

A GUIDE TO UNDERSTANDING YOUR ELECTRICITY TARIFF



**WITH TARIFF REFERENCES FOR
GAUTENG'S INDUSTRIAL AREAS**

SOLA

CONTENTS

- What is an electricity tariff?
- Understanding demand charges
- Understanding energy charges
- How tariffs are applied
- How this affects your business
- Introducing solar to reduce electricity tariffs
- Appendix 1: Ekurhuleni Industrial tariffs, 2021/2022
- Appendix 2: City Power Industrial tariffs, 2020/2021

ABOUT THE AUTHOR



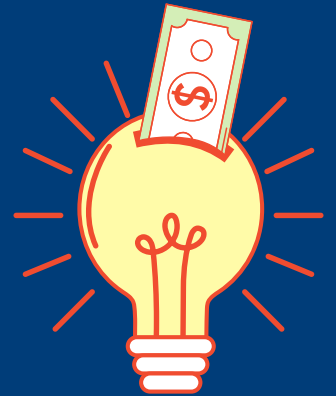
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Disclaimer: This guide is intended as an informative document and does not replace professional advice or electricity bills. If you are reading this you agree with our privacy policy and legal disclaimer.

WHAT IS AN ELECTRICITY TARIFF?

***NIGHT SAVE, MEGA FLEX,
BLENDED, MUNICIPAL:***



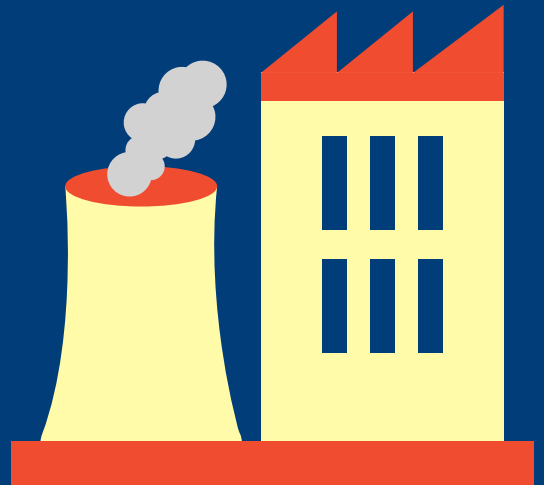
There are several different electricity tariffs, all resulting in different costs of electricity. As an industrial or commercial business owner, it can be confusing to understand electricity tariffs, particularly if you are wanting to reduce your electricity costs.

This short eBook, compiled by SOLA Group's head of Energy Storage Services, aims to explain the basics of understanding your electricity tariff in order to maximise cost-efficiency.

It has three sections – firstly, understanding your energy tariff; secondly, it explores the differences between demand charges and energy charges, and finally it looks at using solar to reduce significant demand charges. Tariff overviews for Gauteng's Ekurhuleni and City Power Johannesburg rates are included in appendices at the end.

South Africa's state utility, Eskom, currently supplies approximately 95% of the electricity consumed in the country, and makes this available to customers either directly via its distribution division, or via municipalities who are licensed distributors of electricity. If you are based within a city's metropole, chances are that you'll be purchasing electricity from a municipality.

WHAT IS TARIFF DESIGN?



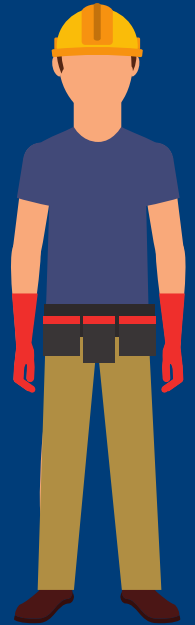
Tariff design allows a distributor of electricity (such as a municipality) to allocate and recover costs associated with the supply of customers within its jurisdiction, as well as account for time and seasonal variance. As such, tariffs typically include the following:

- Basic or service charges; to recover the costs of administering the network, overheads, metering and billing as well as related support
- Demand charges; to recover costs of existing physical electricity infrastructure and assets in a geographic area, and their eventual replacement
- Energy costs; to recover the input costs of the energy as it is used, and related maintenance
- Individual tariff structures are differentiated according to capacity required, voltage level, load profile and geographic location, amongst others. This allows the Municipality to ring fence their costs per customer category and from non-electricity costs.
- Some customers will be charged additional tariff categories, such as ancillary services and subsidies, but may also receive a rebate based on their location.
- Additionally, certain customers may be required to pay a connection charge, where new electrical infrastructure is required to be built or upgraded.

