The LiveView* Interface

LiveView systems provide user-friendly energy consumption information online, giving you access to data by way of a dedicated website, which includes the ability to send reports and alerts via email or SMS.

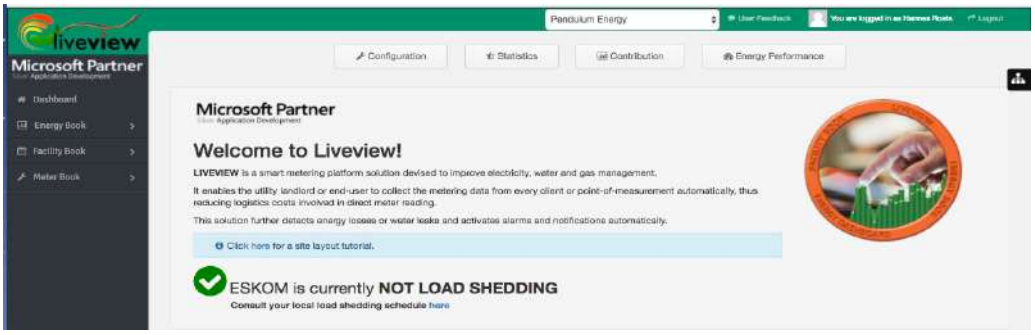
The LiveView systems provide extensive data to help you manage energy usage and expenses more efficiently and make it easy to monitor and visualise energy consumption in great detail. It allows you to respond to any inefficiency, resulting in substantial savings in total energy costs.

The User Interface, or Dashboard, features many functions, and in this article we describe merely a few of the more commonly used components. "Bill Verification" is a particularly popular feature. Be sure to read the description on page 10.

Login to LiveView

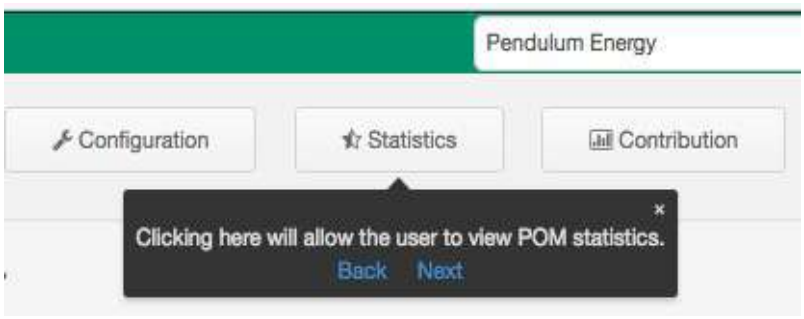
Login URL: http://www.pendulumenergy.liveview.co.za

Login with the details supplied with your welcome email. The landing page opens.



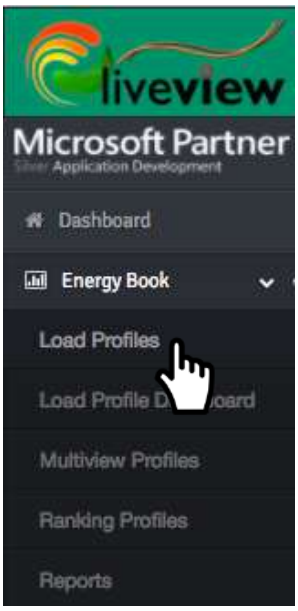
*Livewire Engineering and Consulting (Pty) Ltd own the LiveView Intellectual Property.

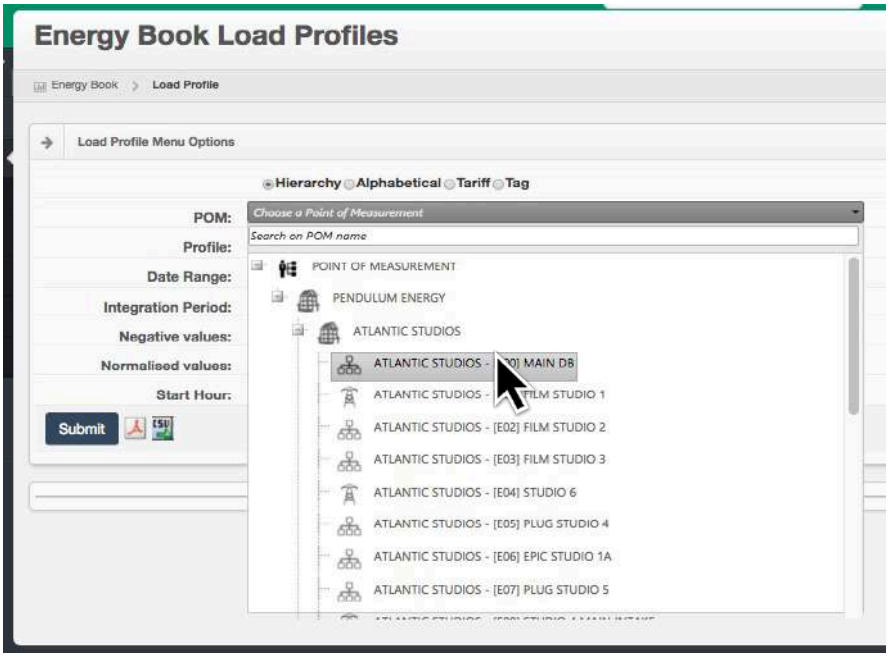
For first time users, we recommend the site layout tutorial for a quick orientation.



Energy Book

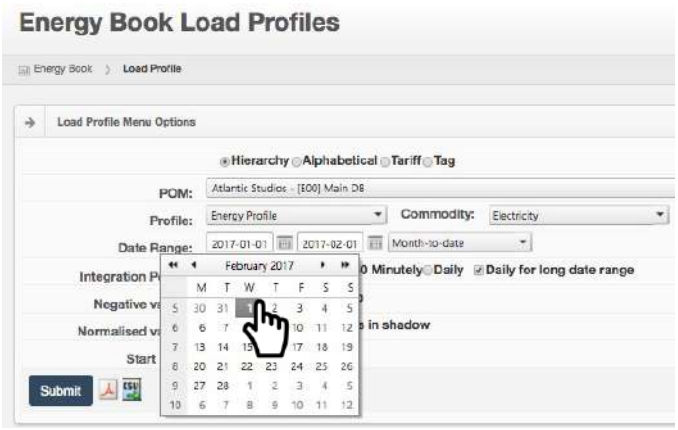
This is where most of the information that you will be using resides. Click on "Energy Book" and select "Load Profiles"

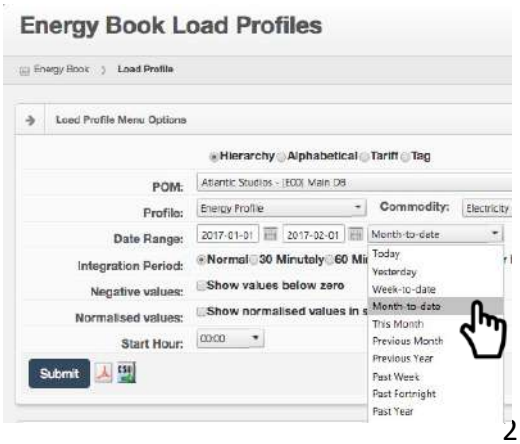




At the POM (Point of Measurement) window, click on the down arrow and select the Point of Measurement. If you are a single meter user, there will be only one choice. For multi meter users select the appropriate POM, like in the example above. In the illustration we select Atlantic Studios Main DB.

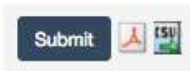
Next, select the date range. There is also a "Quick Date Selection" available.



