projects per Municipality – Total (2021)

-Total Projects: 328 as of 2021



	Biogas	Energy Efficient	Energy Efficient Streetlights	Energy Storage	Hydro Power	Landfill Gas	Natural Gas	Solar PV	Tri-generation plant	Waste to Energy	Wind Power	Other
CoE	2	0	0	0	0	6	0	48	1	0	2	1
CoJ	8	0	0	4	0	29	2	169	5	1	4	2
CoT	3	1	2	0	7	0	2	12	0	0	0	0
Emfuleni LM	0	0	0	0	0	0	0	2	0	0	0	1
Lesedi LM	0	0	0	0	0	0	0	3	0	0	0	0
MeCLM	0	0	0	0	0	0	0	3	0	0	0	0
Midvaal LM	0	0	0	0	0	0	0	3	0	0	0	0
MoCLM	0	0	0	0	0	1	0	2	0	0	0	0

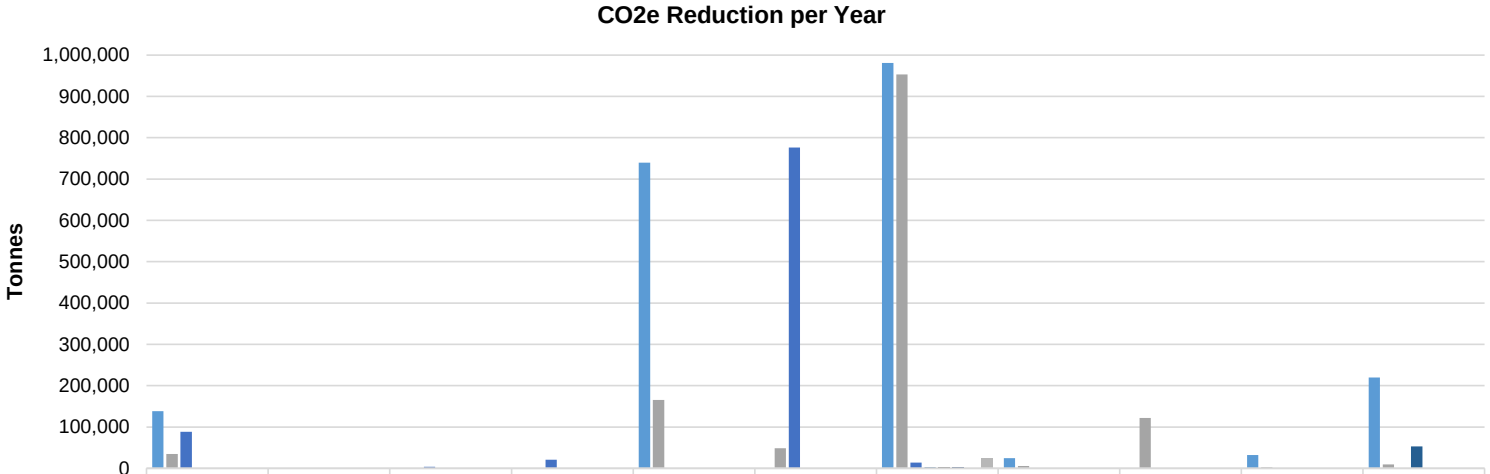
GP Recorded RE Projects per Municipality – MW Capacity (2021)



	Biogas	Hydro Power	Landfill Gas	Solar PV	Waste to Energy	Wind Power	Other
CoE	20	0	107	500	0	15	27
CoJ	5	0	24	486	30	1.1	1.2
CoT	13	3	0	7	0	0	0
Emfuleni LM	0	0	0	1.2	0	0	7
Lesedi LM	0	0	0	1.4	0	0	0
MeCLM	0	0	0	0.8	0	0	0
Midvaal LM	0	0	0	0.6	0	0	0
MoCLM	0	0	0	13	0	0	0