UNDERSTANDING DEMAND CHARGES

As mentioned above, demand charges allow a distributor to recover costs for making power available, in that they cover the cost of fixed distribution and reticulation equipment necessary to supply the customer with power when needed, as well as the related financing charges.

Demand charges are therefore separate and additional to your total energy consumption amount, because the energy distributor or municipality needs to be able to supply a large volume of power to you at any given time - and, the more this power is, the more you will need to pay. Reducing your demand charges is therefore a great way to save on your energy bill.

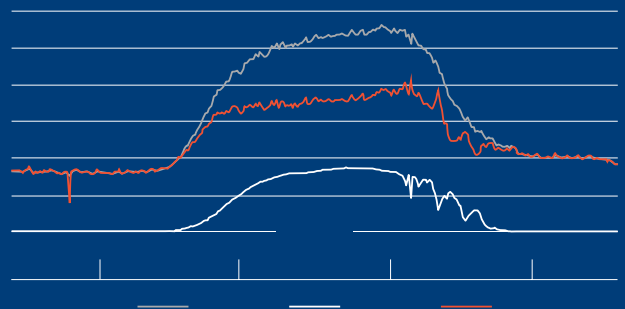


WHAT IS KVA?

As costs for making power available are determined by the nameplate capacity of the equipment in any given building, the costs for this demand are therefore calculated on a per kW basis.

This amount is charged to the customer based on their maximum demand in kW (or kVA) per month, in order for the municipality to supply the necessary power.

DAILY LOAD PROFILE GRAPH



Your peak demand is charged based on the highest peak in your energy consumption – as shown in the graph above. The above graph also shows the new peak demand, demonstrated by the orange line, after the addition of a solar system. More on solar systems on page 15.

UNDERSTANDING ENERGY CHARGES

ENERGY CHARGES

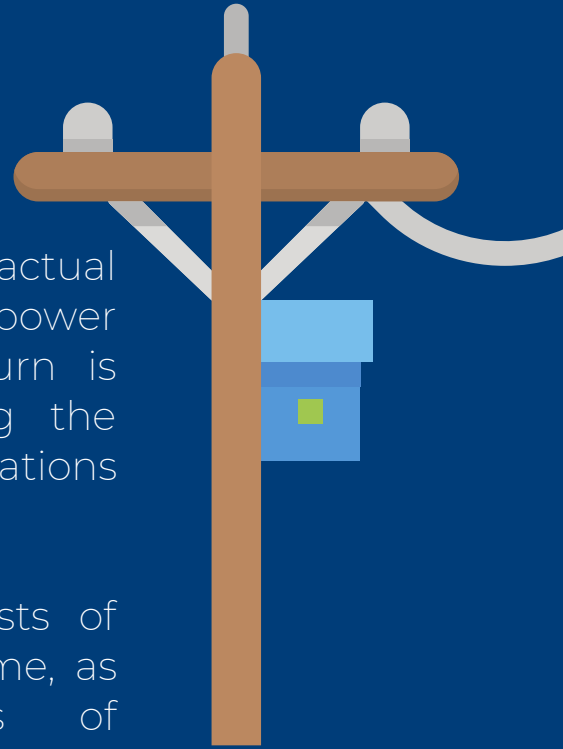
A distributor will charge for their costs to supply actual energy as it used (beyond being ready to supply power as described above), as the distributor in turn is charged for the running costs of operating the generator's plant, including input fuel costs, operations and maintenance and water for cooling.

The energy cost may vary to reflect the costs of producing and delivering electricity at that time, as depending on the demand, different types of generators are dispatched according to a merit order to meet peaks. This is called a Time of Use (TOU) tariff, and provides a pricing signal for customers to more effectively use electricity. A TOU tariff may vary according to demand season, or time of the day (Peak, Standard, Off-Peak, or both season and time of day).

WHAT IS A TIME OF USE (TOU) TARIFF?

Time of use (TOU) is a an additional charge that an electricity provider may charge in order to manage peaks during particular times.

They help the provider of electricity to discourage energy use during certain times when there is increased demand on the electricity supply.



