PowerOptimal Elon 100 User Manual (Elon 100 units pre-2019)

Version 1.41 · Last updated June 2026

PLEASE NOTE: This manual is for old Elon® 100s up to August 2019.

See https://poweroptimal.com/manuals/ for manuals & guides for new Elons from September 2019 onwards.

(How do I know if I have an old or new Elon® 100? The controller for the old version says “Efficiency” below the dial (knob), whilst the controller for the new version has “Turn anticlockwise to increase solar hours” below the dial.)

SAFETY WARNING

Installation of the Elon 100 should ONLY be performed by an electrical contractor registered with the Department of Labour (the so-called “wireman’s licence”) and strictly according to the installation instructions in this manual. **The electrician should provide you with a Certificate of Compliance (CoC) once installation is completed.**

- We strongly recommend that you use a reputable and experienced solar photovoltaic (PV) system installer to install your solar PV modules.
- **Solar PV modules exposed to the sun are live** (i.e. will produce electricity) and can give an electric shock. Special care should be taken and only trained solar PV installers should install the modules.
- **Do not attempt to** alter or service the electrical installation, or open the Elon 100 unit or controller for any purpose.
- Use the Elon 100 **only for its intended purpose**.
- **Always** make sure that every wiring connection is **properly tightened**.
- **Do not earth** either of the solar module wires (but do earth the frames).
- All installation wiring should be at least 2.5mm².
- Avoid coiling, since DC switching can create damaging spikes.
- Keep all wires as short as possible.

Refer to the **PowerOptimal Elon 100 Installation Guide** at www.poweroptimal.com/manuals for detailed installation information.

You can find an easy-to-understand **Quick Reference User Guide** for download from: www.poweroptimal.com/manuals

You can also watch an online instruction video for instructions on how to use the PowerOptimal Elon® 100:

www.poweroptimal.com/elon100

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1. Introduction

Thank you for buying the PowerOptimal Elon™ 100 solar PV water heating unit! You can look forward to many years of savings and free energy from the sun.