GP Calculated CO_2 Reduction per Municipality – Tonnes

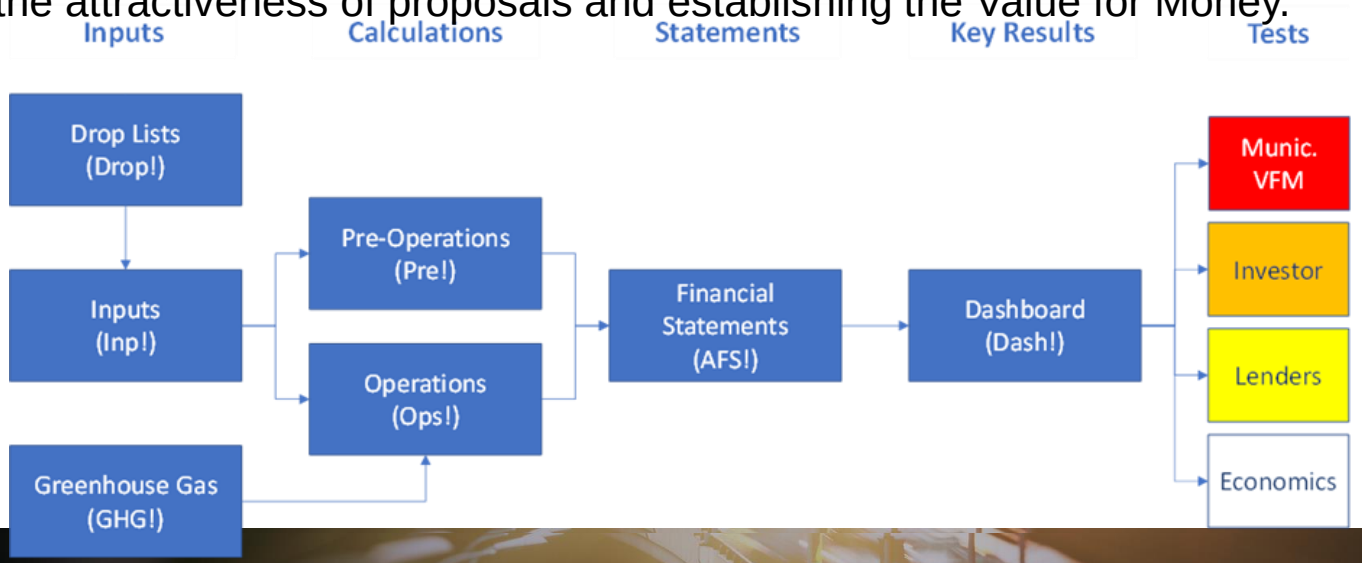
**assumed an emission reduction factor of 0.928 kgCO2e for each kWh avoided from the national grid by using renewable energy sources.*



	Biogas	Energy Efficient	Energy Efficient Streetlights	Hydro Power	Landfill Gas	Natural Gas	Solar PV	Tri-generation plant	Waste to Energy	Wind Power	Other
CoE	138,198	0	0	0	739,358	0	980,819	24,388	0	32,022	219,491
CoJ	34,605	0	0	0	165,405	48,491	953,023	5,697	121,939	2,439	9,511
CoT	88,101	0	3,717	20,535	0	775,858	13,740	0	0	0	0
Emfuleni LM	0	0	0	0	0	0	2,255	0	0	0	52,840
Lesedi LM	0	0	0	0	0	0	2,739	0	0	0	0
MeCLM	0	0	0	0	0	0	1,530	0	0	0	0
Midvaal LM	0	0	0	0	0	0	1,128	0	0	0	0
MoCLM	0	0	0	0	0	0	24,633	0	0	0	0

Financial Model and Funding Approach

- SSEG and IPP Developers approaching municipalities in GP – some with well developed proposals but others with the commercial case not sufficiently explained.
- Need to standardize project financial model for checklist, easy assessments, comparisons, judging the attractiveness of proposals and establishing the Value for Money.