HOW DEMAND AND ENERGY CHARGES ARE APPLIED

DEMAND & ENERGY TARIFFS

Depending on the state of a distributor's network and the mix of customer types within its jurisdiction, a distributor may adjust how it charges for the supply of energy and the availability of power in order to recover the costs it is charged by Eskom. Where there are network constraints at certain points in the day, a distributor may have high peak TOU energy tariffs, or a high demand charge, in order to encourage demand to move out of these time periods.



WHAT IS A BLENDED TARIFF?

Your "blended" or "effective" tariff is what you would typically spend per month on demand charges, plus your typical energy charges, divided by the total number of kWh you would use each month. This number would be different to your actual energy tariff, but it is useful because it shows what you effectively pay per kWh.

Effective Tariff - Typical Industrial Customer	R/kW
Ekurhuleni - Large Business and Industrial (Tariff C) - 230 /400V	1.458
City Power - Industrial Low Voltage	1.470
Ekurhuleni - Large Business and Industrial (Tariff C) - 230 /400V from sub	1.431
Ekurhuleni - Large Business and Industrial (Tariff C) - >230/400V &<=11kV	1.405
Ekurhuleni - Business & Industrial Customers(Tariff E) - 230 /400V	1.428
Ekurhuleni - Business & Industrial Customers(Tariff E) - 230 /400V- from Sub	1.403
City Power - Industrial Medium Voltage	1.375

HOW THIS AFFECTS YOUR BUSINESS

Your hours of operation, and the specific equipment on site, may push your energy usage into peak demand periods, or result in a load profile that incurs unnecessarily high demand charges due to peaks or spikes in your demand (for example, if you have a set of air-conditioners which are all triggered to turn on at the same time).

METERING YOUR LOAD

In order to effectively understand your energy consumption, installing a metering device can be invaluable. This could help to provide detailed input into your consumption patterns, making guesswork unnecessary.

Once you understand when and where your biggest energy consumption spikes are, you can investigate this and put plans in place to bring both your demand and consumption down. To take the solution a step further, it is recommended that your load is metered at the incomer at hourly intervals, or shorter in order to determine the savings as accurately as possible.



QUESTIONS TO HELP DETERMINE IF YOUR LOAD PROFILE IS GOOD FOR SOLAR PV

Understanding your energy consumption patterns is the first step to regaining control of your energy costs through solar PV. However, most energy bills will indicate how much you are paying for each charge category, however they will not indicate when these categories are triggered, or what you can do about high electricity costs. Even worse, some electricity bills are difficult to understand.

1

ARE YOUR OPERATING HOURS MOSTLY DURING THE DAY?

If you operate during peak times, your tariffs might be higher, but if you operate after hours you might benefit from lower tariffs. Understanding your operational load profile (for example, do you use the same electricity 24/7, or does your electricity ramp up during the day and come down in the evening? If your business is based in South Africa and you operate during daylight hours, your solar PV electricity tariff is likely to be much cheaper than grid-supplied power.

2

DOES SOME EQUIPMENT TURN ON AND OFF DURING THE DAY?

In the case of manufacturing or industrial processing, you might have processes that run all the time, meaning that your energy doesn't necessarily have peaks or troughs, but has a consistent demand throughout the day and night.

Starting up equipment - particularly motors, compressors, coolers, etc - could cause your demand to spike, pushing you into a higher demand tariff. If this equipment ramps up during peak solar time, it will make a big difference to your energy costs, because you'll draw less kVA from the grid.

3

DOES YOUR OPERATION HAVE HIGH ENERGY DEMAND?

If you operate during peak times, your tariffs might be higher, but if you operate after hours you might benefit from lower tariffs.

Obviously, if you have significant operations at night, then your facility will benefit from solar when combined with an energy storage element. For many industrial tariffs, the combination of solar, grid and storage is an ideal cost-effective solution, even with high energy demand during the night.

INTRODUCING SOLAR TO REDUCE YOUR ELECTRICITY TARIFF

Taking into account what we have learnt so far, it is helpful to understand that solar's "effective tariff" (the costs of installing solar divided by the kWh that the solar system will provide over the life of the asset, and adjusted for inflation) is usually about 30 - 50% lower than an "effective tariff" in an industrial metropolitan area.