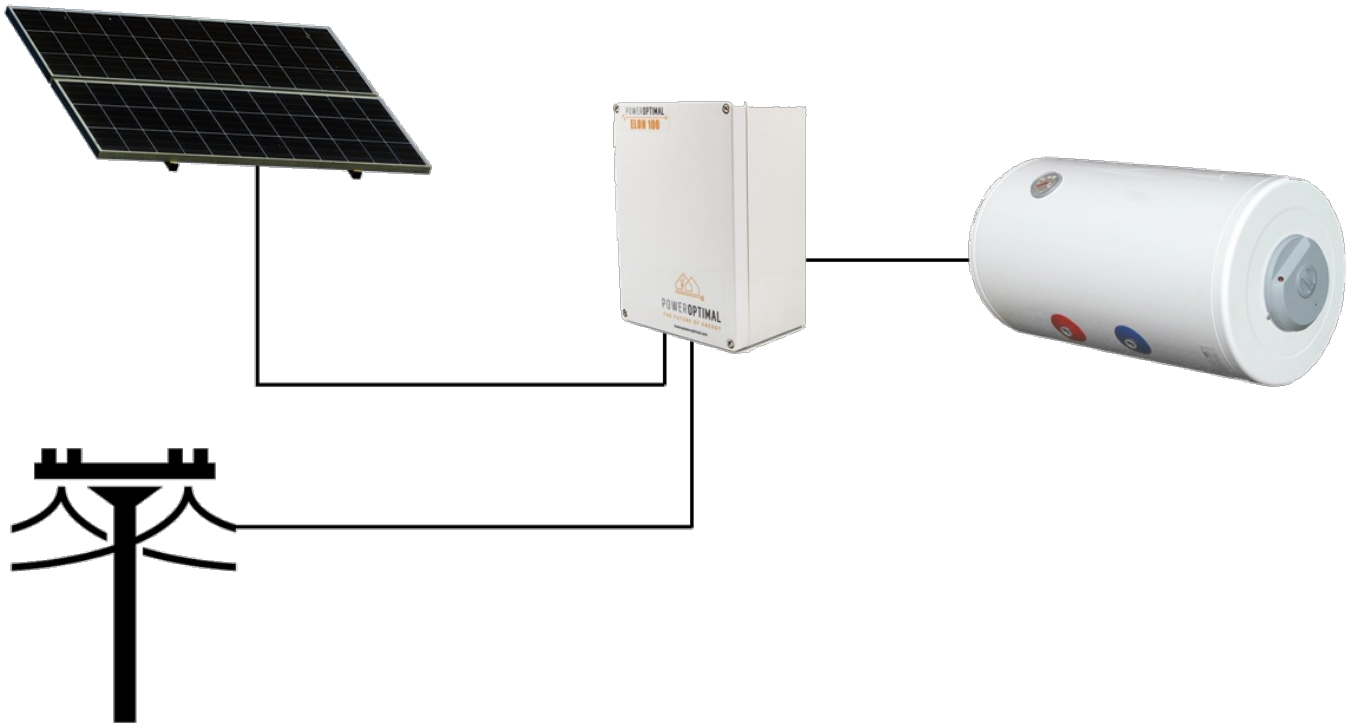
1.1 System overview

The PowerOptimal Elon 100 operates on a very simple principle: it enables direct current (DC) electricity produced by solar PV modules to be used directly for water heating using a standard geyser with alternating current (AC) heating element and AC thermostat, with **no need for an inverter**. It **uses the water in your geyser as a battery** to store solar energy in the form of heat.

You can connect the system completely off-grid, or connect it to your existing grid AC power supply. Connecting the system to the existing grid supply allows for grid power backup in case of cloudy / overcast days, or where your hot water use exceeds the generation capacity of your solar PV array.

Note: the system is designed in such a way that there is no possibility of solar array-produced electricity feeding back into the grid.

Below is a simplified layout of the main components of the water heating system.



An array of solar modules (a string of 3 to 6 solar modules connected in series, or two parallel strings of 4, 5 or 6 solar modules each) is connected to the Elon 100. Grid electricity is also connected to the Elon 100.

The Elon 100 is connected to the geyser element and thermostat.

When the solar modules are producing electricity, the Elon 100 feeds this into the geyser element to heat water, until the water reaches the temperature setting on the thermostat.

Depending on the Elon 100 efficiency setting (see Section 2.3) or when the user presses the override button, the Elon 100 will boost the water heating with grid electricity.

1.2 Main system components

The main components of the system are as follows:

- **Solar modules** with struts, brackets and cabling
- **PowerOptimal Elon** unit with controller
- Existing or new **water heater or geyser** (hot water tank with AC heating element and AC thermostat)
- **Isolators** for grid and solar connections

1.3 Deciding on size of Elon system (basic guide)

The table below provides a basic guide to selecting the size of your Elon system based on number of people in the household and/or hot water use. The **Installation Manual** (which you can download from www.poweroptimal.com/manuals) contains a more detailed guide.

Solar PV array size (kW_p)	Showers per day*	50%+ of daily hot water use provided for how many people?	How many people off-grid for hot water?	Typical number of solar PV modules
1 – 1.6				2 -3 modules
1.6 – 2				3 - 4 modules
2 - 3				4 - 5 modules
3 – 4 (two parallel PV strings)				6 - 8 modules

* 6-minute showers at 40 ºC with 8 litre/min (low-flow) showerheads

2. Operation

Instruction video: www.poweroptimal.com/elon100

Refer to our easy to understand instruction video on how to use the Elon 100.