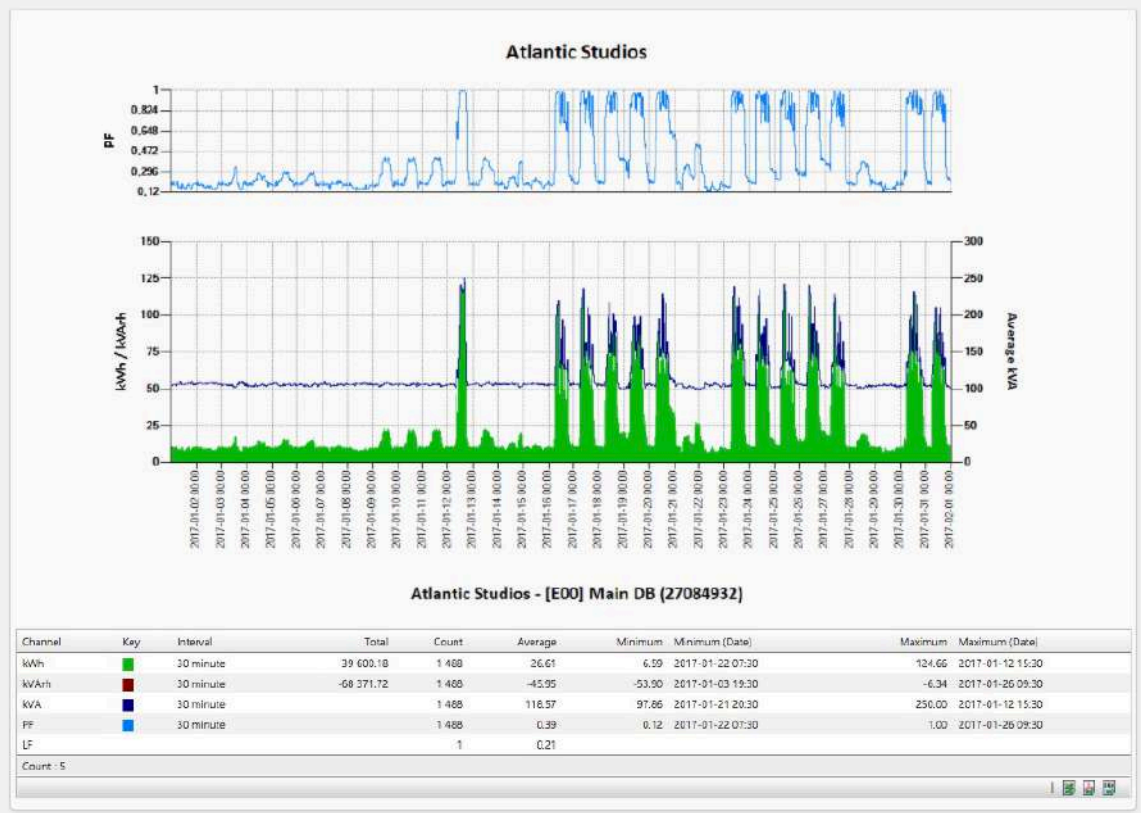


Note:

1. The default Start Hour is 00:00 (midnight). Thus, if you want to include all the hours of all the days for January, for instance, enter 1 January as the start date and 1 February as the end date.
2. Leave all other default selections as is. They are for specialist use.



Click on "Submit," and the profile graph opens.



Channel	Key	Interval	Total	Count	Average	Minimum	Minimum (Date)	Maximum	Maximum (Date)
kWh		30 minute	39 600.18	1 488	26.61	6.59	2017-01-22 07:30	124.66	2017-01-12 15:30
kVArh		30 minute	-68 371.72	1 488	-45.95	-53.90	2017-01-03 19:30	-6.34	2017-01-26 09:30
kVA		30 minute		1 488	116.57	97.86	2017-01-21 20:30	250.00	2017-01-12 15:30
PF		30 minute		1 488	0.39	0.12	2017-01-22 07:30	1.00	2017-01-26 09:30
LF				1	0.21				

Count : 5

Graphing Smart Meter Data

The importance of graphing smart meter data cannot be overstated. Our eyes are much better at identifying patterns and trends from graphical information than from tables or numbers. At first glance, it is quite evident that the studios were inactive for the first two weeks in January.

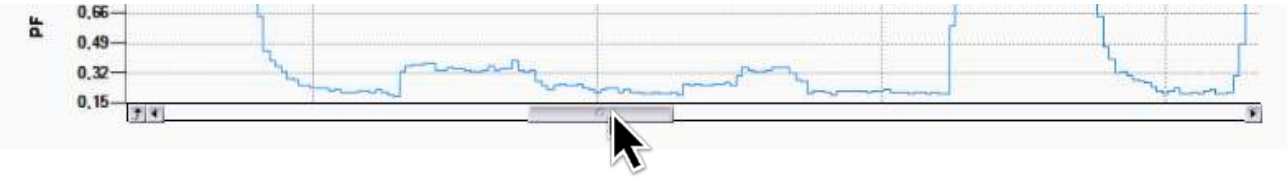
The PF (Power Factor) graph is at the top. That is mainly for engineering use. However, we do give a short explanation of this phenomenon a little later on.

The y-axis on the left shows kWh or Energy Consumption. (Disregard kVArh. That is for our engineering friends). If you are planning to introduce an Energy Efficiency programme, this is the number you want to reduce and, importantly, monitor continuously. Even if you were successful in your efficiency programme, consumption has a tendency to creep steadily up if you are not wary.

The y-axis on the right indicates the values for kVA or Demand. If you have a "Demand" sensitive account, "Maximum kVA Demand" is the next significant figure to consider. Generally speaking, connections with a demand of 100kVA and above get charged for "Maximum Demand". Electricity suppliers charge you for the highest demand measured over a 30-minute interval during the billing cycle, usually a calendar month. Some municipalities even use a "Historical High Demand" and charge for the Maximum Demand during the previous year. We will tell you a bit more about "Demand" a little later.

If you want a closer examination, let's say a 24-hour period, select the area of interest by clicking and dragging over it, and it instantly zooms into that area. It permits you to scrutinize the graph (below) at a much higher resolution.

The software generates a bar graph where the bars represent the average consumption over every 30-minute period. That is exactly how Eskom or the Municipality measures your usage as well. The graph above shows a 24-hour period.

