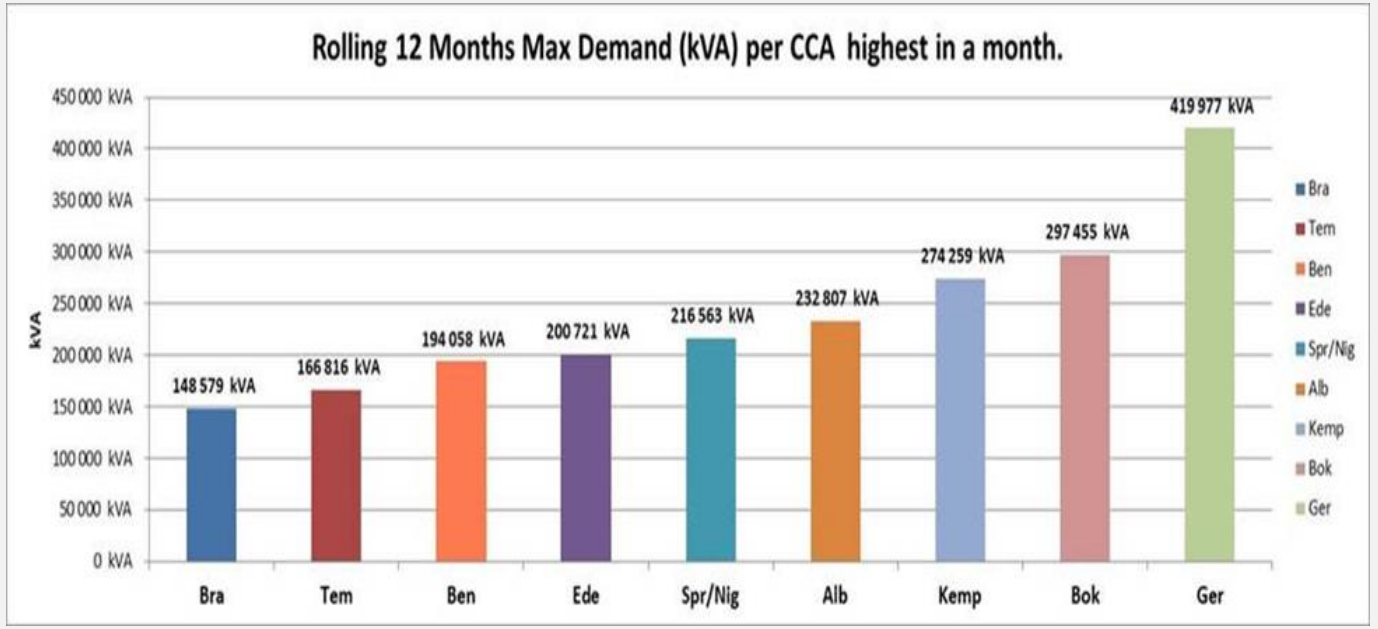
The Impact of Loadshedding, Cost of Loadshedding and Measures to Mitigate Loadshedding