2.1 Elon 100 controller



Your Elon 100 has a controller that is typically installed next to your DB (distribution board). The controller has **three main functions**:

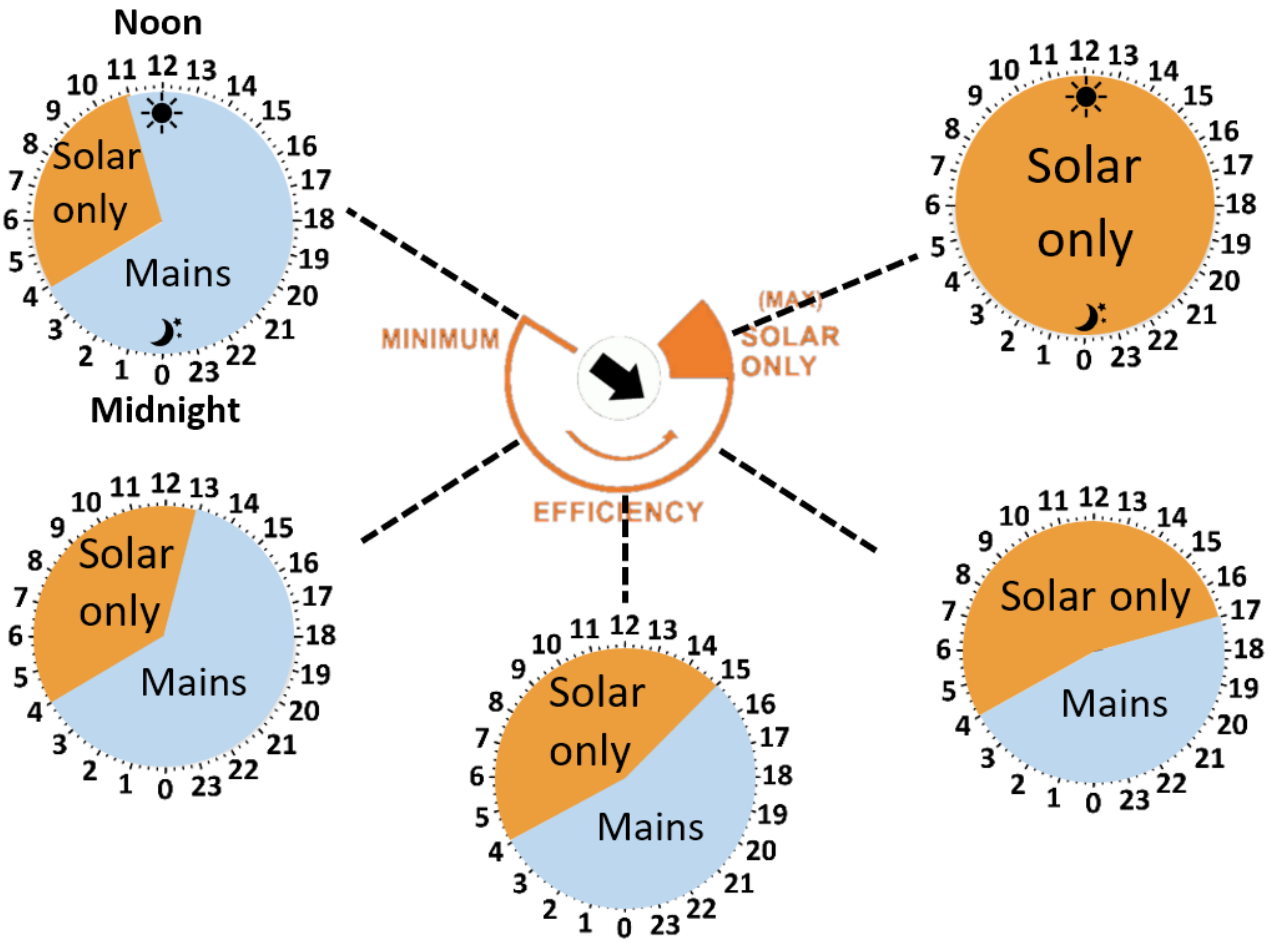
1. Indicating heating activity through the **mains (red) & solar (green) indicator lights** *(Section 2.2)*
2. Setting the timing on the **efficiency dial** *(Section 2.3)*
3. Forcing the system to use grid (mains) electricity for one heating cycle using the **override button**. *(Section 2.4)*