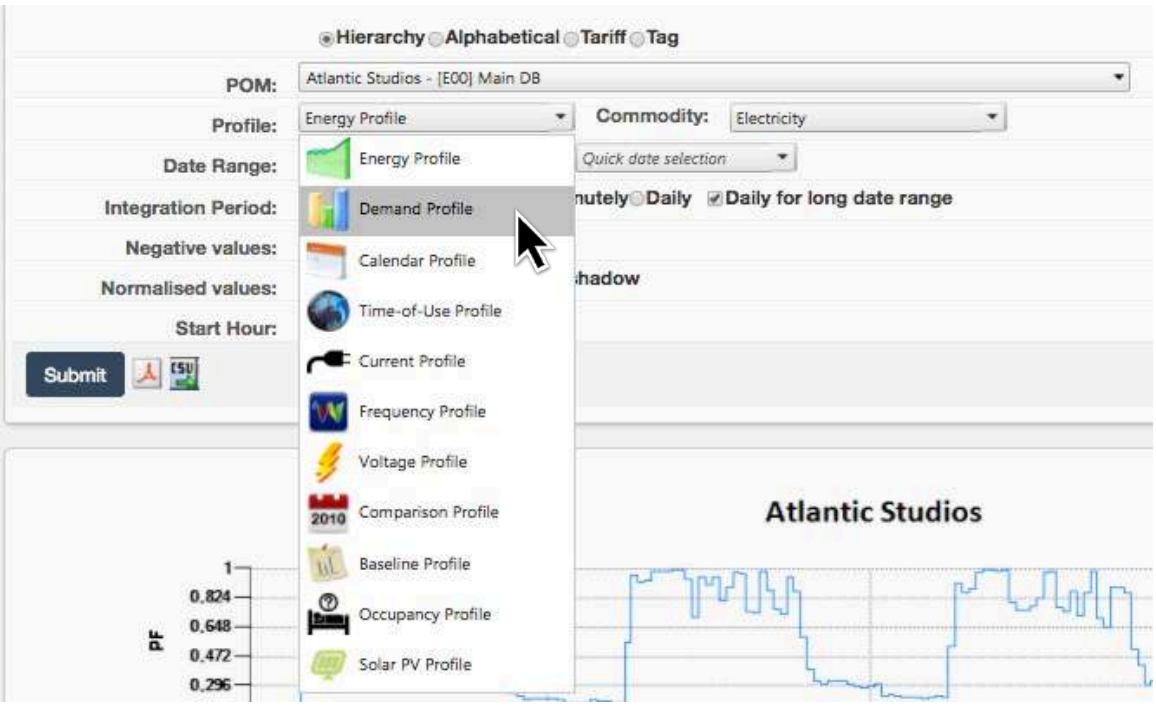


At the bottom of the PF graph is a handy tab that you could use to scroll through the entire selection at high resolution. This function is only available if you used the zoom function. Supposing you generated a 24-hour graph by using the date range, this function is not available.

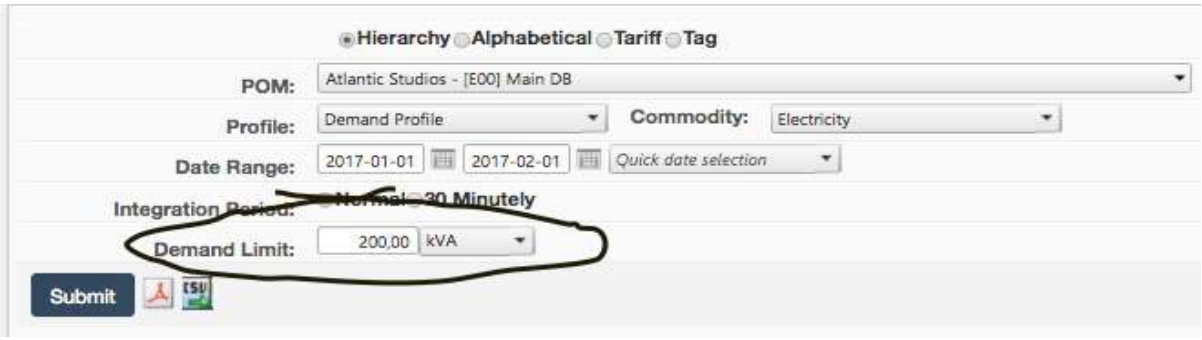
Channel	Key	Interval	Total	Count	Average	Minimum	Minimum (Date)	Maximum	Maximum (Date)
kWh		30 minute	296.14	48	6.17	1.23	2017-02-01 06:30	14.52	2017-02-01 15:00
kVArh		30 minute	47.10	48	0.98	0.34	2017-02-01 04:00	2.91	2017-02-01 15:30
kVA		30 minute		48	12.58	2.47	2017-02-01 06:30	29.58	2017-02-01 15:00
PF		30 minute		48	0.98	0.97	2017-02-01 17:30	1.00	2017-02-01 07:30
LF				1	0.42				

Count : 5

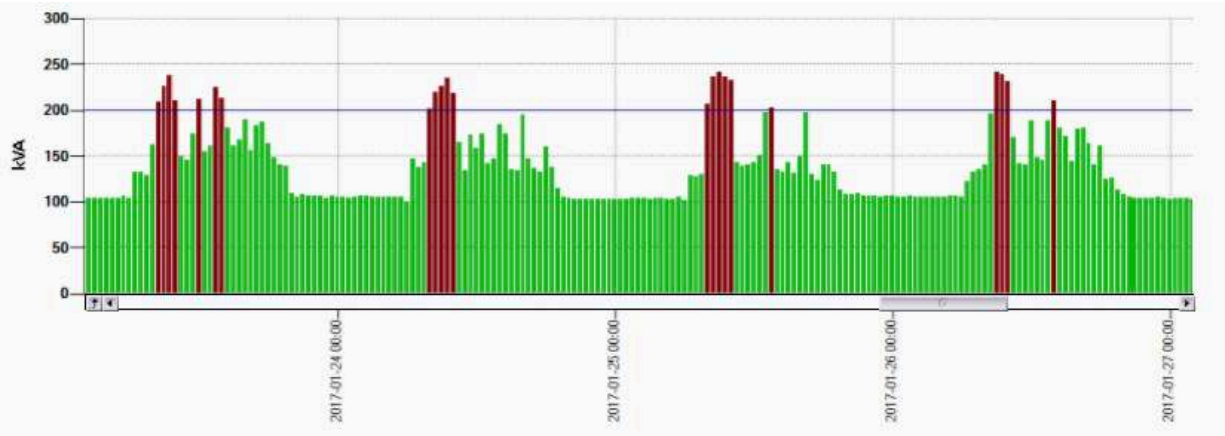
The tables at the lower end contain the statistics for the selected period. This information is essential if you are serious about reducing energy costs. Please refer to our Energy Manual for the interpretation and use of the data that is supplied by the smart meter. It is available for download at, www.pendulum-energy.co.za.



Between the POM and Date Range is the "Profile" window where you can choose from a multitude of different profiles from the drop-down menu. Most of them are for specialist use, but we will have a look at the most popular. We have already had a look at the default "Energy Profile" above, so let us explore the "Demand" profile.



A "Demand" limit can be set (200 kVA in the example above), and when we "Submit" it, the bar graph (below) clearly shows the areas where the kVA limit was exceeded. Notification by email or SMS is also available for any exceedance.