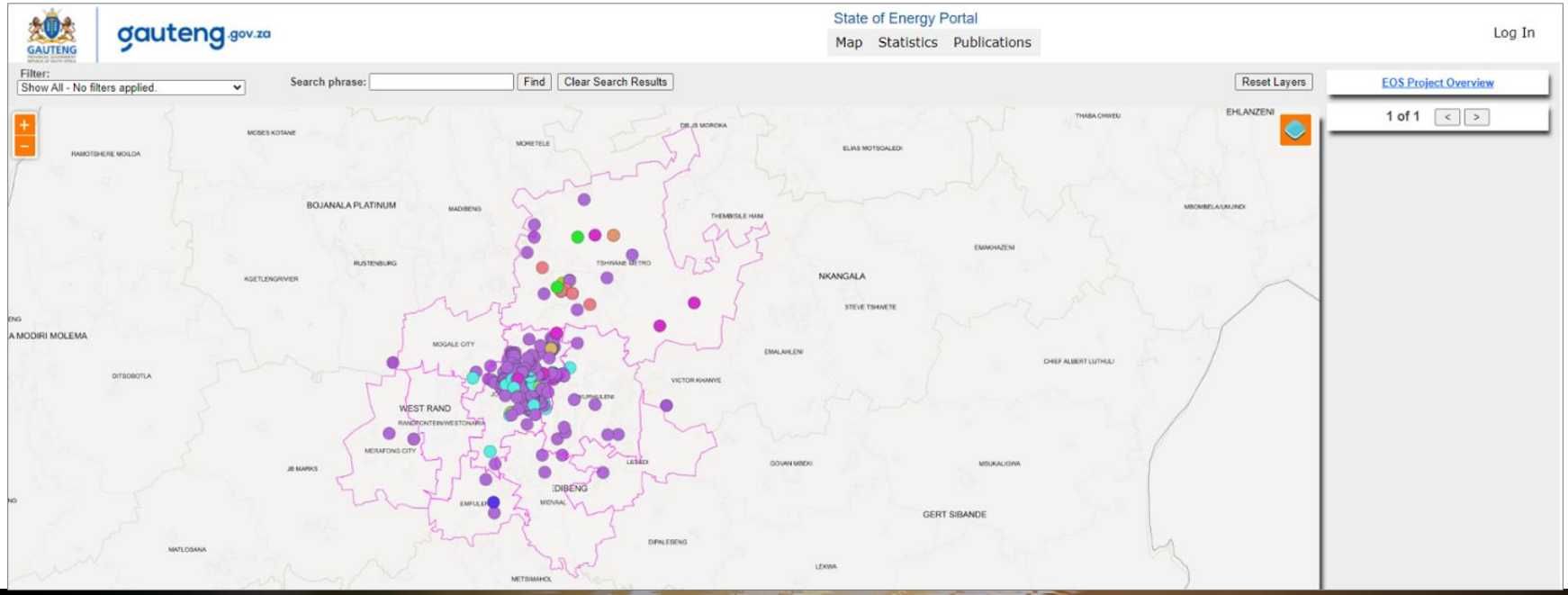


Project Support

- Direct project support vs Programmatic support
- Such support must evidently reflect the legal framework and parameters which apply to municipal-level IPPs.
- Direct project support focuses on a specific IPP at a time
- Programmatic support is more wide-ranging, and it is anticipated that the PPP approach is likely to become more prevalent at the municipal level, and that arranging these in the form of a PPP programme rather than as individual projects will “commoditise” these contracts and speed up delivery.

Web-Enabled Management System

- A web-based system to record and process energy projects information to allow for collaboration and visualization – internal website and external website (for the public).



Concluding Remarks

- Creating a holistic JET plan requires to first understand the existing sources and demand of energy, and how much energy is consumed.
- Availability and quality of data is critical. Key municipal stakeholders should be engaged to explain project benefits and to solicit their participation.
- Municipalities should be assisted to develop policies, processes and tariffs for embedded generation.
- A standard financial standing checklist should be developed, in consultation with National Treasury, to be used by municipalities. Also, a standard PPA should be developed to be used as a template across the municipalities.

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Thank you