Understanding your energy tariff carefully is the first step to understanding if your building can benefit from solar or solar and storage. If no metering data is available, a skilled solar installer will be able to make certain assumptions about your load profile to be able to determine the cost-benefit of installing a PV or PV and Storage system.

However, if metering data is obtained, this data can be used to prepare more accurate and detailed proposals, which will be able to provide you an idea of the best scenario from a monetary perspective.

Whether or not your business has sustainability targets, if your business is a large energy consumer on an industrial municipal or direct-Eskom tariff, it will benefit greatly from the cost-savings that solar PV can provide.

A solar PPA (Power Purchase Agreement) enables businesses to purchase clean power directly without needing to lay out capex costs. It effectively provides electricity to your business (either by an embedded system on your roof or via the grid through wheeling) at a lower tariff, reducing overall electricity costs.



INTRODUCING SOLAR AND ENERGY STORAGE FOR MAXIMUM SAVINGS

Solar, understandably, produces the most power when the sun is at its peak. For some large-energy consumers, it makes financial sense to build a larger solar PV system than the building requires, storing that excess power in a battery for dispatch at a later time. This can either be done through an off-grid (microgrid) system, or an on-grid, islandable microgrid system.

By adding solar, storage and the grid, an islandable on-grid microgrid system can intelligently predict when to use the most appropriate power, in order to maximise returns and provide the lowest cost energy at any given time. It also ensure protection from power outages and load shedding.

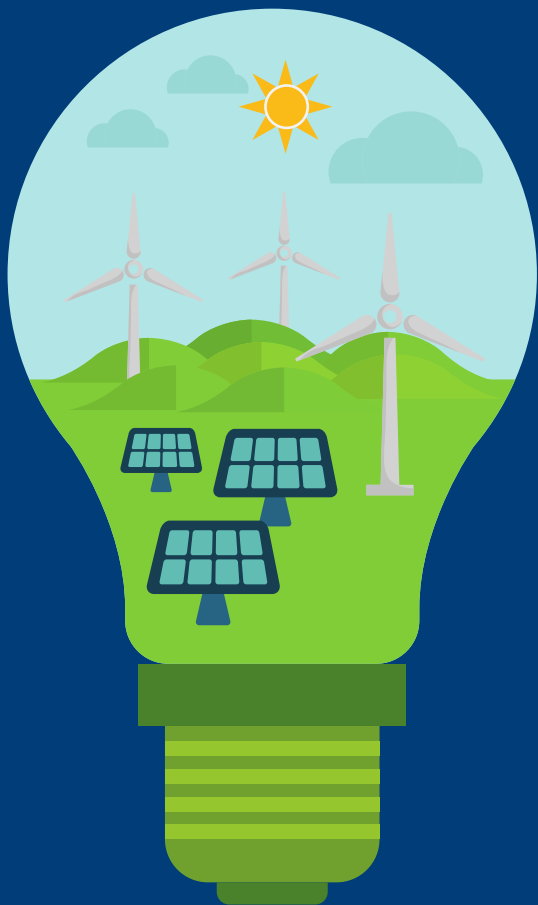
WHAT IS PEAK SHAVING?

In addition to reducing energy costs through saving the amount of grid kWh's purchased, solar can also assist with reducing demand charges through "peak shaving". In this scenario, the solar PV stores excess power in batteries and dispatches this when power typically ramps up, ensuring lower peak demand and thus significant kVA savings.

DOES ENERGY STORAGE MAKE SENSE FOR YOUR FACILITY?

- Is your facility located remotely, for example on an island or in a remotely-located mine?
- Is your facility located on a constrained grid, for example an agricultural or rural area?
- Is your facility located in a municipality or grid network with a very expensive electricity tariff?

If you answered "yes" to any of the questions above, it's time to start thinking seriously about a solar PV and energy storage solution for your facility.



CONCLUSION

Understanding your energy consumption pattern is an essential first step in calculating your effective tariff and can help you get started to reduce your costs significantly. Depending on the tariff charged to your facility, different solutions may have significant effects to your overall energy cost and consumption patterns. Installing solar is one way to reduce energy consumption specifically, but understanding the load profile of a specific building be invaluable for saving costs on electricity in the long run.