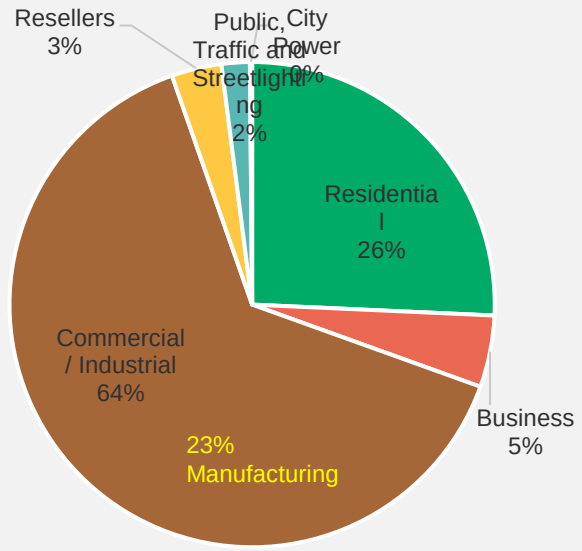
Energy Department's Perspective

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

IMPACT OF LOADSHEDDING

- Exponential increase in cable theft and electrical infrastructure vandalism during load shedding.
- The positive effects of planned maintenance aimed at extending the lifespan of equipment are severely reduced by load shedding
- Equipment breakdown/failures due to constant switching on/off during loadshedding periods – *this further frustrates already frustrated customers when power is not restored as per loadshedding schedule*
- The City has private security that assist in theft and implementation of early warning detection of cable theft.
- Since the beginning of rolling black outs even the private security service providers are unable to curb theft and vandalism.
- Loss of potential revenue derived from sale of electricity (cost of unserved electricity).
- Industrial customers are losing production, business and that impact their sustainability
- Increase in overtime claimed by servicemen for implementing loadshedding
- Increased diesel cost to operate standby generators (Waste treatment, Municipal buildings)

PERCENTAGE LOSS OF POTENTIAL REVENUE FROM EACH LOADSHEDDING STAGE

City of Ekurhuleni

Load shedding Stage	amount of suburbs affected in terms of the 16 block allocation (off)	% Off Potential Revenue loss	Amount of suburbs still ON and consuming electricity in terms of the 16 blocks	% On
1	1/16 (1 out of 16)	6.25%	15 out of 16	93.75%
2	2/16 (2 out of 16)	12.5%	14 out of 16	87.5%
3	3/16(3 out of 16)	18.75%	13 out of 16	81.25%
4	4/16 (4 out of 16)	25%	12 out of 16	75%
5	5/16 (5 out of 16)	31.25%	11out of 16	68.75%
6	6/16 (6 out of 16)	37.5%	10 out of 16	62.5%
7	7/16 (7 out of 16)	43.75%	9 out of 16	56.25%
8	8/16 (8 out of 16)	50%	8 out of 16	50%

, stage 1 loadshedding will cause a 6.25% loss of revenue, stage 2 - 12.5%, stage 3 – 18.75%, stage 4 - 25%, stage 6 – 37.5% etc

POTENTIAL REVENUE LOSS ACTUAL FIGURES

City of Ekurhuleni

- The average potential revenue loss per month across all stages is **R450 Million (Average)**
- Stage 6 potential loss is 6 X stage 1 figures

		Load shedding Stage Potential Revenue loss per stage					
		Stage 1		Stage 2		Stage 6	
		6.25% potential loss		12.5% potential loss		37.5% potential loss	
Month`	Projected sales 2022/2023 FY.	For whole month	per hour	For whole month	per hour	For whole month	per hour
July	R 2,241,176,444.00	R 140,073,527.75	R188,270.87	R 280,147,055.50	R376,541.74	R 840,441,166.50	R 1,129,625.22
August	R 2,341,027,510.00	R 146,314,219.38	R196,658.90	R 292,628,438.75	R393,317.79	R 877,885,316.25	R 1,179,953.38
September	R 2,290,469,562.00	R 143,154,347.63	R198,825.48	R 286,308,695.25	R397,650.97	R 858,926,085.75	R 1,192,952.90
October	R 1,549,708,859.00	R 96,856,803.69	R130,183.88	R 193,713,607.38	R260,367.75	R 581,140,822.13	R 781,103.26
November	R 1,433,088,187.00	R 89,568,011.69	R124,400.02	R 179,136,023.38	R248,800.03	R 537,408,070.13	R 746,400.10
December	R 1,430,501,032.00	R 89,406,314.50	R120,169.78	R 178,812,629.00	R240,339.56	R 536,437,887.00	R 721,018.67
January	R 1,290,625,071.00	R 80,664,066.94	R108,419.44	R 161,328,133.88	R216,838.89	R 483,984,401.63	R 650,516.67
February	R 1,324,632,451.00	R 82,789,528.19	R123,198.70	R 165,579,056.38	R246,397.41	R 496,737,169.13	R 739,192.22
March	R 1,350,005,657.00	R 84,375,353.56	R113,407.73	R 168,750,707.13	R226,815.47	R 506,252,121.38	R 680,446.40
April	R 1,415,640,306.00	R 88,477,519.13	R122,885.44	R 176,955,038.25	R245,770.89	R 530,865,114.75	R 737,312.66
May	R 1,394,628,240.00	R 87,164,265.00	R117,156.27	R 174,328,530.00	R234,312.54	R 522,985,590.00	R 702,937.62
June	R 1,544,306,087.00	R 96,519,130.44	R134,054.35	R 193,038,260.88	R268,108.70	R 579,114,782.63	R 804,326.09

