EKURHULENI EXPERIENCE WITH EMBEDDED GENERATION

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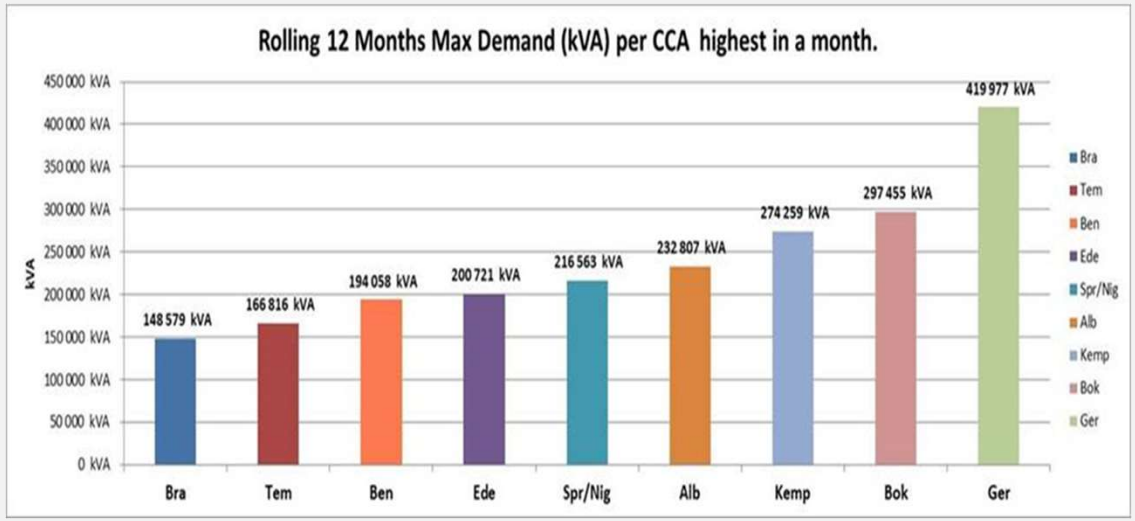
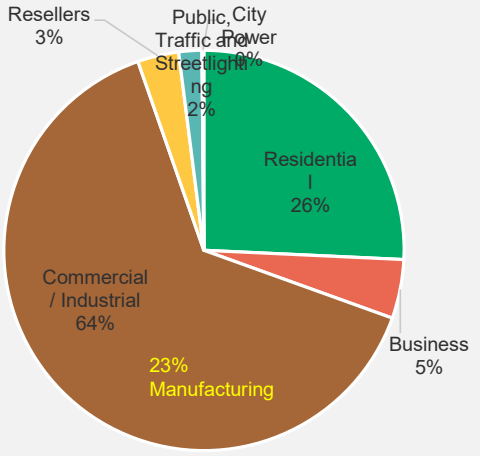
City of Ekurhuleni

1. BACKGROUND

- CoE is a category A Municipality
- One of the country's largest Metros, as well as one of the largest electricity distributors.





- CoE is reliant on Eskom for power requirements with a total of 2500MVA demand (7% contribution to SA demand) from 56 Eskom intake points.
- City currently have 5MW of own generation from solar PV and Biogas
- The city approved an Energy and Climate Change Strategy and one of the objectives is to transition to low carbon operations with a target of 30% renewable/clean energy by 2030

2. DEVELOPMENT OF COE EG FRAMEWORK

- Started in 2013, mainly influenced by industrial customers
- Continuous development over the years
- The framework include:

(a) EG approved policy – detailing guidelines for installation, approval process, commissioning, metering etc. Policy updated yearly

(b) By-laws update to enforce the EG policy

(c) Assessment SOP for the staff

(d) Grid impact study guidelines for systems above 1MW - SEA

(e) Embedded generation feed in tariffs – **R1.06** residential, seasonal industrial tariffs (Winter: **R1.41**, Summer: **R0.96**). Bilateral tariffs under unregulated energy market.

(f) Metering and Billing – Bidirectional meters and prepaid meters only, NO electro-mechanical meters

- Bidirectional meter – Preferred
- Prepaid Meter – Customers must install reverse power flow blocking devices to prevent feedback to the grid

(g) Embedded generation recording template – to record all approved systems, NERSA and other stakeholder's reporting

3. COE APPROVAL PROCESS

SSEG below 1MW:

- Applications are either emailed or hand delivered.
- CoE uses simplified connection criteria, NRS097-2-3 to assess low voltage SSEGs for connection up to 1MW
- Customers can install an SSEG of equal size to the UIC/NMD, but export is limited 25% (Shared) & 75% (Dedicated feeder)
- Customers UIC can be retrieved from the metering on line system or billing system, servicemen
- First approval letter issued if all in order for construction to begin
- After construction, CoE requires completed commissioning form, CoC, Inverter NRS097-2-1 certificate, pictures of safety labelling. Due to volume, it is impossible to attend each SSEG commissioning
- Final approval letter is issued if all commissioning documents are in order.