2.2 Mains / solar indicator lights

The **Mains & solar indicator lights** indicate the following conditions:

Lights	Meaning
Mains (**red**) light flashing	Grid (mains) electricity is being used to heat water
Solar (**green**) light flashing	Solar power is being used to heat water. Rate of flashing indicates rate of solar energy supply
Red & **green** alternating	No power is being supplied to the geyser element. (Either the water is on temperature already, or the unit is in solar mode and there is not sufficient sunlight)
Red or **green** flashing very fast	Isolation fault (contact electrician)
Red light **ON**	Solar power switched off (only grid power allowed to geyser). Press and hold override button for **15 seconds** to switch solar power on or off. **To switch off both solar and grid power**, turn the dial to SOLAR ONLY and then switch off the solar power with the override button as described.
Both lights **OFF**	No power to unit (e.g. no sun and a power failure, or no sun and geyser breaker at DB board is switched off)

2.3 Efficiency dial



Turn the dial on the controller to set how much of the day the unit will run on solar power only (see the diagram above). It is **generally best to just leave it pointing straight down**.

The best setting for you will be determined by your hot water use habits and the number of solar PV panels installed.

At all dial settings except "Solar only", the Elon 100 will switch off grid power to the geyser early in the morning. You will start with hot water in the geyser, but as you use it, the temperature will gradually drop, so that the geyser is ready to be heated by the sun during the day.

The dial determines at approximately what time the Elon will switch back to grid power, as shown in the diagram above.

At the **“MINIMUM”** efficiency setting, the Elon 100 will switch back to grid power around 11 am or 12 pm. As you turn the dial anti-clockwise, the time that the Elon 100 will switch back to grid power moves later and later in the day. This will give the solar power supply more time to heat the water before boosting with grid power.

So if you only use hot water early morning and in the evenings, you can set it close to “Solar only” to benefit from a longer solar energy heating period.

When the efficiency dial is set to**“SOLAR ONLY”**, the Elon 100 will ONLY use solar power to heat water.

Note that the override button is still functional at the “SOLAR ONLY” setting, in case you need to boost water heating on a cloudy day or when using a lot of hot water.

If you set the Elon efficiency setting to “SOLAR ONLY” (highest efficiency), you can increase the geyser thermostat temperature to 60 ºC to get maximum benefit from your solar array installation. **We do not recommend setting the thermostat temperature above 60 °C**. Remember to reduce the thermostat temperature again if you reduce the efficiency setting.

Warning: Do not set thermostat temperature above 65 ºC due to increased scalding risk. Be careful when opening hot water taps located close to your geyser. You can install a thermostatic mixing valve to reduce the risk of scalding – ask your plumber.

2.4 Override button

If you would like to **override** the functioning of the Elon 100 and **force it to use grid power** for water heating (for example in case of prolonged cloudy weather, or having used a lot of hot water), **press and hold the override button for 5 seconds**.

This will force the Elon 100 to **switch to grid (mains) power for one heating cycle** (in other words, it will the water with grid electricity to the thermostat set point from whatever temperature it is at the time of pressing the override button).

Only the red mains light on the controller should start flashing at this point. (If both red and green lights are flashing (alternating), the water is already at the thermostat set point, and pressing the override button will have no effect.)

To **switch off solar power completely**, **press and hold the override button for 15 seconds.** The red mains light will come on permanently. This means that the system is heating water with mains power 24 hours a day. To switch the solar power back on, again press and hold the override button for 15 seconds.