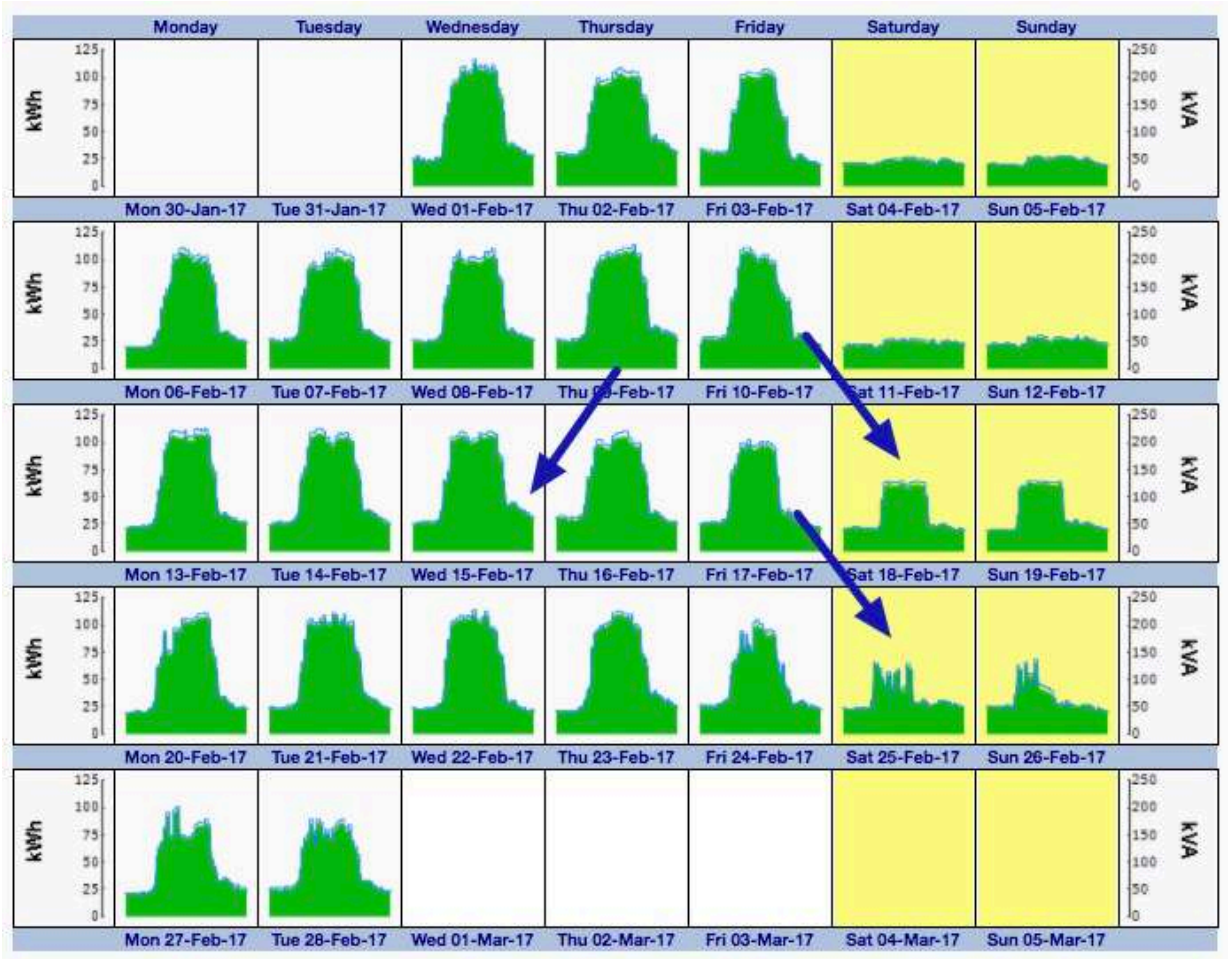
Channel	Key	Interval	Total	Count	Average	Minimum	Minimum (Date)	Maximum	Maximum (Date)
kVA		30 minute		1 488	118.57	97.86	2017-01-21 20:30	250.00	2017-01-12 15:30
kVA Exceeding		30 minute		61	222.21	200.43	2017-01-31 13:30	250.00	2017-01-12 15:30
kVA Threshold		30 minute		1 488	200.00	200.00	2017-01-01 00:30	200.00	2017-01-01 00:30
PF		30 minute		1 488	0.39	0.12	2017-01-22 07:30	1.00	2017-01-26 09:30

Count : 4

The "Demand" statistics are reported in the tables at the bottom of the graph.

Three small tabs on the lower right, allow you to export the stats in Excel, PDF or CSV format.

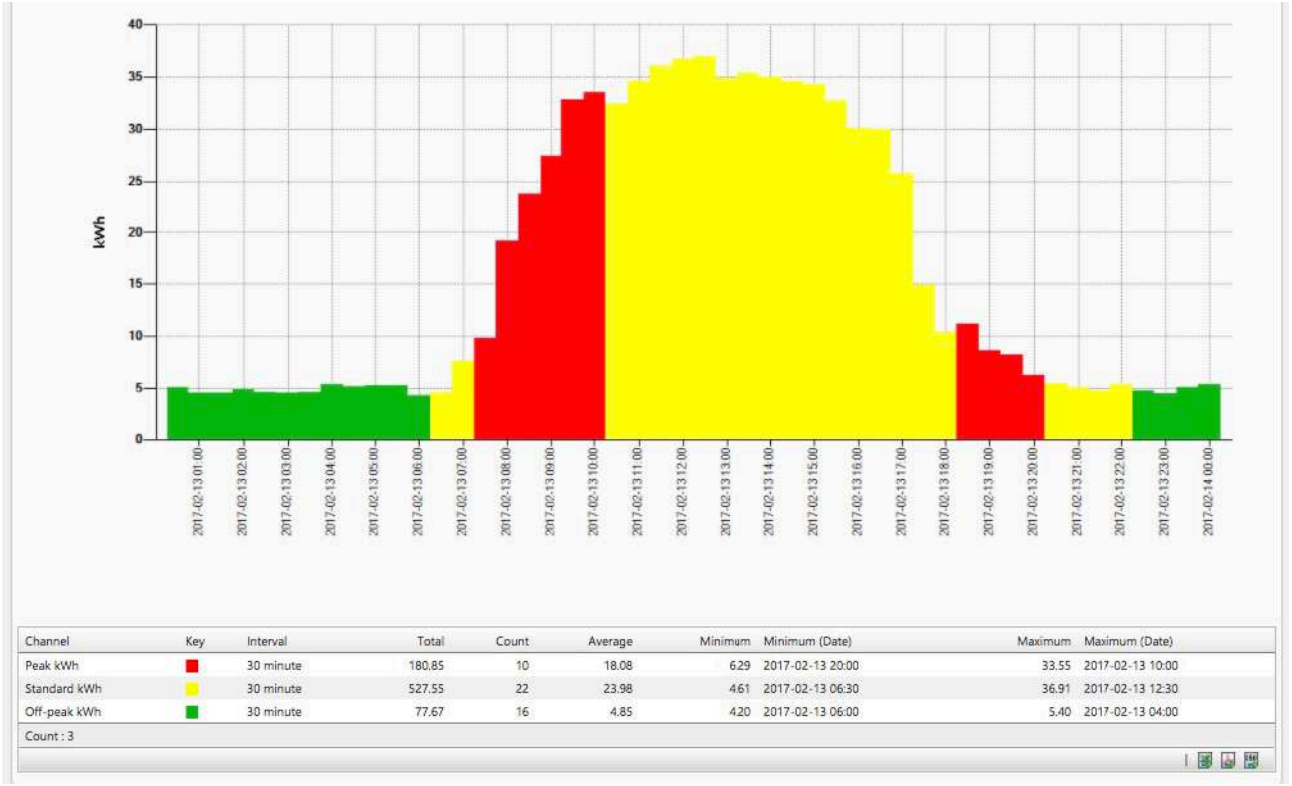
Next, go back to the "Profile" drop-down list and select "Calendar Profile".



The "Calendar Profile" is particularly handy if you want to compare different days during a particular time period. These mini-graphs permit you to pick up any abnormality with ease, which could then be scrutinized using a high resolution graph.

At a glance we can see that there was substantial activity over two weekends, when there was supposed to be none. In addition, the night load on Wednesday 15th was considerably higher, compared to other nights.

Let's select the "Time-of-Use" profile next.



Channel	Key	Interval	Total	Count	Average	Minimum	Minimum (Date)	Maximum	Maximum (Date)
Peak kWh		30 minute	180.85	10	18.08	6.29	2017-02-13 20:00	33.55	2017-02-13 10:00
Standard kWh		30 minute	527.55	22	23.98	4.61	2017-02-13 06:30	36.91	2017-02-13 12:30
Off-peak kWh		30 minute	77.67	16	4.85	4.20	2017-02-13 06:00	5.40	2017-02-13 04:00

Count : 3

This facility is indispensable if you are on a Time-of-Use Tariff, or particularly if you are contemplating changing your tariff to Time-of-Use.

The three colours indicate the energy consumption during Peak, Standard and Off-Peak times, which allows you to calculate the exact cost during the different rates.