The SOLA Group represents cutting-edge solar technology and engineering expertise in Africa. SOLA grows businesses, connects communities and helps people prosper by advancing the adoption of clean energy throughout the African continent.

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APPENDIX 1: EKURHULENI INDUSTRIAL TARIFFS 2021/2022

A note on solar PV in Ekurhuleni

Ekurhuleni electricity cost recovery is mostly weighted to energy charges, therefore installing PV would directly offset the cost of energy in the applicable time period, and installing a small battery to discharge in the peak time of use period would offset peak electricity charges comparable to running a diesel generator.

	Energy charge						Demand charge		Network Access Charge
	High Season			Low Season			High season	Low Season	
	Peak	Std	Off-peak	Peak	Std	Off-peak			Peak/Std
Tariff E - 230 /400V	R 7.69,81	R 2.20,22	R 1.29,74	R 2.34,06	R 1.53,67	R 1.15,34	R 100.13	R 100.13	R 61.47
Tariff E - 230 /400V- from Sub	R 7.56,05	R 2.16,09	R 1.27,34	R 2.30,06	R 1.51,05	R 1.13,38	R 98.45	R 98.45	R 60.50
Tariff E - >230/400V & <=11kV	R 7.42,56	R 2.12,65	R 1.25,00	R 2.25,77	R 1.48,23	R 1.11,22	R 96.54	R 96.54	R 59.34
Tariff E - at 11kV	R 6.87,50	R 1.96,82	R 1.15,75	R 2.09,03	R 1.37,25	R 1.03,01	R 89.42	R 89.42	R 54.92
Tariff C - 230 /400V	R 2.58,03	R 2.58,03	R 2.58,03	R 1.54,33	R 1.54,33	R 1.54,33	R 193.06	R 160.88	R 55.98
Tariff C - 230 /400V from Subs	R 2.53,22	R 2.53,22	R 2.53,22	R 1.51,59	R 1.51,59	R 1.51,59	R 189.60	R 158.03	R 54.99
Tariff C - >230/400V & <=11kV	R 2.48,43	R 2.48,43	R 2.48,43	R 1.48,82	R 1.48,82	R 1.48,82	R 186.14	R 155.12	R 53.99
Tariff D 230/400, Direct from Substation	R 5.56,06	R 1.95,09	R 1.17,65	R 2.06,73	R 1.35,62	R 1.07,01	R 91.25	R 91.25	R 54.75
Tariff D - >230/400V & <=11kV	R 5.45,74	R 1.92,00	R 1.15,53	R 2.03,02	R 1.33,15	R 1.05,00	R 89.59	R 89.59	R 53.76
Tariff D >=11kV	R 5.05,82	R 1.77,55	R 1.07,01	R 1.87,97	R 1.23,41	R 0.97,20	R 82.97	R 82.97	R 49.75

APPENDIX 2: CITY POWER INDUSTRIAL TARIFFS 2020/2021

A note on solar PV in City Power

Installing PV at a site within the City of Johannesburg's supply jurisdiction would have additional benefit as there are high demand charges present in the municipality's tariff structure. Therefore a much larger portion of a customer's saving is derived from demand charges relative to energy charges. Even after PV there are further savings available from reducing a client's demand, by installing battery storage to peak shave.

	Energy charge						Demand charge	
	High Season			Low Season			High season	Low Season
	Peak	Std	Off-peak	Peak	Std	Off-peak		
Industrial Low Voltage	R 1.76,26	R 1.76,26	R 1.76,26	R 1.50,48	R 1.50,48	R 1.50,48	R 224,83	R 224,83
Industrial Medium Voltage	R 1.40,48	R 1.40,48	R 1.40,48	R 1.66,27	R 1.66,27	R 1.66,27	R 210,15	R 210,15
Time Of Use Low Voltage	R 4.01,73	R 1.53,39	R 1.05,10	R 1.68,83	R 1.27,11	R 0.97,71	R 224,88	R 224,88
Time Of Use Medium Voltage	R 4.01,73	R 1.53,39	R 1.05,10	R 1.68,83	R 1.27,11	R 0.97,71	R 210,17	R 210,17
Time Of Use High Voltage	R 1.68,83	R 1.27,11	R 0.97,71	R 4.01,73	R 1.53,39	R 1.05,10	R 195,45	R 195,45