COST OF LOADSHEDDING

Cost incurred due to load shedding:

- The cost incurred by the Energy department as result of Load shedding varies. Many factors impact on the actual cost, and it is not the same each time a load shedding block is subjected to load shedding. Equipment failure increases when load shedding is applied over a prolonged period. Network equipment has not been designed for frequent switching, and it is affecting especially oil filled equipment, where the risk of breakdown of equipment increases each time, it gets switched.
- Syndicates also target the network during load shedding.

1. Cable faults increases due to high loads after restoring supply of electricity

- Approximately R 200 000/day of load shedding.

2. Medium voltage switchgear failure

- Approximately R 100 000/day of load shedding

COST OF LOADSHEDDING CONTINUES…

3. Theft and vandalism on infrastructure during load shedding

- Approximately R 350 000/day of load shedding

4. Additional overtime for switching operators and Control officers to perform network switching operations and restoring supply after equipment damage or theft & Vandalism incidents.

- Approximately R 75 000/day of load shedding

5. Additional costs for as-and-when-required contractors to assist in repairs.

- Approximately R 180 000/day
- As high stages of load shedding continue to be implemented the risk of escalation in cost also increases.
- Not only equipment can break under the strain of load shedding but also our staff cannot continue to do load shedding continuously. This creates the risk of burnout and possible operator error that can lead to serious injury or even death.
- The approximate expenditure due to load shedding is R 905 000/day of load shedding.
- Third party claims though insurance are not included.

COST OF LOADSHEDDING ON OTHER SERVICES

City of Ekurhuleni

Wastewater treatment facilities:

2022/2023	Eskom Loadshedding Stages	Total Number of Outages	Total Hours of outages (H)	Total diesel used (l)	Budget spent on diesel (R)	Number of Critical equipment failures impacting compliance directly
Q1	1-6	726	2483	80 858	1 035 460	281
Q2	1-6	1376	3597	127 835	2 231 592	259

Municipal buildings alternative power supply:

- The City requires **R17 236 800 for diesel to run the standby generators** should stage 6 continues for a week.
- Plans to convert solar roof top PV to hybrid systems with battery storage starting with ICT data Centre at a cost of **R26 Million** per data Centre.

MEASURES TO MITIGATE LOADSHEDDING

City of Ekurhuleni

1. **Industrial Load Curtailment:**

- Development of loadshedding exemption plan for certain industrial customers who are able to reduce their load by 30% during loadshedding

2. **Rollout of SCADA System and Smart Metering to automate the electrical network:**

- The City is currently load shed directly by Eskom at Point of delivery which makes it difficult to isolate certain customers from load shedding.
- If the City invests in Scada system, load reduction will be done for certain loadshedding stages instead of loadshedding

3. **Exemption of certain substations from Loadshedding**:

- Certain substations connecting key customers are exempted from loadshedding, eg, NCP, Randwater
- Further negotiations with Eskom are underway to include other key customers

MEASURES TO MITIGATE LOADSHEDDING CONTINUES…

City of Ekurhuleni

4. <u>Procurement of electricity from IPPs</u>:

❖ City plans to procure over 600MW from independent power producers (IPP) as follows:

Technology	Number of service providers	Range (MW)	Total Proposed Capacity
Solar PV	31	1 -10	298
Waste to Energy	6	5 - 33	139
Landfill Gas	1	5	5
Gas	7	to 50	195
Fine Coal Gasification	1	36	36
Kinetic Power Production	1	10	10
Total	**47**		**683**

❖ In addition to the above programme, the City plans to engage the market for modular innovate and renewable energy generators to be connected at certain substations to deliver power even during loadshedding (dispatchable and Baseload)

5. <u>Own electricity generation</u>:

❖ Installation of Solar rooftop on Council buildings to reduce the load taken from the grid

❖ Generation of electricity from landfill gas at Simmer & Jack landfill site

❖ Development of a City owned concentrated solar power plant (CSP) – *Planning stage*

MEASURES TO MITIGATE LOADSHEDDING CONTINUES…

City of Ekurhuleni

6. <u>Development of energy wheeling framework</u>

- To allow City's large power users to receive energy from IPP generators not located withing customer's premises or connected to customers supply. This will ensure continued investment of large power users in the City and additional electrons on the National grid.