Time-of-Use Principle

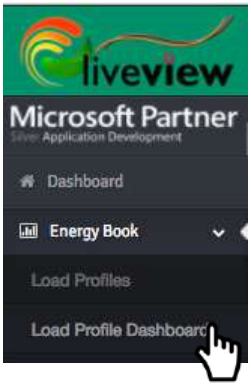
As a consumer, you are accustomed to making money-saving choices and paying lower prices for goods and services used during off-peak times. Some industries such as telecommunications and commercial airlines offer attractive off-peak rates to even out customer demand and prevent system overload.

Time of Use (TOU) electricity rates are based on the same concept. By reducing your electricity use during peak periods, you have the opportunity to lower your annual energy costs without reducing the overall amount of electricity you use. When you shift electricity use to periods of lower demand (off-peak), you can potentially save thousands of Rands each year.

Several South African utilities including Eskom introduced time-of-use pricing to reflect the costs of producing electricity at different times of the day. By shifting electricity use off- peak, they can avoid the astronomical cost of running gas turbine generators to meet the demand. It also reduces the cost of infrastructure and allows their current facilities to operate more efficiently, reducing electricity costs even more. The incentive is a lower kWh charge in the off-peak periods.

There are three different rates namely, Peak, Standard, and Off-peak.

If you want to to take advantage of TOU rates, it goes without saying that a smart meter is an indispensable tool to tell you how much electricity you are using and when.

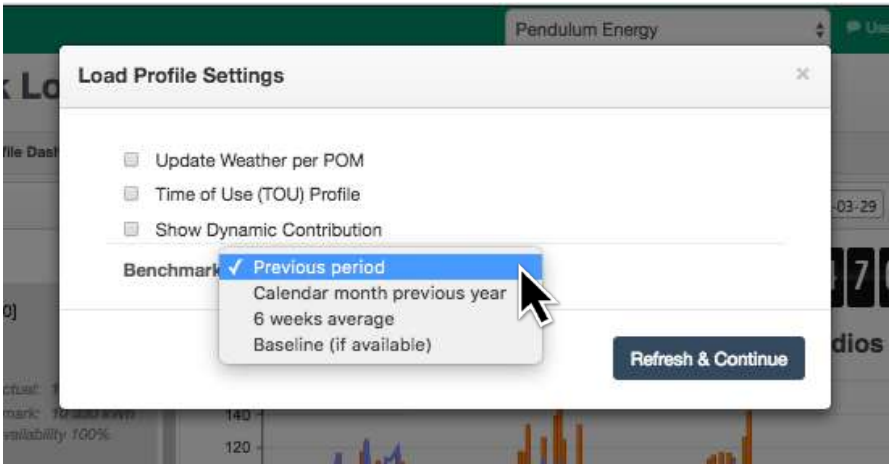


Go back to the "Energy Book" and this time select "Load Profile Dashboard" which opens the "Energy Book Load Profile Dashboard." (See graph on next page).

At the top of the page is a prominent display of the energy consumption and there is even an abbreviated weather readout.

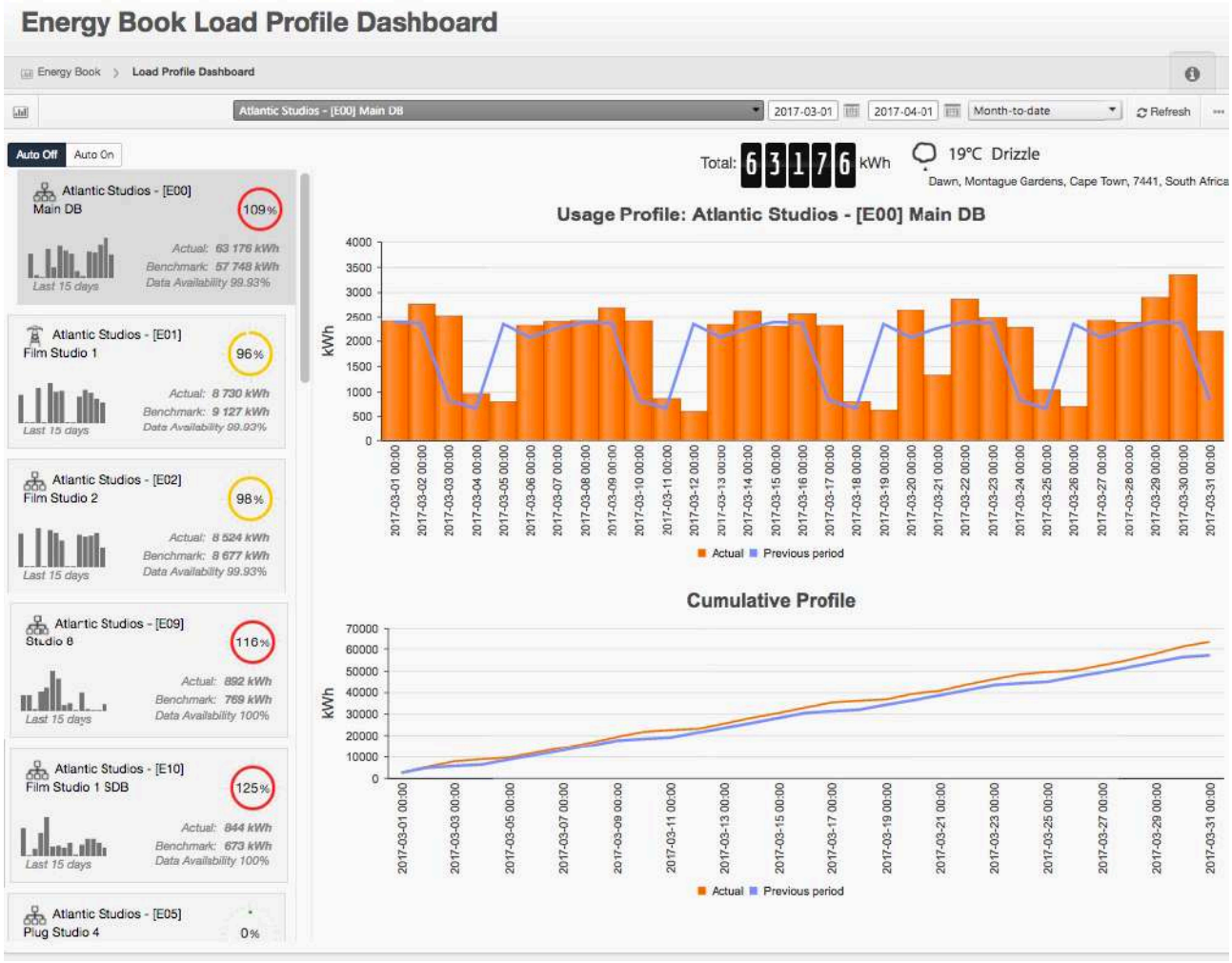
The graphics on the left give an instant comparison to the benchmark that can be set by clicking on the menu icon (extreme right) on the task bar 

and then selecting the required benchmark.