EG above 1MW:

- CoE generally requires applicants to conduct grid impact studies for connections above 1MW before approval
- Working on a process to conduct the studies internally.
- Studies may include, load flow under different generation and loading scenarios, short circuit studies, rapid voltage changes, export capacity etc
- Grid code compliance - power factor requirements, frequency requirements

4. WAYS COE IS ACCELERATING APPROVALS

City of Ekurhuleni

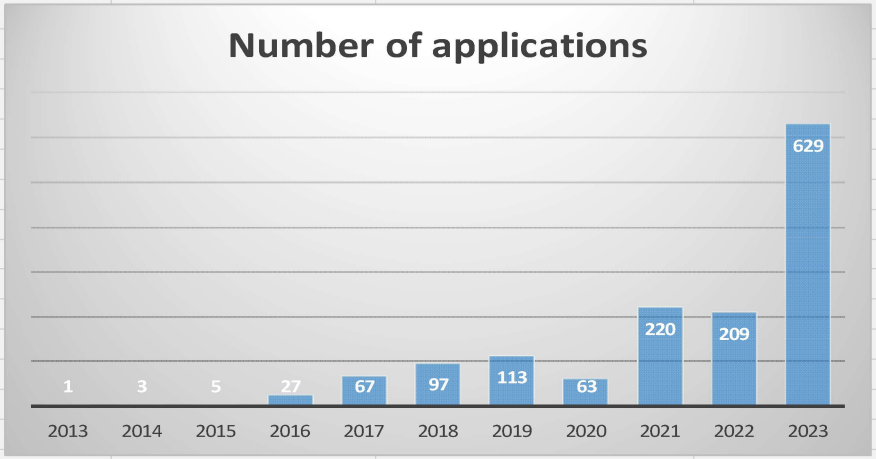
- Appointment of students doing in-service training or other Municipal training programmes
- Hand delivery of application forms
- Participation in the pilot program for online application forms arranged by SEA
- Striving to issue approvals between 1-5 days.

5. GRID PENETRATION OF SSEG / EG

- 171MW approved installed capacity of embedded generators
- 95% of applications received are from industrial or commercial customers
- 45MW estimated residential unregistered systems
- Approval takes between 1-5 days for applications below 1MW
- Solar feed in tariffs seems to be attracting more residential registrations

Summary:

YEAR	No of applications	Installed Capacity (MW)
2013	1	350
2014	3	580
2015	5	1 511
2016	27	7 481
2017	67	6 450
2018	97	18 524
2019	113	16 072
2020	63	18 501
2021	220	49 227
202 2	209	43 855
2023	629	105 067
TOTAL	**1 434**	**267 618**



6. IMPLICATIONS OF NOT HAVING AN EG PROCESS IN PLACE

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- Legislative requirement
- Unregistered systems are a safety hazard to Municipal service man
- Unregistered and illegal systems can potentially impact the functioning of The Municipal grid – compromises quality of supply
- Billing errors from customers with electro-mechanical meters
- Nuisance callout from customers with prepaid meters tripping or deducting units during export period

6. CITY OWNED SOLAR SSEG

- Installation of solar rooftop

Area/Name	Rated capacity (Kw)	Type
Alberton CCC	500 kw	Solar rooftop
Thembisa CCC	250kw	Solar rooftop
Boksburg CCC	250 kw	Solar rooftop
Brakpan CCC	250 kw	Solar rooftop
Kempton Park CCC	750 kw	Solar rooftop
Bunny Park	100 kw	Ground Mounted solar
OR Tambo Precint	200 kw	Ground Mounted solar
Nigel CCC	250 Kw	Solar rooftop
Alberton Swartkoppies Municipal Complex	250 kw	Solar rooftop
Springs CCC	250 kw	Solar rooftop

7. SOLAR ROOFTOPS ON COUNCIL BUILDINGS

- Kempton park 750kW exporting plant and 70% reduction in grid power

ACCOUNT NAME:	EKURHULENI MM	METER SERIAL NUMBER(S):	14263321
ACCOUNT #:	1700155850	STAND NUMBER:	kempton_int_01
LOT NUMBER:	R33000000000330001400000000	REGION:	KEM
TARIFF:	E3XX EKURHULENI_TARIFF E_TOU_>230/400V &<=11kV_EXPORT ENERGY ; Ekurhuleni		

8. Solar Rooftops on Council Buildings

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CIVIC CENTRE	Usage prior to solar installation (kWh)	Usage post solar installation (kWh)	Monthly Savings (kWh)	Monthly Savings (R) VAT exclusive	Remarks
Kempton Park	306 175	89 951	225 128	425 717.05	These are actual consumption figures recorded by the billing meter. The installation of a solar system resulted in 71% reduction in electricity taken from the grid. Repairs on Plant Complete. Plant Operating close to Maximum Capacity with 8 904kWh excess electricity exported to the Grid per month
Alberton	289 737	149 832	139 905	264 560.36	These are actual consumption figures recorded by the billing meter. The installation of a solar system resulted in 48% reduction in electricity taken from the grid
Boksburg	350 312	162 995	187 317	354 216.45	These are actual consumption figures recorded by the billing meter. The installation of a solar system resulted in 53% reduction in electricity taken from the grid
Springs	188 636	82 929	105 707	199 891.94	These are actual consumption figures recorded by the billing meter. The installation of a solar system resulted in 56% reduction in electricity taken from the grid.
Thembisa Brakpan Nigel	The other area's PV systems savings and performance will be estimated based on the above actual figures since some of the billing meters were not functional at the time of the report. The areas are Thembisa (Vandalised during recent protest), Brakpan, Nigel (New installation), and Alberton Swartkoppies (New installation).				
TOTAL SAVINGS (per month)				**R2 352 603.00**	**2-3 years payback period**

9. COE BIOGAS SSEG

- City has installed a 1MW biogas generator to harvest methane gas and generate electricity at Simmer & Jack landfill site

10. CHALLENGES

- Lack of capacity to process SSEG applications and policing of unregistered SSEGs – students appointed on temporary basis, meter inspectors to identify unregistered systems
- No statistics meters on some distribution substations – Needed for grid studies
- Not currently able to conduct grid impact studies internally.

Thank you

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