7. <u>Private embedded generation integration framework</u>

- This allows customers to install their own generation and also sell excess electricity to the City at cheaper rates than Eskom. 200MW installed capacity

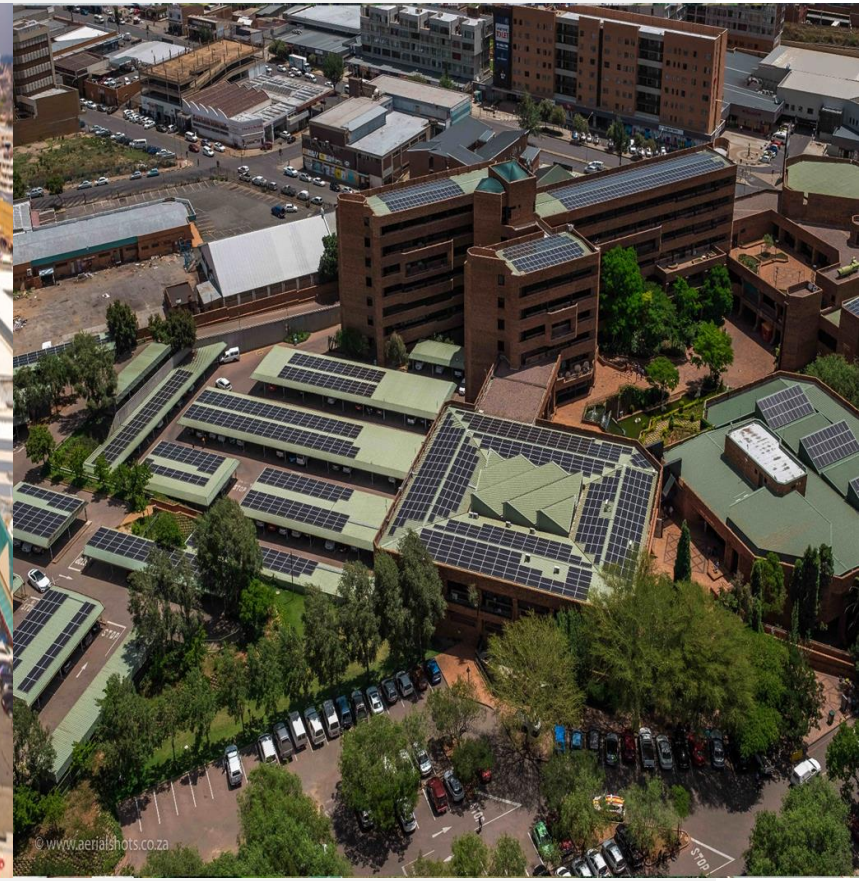
8. <u>Residential geyser control through ripple relays</u>

- City plans to expand this initiative to reduce residential load when needed

Solar Rooftops in Council Buildings

- Installation of solar rooftop to reduce power taken from the grid

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



SAVINGS FROM COUNCIL ROOFTOP PV

City of Ekurhuleni

- Total monthly savings on electricity: **R2 352 603.00**

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	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).				
Brakpan					
Nigel					
TOTAL SAVINGS (per month)	**R2 352 603.00 2-3 years payback period**				

3. Electricity generation from waste

- City owns a 1MW landfill gas to electricity generator installed at Simmer and Jack landfill site

- Power generated is pumped into the grid for selling to end users
- The plant is currently offline due to lack of gas coming from methane gas wells managed by Environmental and Waste Management Department (Contractor need to be appointed)

Thank you

City of Ekurhuleni