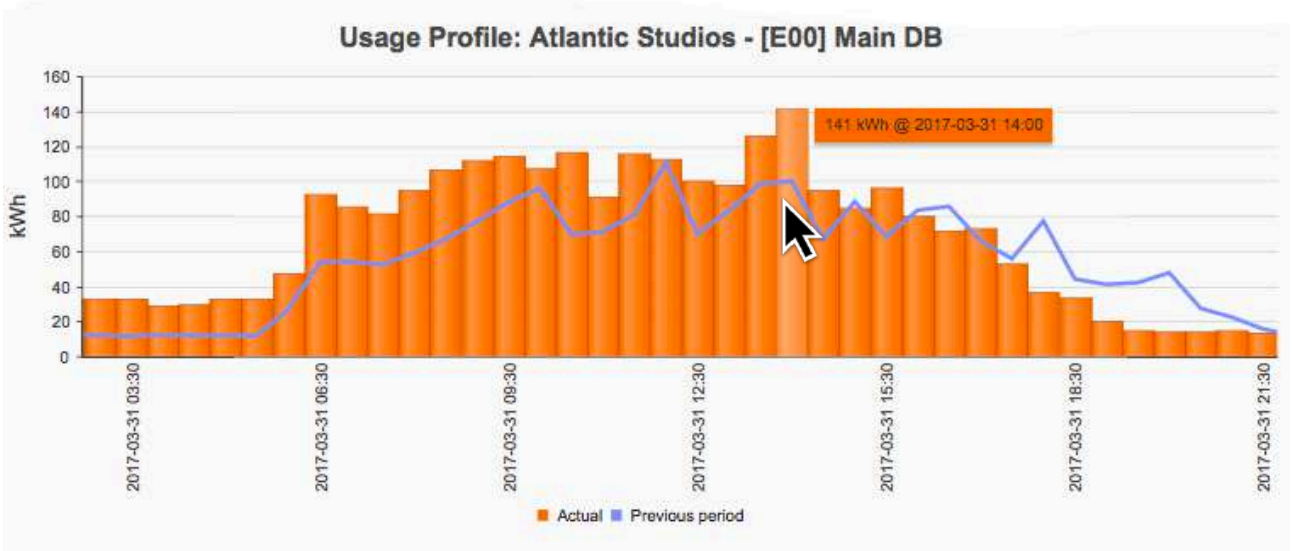
The amber bar graph shows the actual consumption for each day, with the previous period superimposed in blue. This visual illustration presents complex information quickly and clearly, making it easy to evaluate the facility's performance at a glance.

The bottom graph shows the Cumulative Profile.



Resting your mouse pointer on any of the bars produces a label with an accurate digital readout in kWh, as well as the date and time. Using the Scroll Wheel on the Mouse causes a Zoom-in or Zoom-out, and you can click and drag to reposition any part of the graph.

The above mouse actions have the same effect on the Cumulative Graph as well.

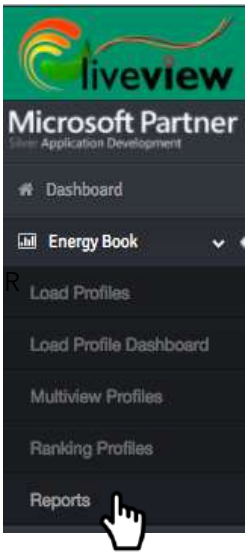


Bill Verification

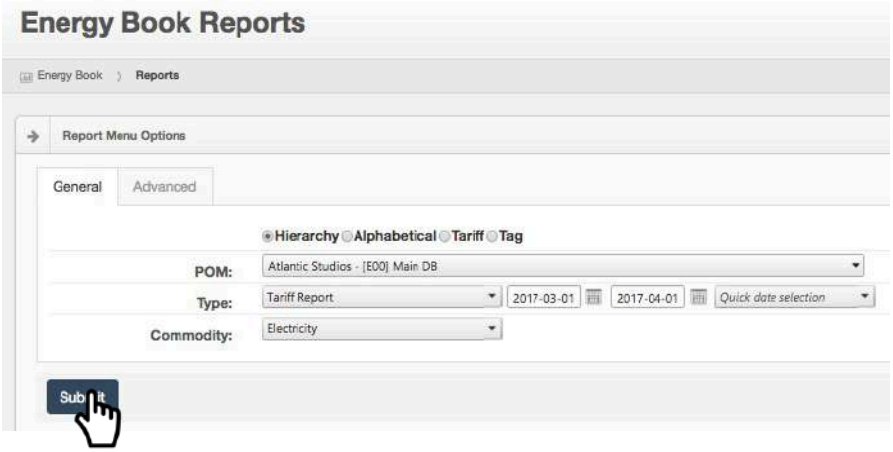
Liveview Smart Meters record precisely what the actual consumption is and the software is programmed to generate a virtual bill that mimics what the municipal bill should be at the click of a button. If there is a marked difference, (which is usually in the council's favour) their bill could be challenged. In the case of a dispute, you will have access to data with a legal standing.

Your tariff details are programmed into the software, so there is no need to enter any tariff information. Changes, like price increases, are taken care of automatically.

All meters are calibrated in a SANAS (South African National Accreditation System) accredited laboratory as required by NRS 057. The metering technicians receive comprehensive training and meticulously adhere to conventionally documented practices. This quality administration program permits anybody to follow the entire audit trail of the system.



Returning to "Energy Book," click on "Reports" to open the window below.



Ensure that the correct POM is selected and for "Type" choose "Tariff Report." Take care that you enter the correct dates for the metering period required. Do not assume that it is a calendar month, and scrutinize your bill for the exact dates.

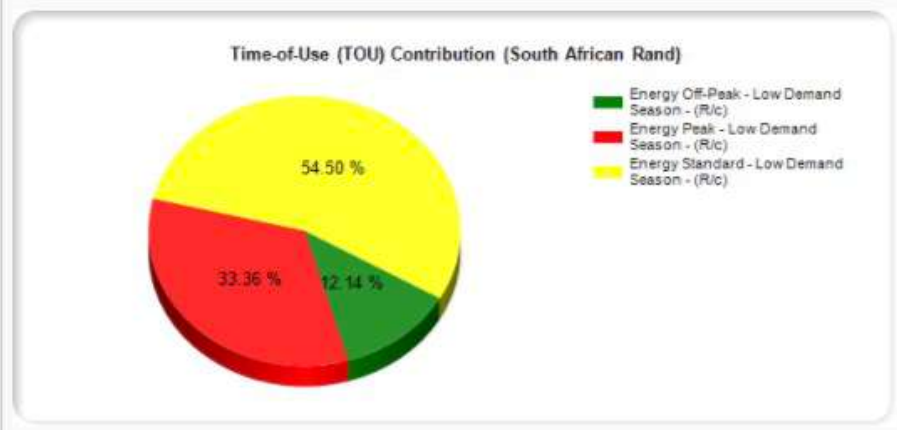
Once you are satisfied that you have entered the correct data, click on "Submit" and within seconds the system produces a bill that reflects all the charges in minute detail.

Utility Account for full metering period

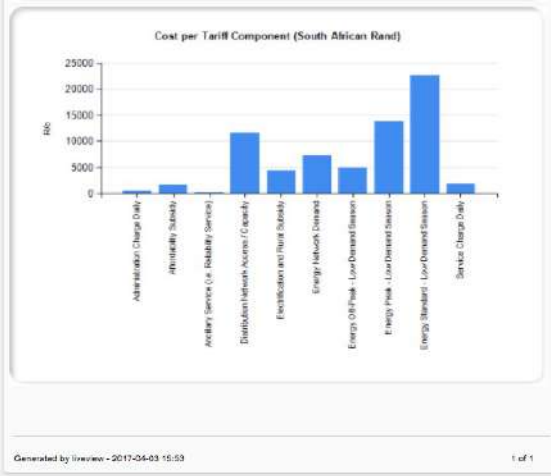
Tariff Component	Unit	Recorded Total	Cost per Unit	Total Cost
Energy Peak - High Demand Season	R/kWh	0.000	R 2.8009000	R 0.00
Energy Peak - Low Demand Season	R/kWh	15 180.000	R 0.9138000	R 13 871.48
Energy Standard - High Demand Season	R/kWh	0.000	R 0.8487000	R 0.00
Energy Standard - Low Demand Season	R/kWh	36 035.000	R 0.6288000	R 22 658.81
Energy Off-Peak - High Demand Season	R/kWh	0.000	R 0.4608000	R 0.00
Energy Off-Peak - Low Demand Season	R/kWh	12 648.000	R 0.3991000	R 5 047.82
Excess Reactive - High Demand Season	R/kVArh	0.000	R 0.0546000	R 0.00
Excess Reactive - Low Demand Season	R/kVArh	0.000	R 0.0000000	R 0.00
Energy Network Demand	R/kWh	51 214.000	R 0.1438000	R 7 364.57
Electrification and Rural Subsidy	R/kWh	63 863.000	R 0.0693000	R 4 425.71
Administration Charge Daily	R/c	31.000	R 16.1900000	R 501.89
Service Charge Daily	R/c	31.000	R 57.7600000	R 1 790.56
Distribution Network Access / Capacity	R/kVA	500.000	R 23.4300000	R 11 715.00
Ancillary Service (i.e. Reliability Service)	R/kWh	63 863.000	R 0.0036000	R 229.91
Urban Low Voltage Subsidy	R/kVA	500.000	R 0.0000000	R 0.00
Affordability Subsidy	R/kWh	63 863.000	R 0.0265000	R 1 692.37
Total Cost (excl. VAT)				R 69 298.12
Effective Cost (excl. VAT)	R/kWh		R 1.0851059	

Note: Rounding is applicable to kWh / kL tariff components. Selections made: Without SMD / Without Custom values / Without VAT

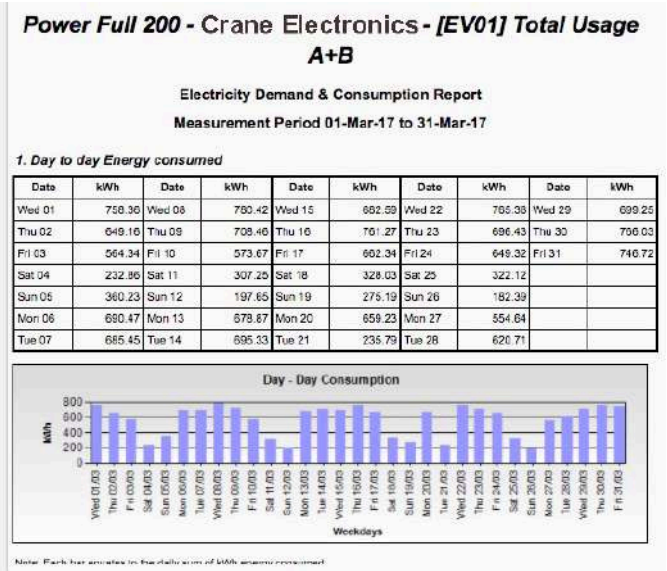
If you happen to be on a Time-of-Use Tariff, a contribution pie chart is produced.



The "Cost per Tariff" graph shows the cost contribution of the various charges at a glance.



"Energy Book Reports" also offer several handy templates to analyse other parameters and is found in the "Type" drop-down list. For instance, the Demand and Consumption Report (reproduced below) is essential for an energy efficiency intervention.



Power Full 200* - Crane Electronics - *[EV01] Total Usage A+B

Electricity Demand & Consumption Report

Measurement Period 01-Mar-17 to 31-Mar-17

1. Day to day Energy consumed

Date	kWh	Date	kWh	Date	kWh	Date	kWh	Date	kWh
Wed 01	758.36	Wed 08	760.42	Wed 15	662.89	Wed 22	765.38	Wed 29	699.25
Thu 02	649.16	Thu 09	708.46	Thu 16	761.27	Thu 23	696.43	Thu 30	756.03
Fri 03	564.34	Fri 10	573.67	Fri 17	662.34	Fri 24	649.32	Fri 31	746.72
Sat 04	232.86	Sat 11	307.25	Sat 18	328.03	Sat 25	322.12		
Sun 05	360.23	Sun 12	197.65	Sun 19	275.19	Sun 26	182.39		
Mon 06	690.47	Mon 13	678.87	Mon 20	659.23	Mon 27	554.64		
Tue 07	685.45	Tue 14	695.33	Tue 21	235.79	Tue 28	620.71		

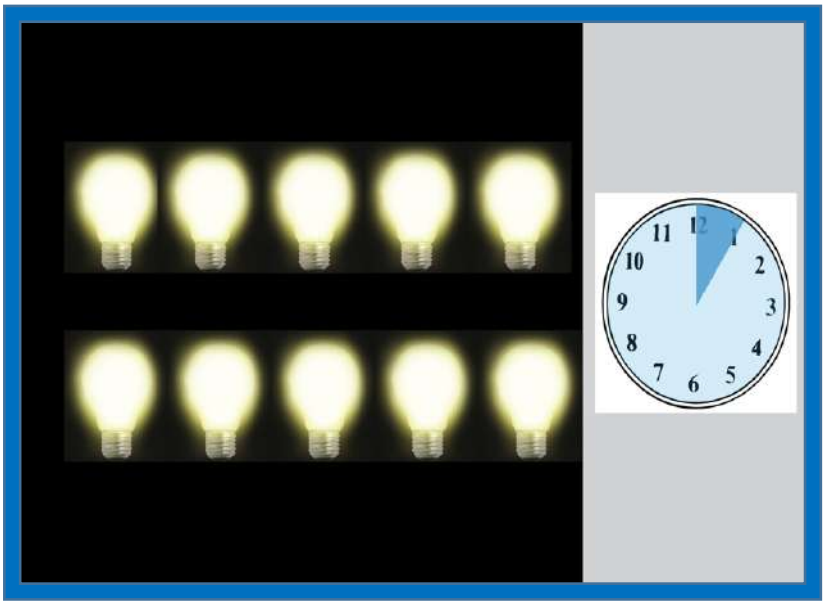
2. Day to day Demand recorded

Date & Time	kVA	Date & Time	kVA	Date & Time	kVA	Date & Time	kVA	Date & Time	kVA
Wed 01 14:00	79.10	Wed 08 11:00	68.34	Wed 15 12:30	65.39	Wed 22 13:30	68.66	Wed 29 14:30	67.27
Thu 02 14:00	65.74	Thu 09 14:00	62.54	Thu 16 12:30	65.27	Thu 23 12:30	61.88	Thu 30 14:30	68.80
Fri 03 10:00	49.77	Fri 10 13:00	54.93	Fri 17 13:30	71.02	Fri 24 12:30	60.46	Fri 31 13:30	70.49
Sat 04 11:00	21.74	Sat 11 13:00	32.37	Sat 18 09:00	26.32	Sat 25 12:00	37.38		
Sun 05 11:30	26.72	Sun 12 21:00	11.97	Sun 19 11:30	17.19	Sun 26 00:30	10.07		
Mon 06 11:30	63.48	Mon 13 13:30	60.07	Mon 20 16:00	57.05	Mon 27 14:30	52.94		
Tue 07 15:00	63.19	Tue 14 15:00	65.16	Tue 21 11:00	16.35	Tue 28 15:00	56.84		

For non-engineers, here is something about the most important Parameters your Smart Meter will be measuring, as promised.

Consumption (kWh)

Before we see how much electricity costs, we have to understand how it is measured. When you buy petrol, they charge you by the liter. When you buy electricity, they charge you by the kilowatt-hour.



Burning 10 X 100 watt light bulbs for 1 hour equals 1 kilowatt-hour (kWh)

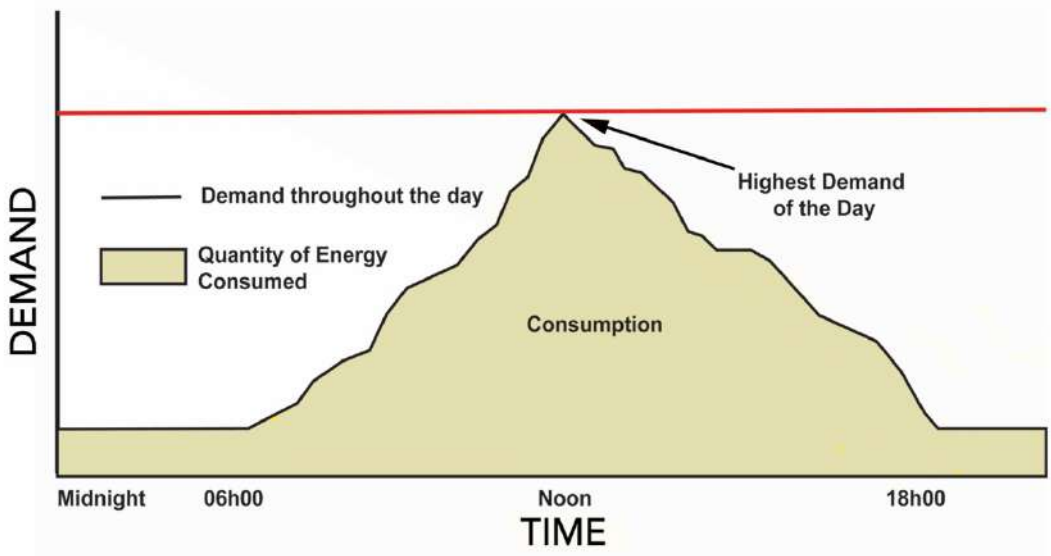
The kilowatt hour (symbol kWh), is a unit of energy equal to 1000 watt hours. For constant power, energy in watt-hours is the product of power in watts and time in hours. So, when you use 1000 watts for 1 hour, that is a kilowatt-hour. The kilowatt hour is most commonly known as a billing unit for the amount of energy delivered to consumers by electricity utilities such as Eskom or a municipality.

Demand Charge (kVA)

Peak demand is a technical term describing the period whenever the electrical supply level is substantially greater than the average.

Think about the following. Two times every day thousands of people do precisely the same thing. During the early mornings, we take a shower, get started on a cup of coffee, use the kitchen stove to prepare breakfast and maybe turn on the automatic washer before heading out for the day. In the evening, we make dinner, watch TV, turn on the heater in winter or air conditioner in summer, use the computer, and switch on the dishwasher, the dryer and more. All that combined usage creates a daily peak in electricity demand.

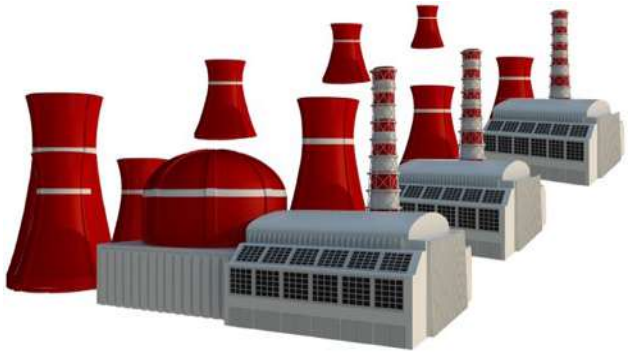
The same phenomenon occurs during the business cycle when equipment and machinery are turned on during the day and mostly remains idle at night. As you can imagine, at these times, energy demand surges and the effects are far-reaching. Billions are spent on extra electricity infrastructure to cater for these peak times.



Customers are charged for the highest peak registered during a billing cycle, usually a calendar month.

The demand, or rate of electricity usage, is generally measured as an average over a period of 30 minutes. For instance, if most of your electrical equipment is used during that 30-minute interval, your demand charge will be close to the maximum.

Just one high peak demand in any of those short 30-minute intervals will mean a substantially higher bill because you are charged for the highest peak registered during a billing cycle, usually a calendar month. Meeting customers' needs require keeping a vast array of expensive equipment like transformers, wires, substations and even generating stations on constant standby.

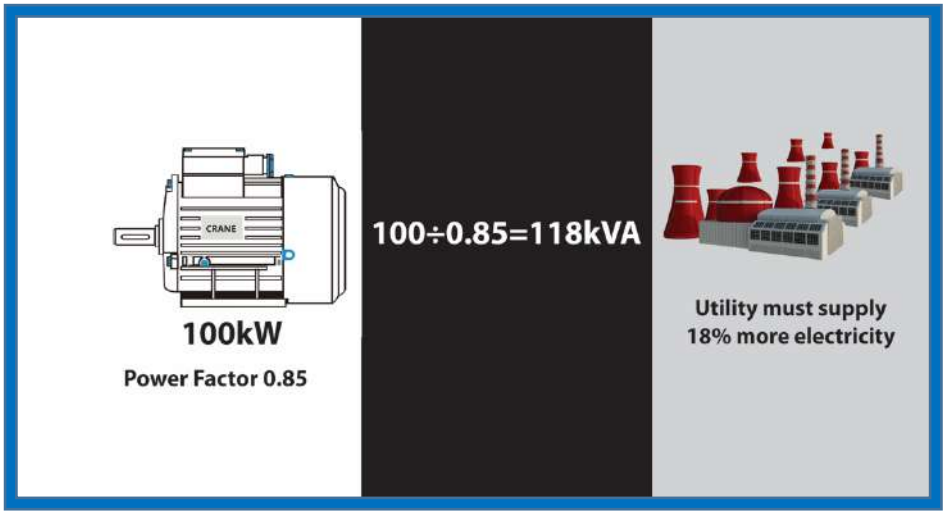


The amount and size of this equipment must be sufficient to meet peak consumption periods when the need for electricity is highest. To make provision for their additional expenses, your utility charges liberally for the high peak demand that most of us help create and of which many consumers are totally unaware.

Power Factor

Our relatively unscientific, albeit correct explanation, describes this often misunderstood phenomenon. In an alternating current or AC electrical supply, a mysterious thing called "Power Factor" comes into play. Power Factor is simply the measure of the efficiency of the power being used, so a power factor of 1 would mean 100% of the supply is being used efficiently. A Power Factor of less than 1 means the use of the power is inefficient or wasteful. In the real world of industry and commerce, a Power Factor of 1 is not obtainable because equipment such as electric motors, welding sets, fluorescent and high bay lighting create what is called an "inductive load." That, in turn, causes the Power Factor to become less than 1.

For example, a large electric motor will typically have a Power Factor of about 0.85 at full load. If we have a hypothetical electric motor rated at 100kW, then ignoring the inherent inefficiency of the motor, when running at full load the electricity supplier would have to supply 100 ÷ 0.85 = 118kVA, to provide the 100kW to operate the motor. Put another way, they would be supplying 18% more electricity.



For a Power Factor of 0.85, the utility must supply 18% more electricity

For that reason, the power station measures Maximum Demand in kVA because the current drawn is dependent on the Power Factor for the same load. Therefore, the current drawn is calculated in kVA. The fact that the client had used the service inefficiently is ultimately his problem, and he should consequently make up the difference. In other words, if you have a bad Power Factor it will increase the demand (kVA), which in turn drives up the cost of your electricity.

The good news is that these effects could be made significantly smaller by the introduction of Power Factor Correction, which is a widely recognized method of installing modern computer controlled capacitors into the power distribution circuit. It improves the Power Factor, causing the value to become closer to 1, thus liberating more kW from the available supply. It minimises wasted energy, improves efficiency and saves you money! The purchase cost of the installation is usually repaid by realized savings in less than one year.