2.5 Controller settings for switching off solar or grid power to electric geyser

Desired state	Actions	DB board geyser switch	Controller dial position	Lights
✓ **Solar ON** ✓ **Grid ON**	This is the default state.	ON	Anywhere outside the “Solar Only” zone	Normal operation (green and/or red flashing or both alternating)
✓ **Solar ON** □ **Grid OFF**	Turn controller dial anti-clockwise to the “Solar Only” zone indicated on the controller. **Note:** can still boost with grid power for one heating cycle by pressing the Override button for **5s**.	ON	In the “Solar Only” zone	Green flashing or both lights alternating. Red would flash if override button has been used.
□ **Solar OFF** ✓ **Grid ON**	Press Override button for 15s until the red light switches on permanently. Grid power is now always ON (24 hours per day).	ON	Anywhere outside the “Solar Only” zone	Red light on
□ **Solar OFF** □ **Grid OFF**	Turn efficiency dial all the way anti-clockwise into the "Solar Only" zone. Press Override button for **15s** until the red light switches on permanently.	ON	In the “Solar Only” zone	Red light on

2.6 How to maximise your savings

Efficiency dial

The best way to maximise your savings is to set the Elon efficiency dial to “SOLAR ONLY”. This will ensure that the unit will never use grid (mains) power for heating water. You can still override / boost with mains power (for example on a cloudy day) using the **override button** as described above.

If you do not have enough solar power for the number of people and overall level of hot water use in the household, you might not reach the desired water temperature with the “SOLAR ONLY” setting, and might need to reduce the efficiency setting, or reduce your hot water use.

> ⚠ **Please note:** The water in your geyser should be heated to 60 °C at least once a week to prevent Legionella bacterial growth[1]. If you have heavily overcast weather for more than a week, use the **override button** to supplement the solar water heating with grid electricity to reach the thermostat temperature setting.

When is the best time to shower?

If the efficiency dial is set to “SOLAR ONLY”, it is best for people in the household to shower either in the morning or in the evening, but not both. (If you shower in the evening, cold water will mix with the remaining warm water overnight, and you will have cold water the next morning. If you do not shower again in the morning, the water will be heated during the day.)

If the efficiency dial is set to lower efficiency than “SOLAR ONLY”, it is best to **shower in the morning for maximum savings**.

Going on holiday

If you are going on holiday, you **don’t need to switch off the solar power supply to your geyser**. It will continue to maintain water temperature and prevent or minimize Legionella bacteria growth. As a plus you will have hot water in your geyser when you return from holiday!

You can switch off the mains power supply to the geyser in one of two ways: (1) turn the Elon 100 efficiency dial to solar only (anti-clockwise to end position); OR (2) switch off the geyser circuit breaker in your electrical distribution board (DB). We recommend option 1.

If you do want to switch off both the solar and mains power supply to your geyser, turn the Elon 100 efficiency dial to solar only (anti-clockwise to end position), then press and hold the override button for 15 seconds (until the red light comes on permanently). Don’t switch off the circuit breaker at the DB board. (When you return, set the efficiency dial in its normal position, then press and hold the override button for 15 seconds until the red light switches off or starts flashing.)

General hot water energy saving tips

- Shower, don’t bath
- Install water-saving / low flow shower heads (these also save energy because of reduced hot water use!)
- Reduce shower duration
- Check that your geyser is well insulated

South Africa is a water-scarce country – reducing hot water use saves both energy and water!

3. Maintenance

The Elon 100 has been designed to last for a very long time, and has no moving parts aside from two electrical relays. No maintenance is required on the Elon 100.

3.1 Solar PV module maintenance

It is recommended that a qualified electrician inspect your solar PV installation at least once a year.

1. At least once a week, check whether any of the indicator lights are flashing rapidly. (This indicates an isolation fault – refer to Section 3.2.)
2. Perform regular visual checks (at least once a year). Check for soiling or any visible damage to any of the modules.
3. If the modules have been soiled by dirt, dust, debris, bird droppings or any other materials, use water only and a sponge or soft cloth to clean them. Do the cleaning early in the morning or late in the afternoon, as the modules are hot during the day. Avoid using a water jet that may leave streaks on the modules.
4. Visually inspect cables for any degradation or loose fittings.

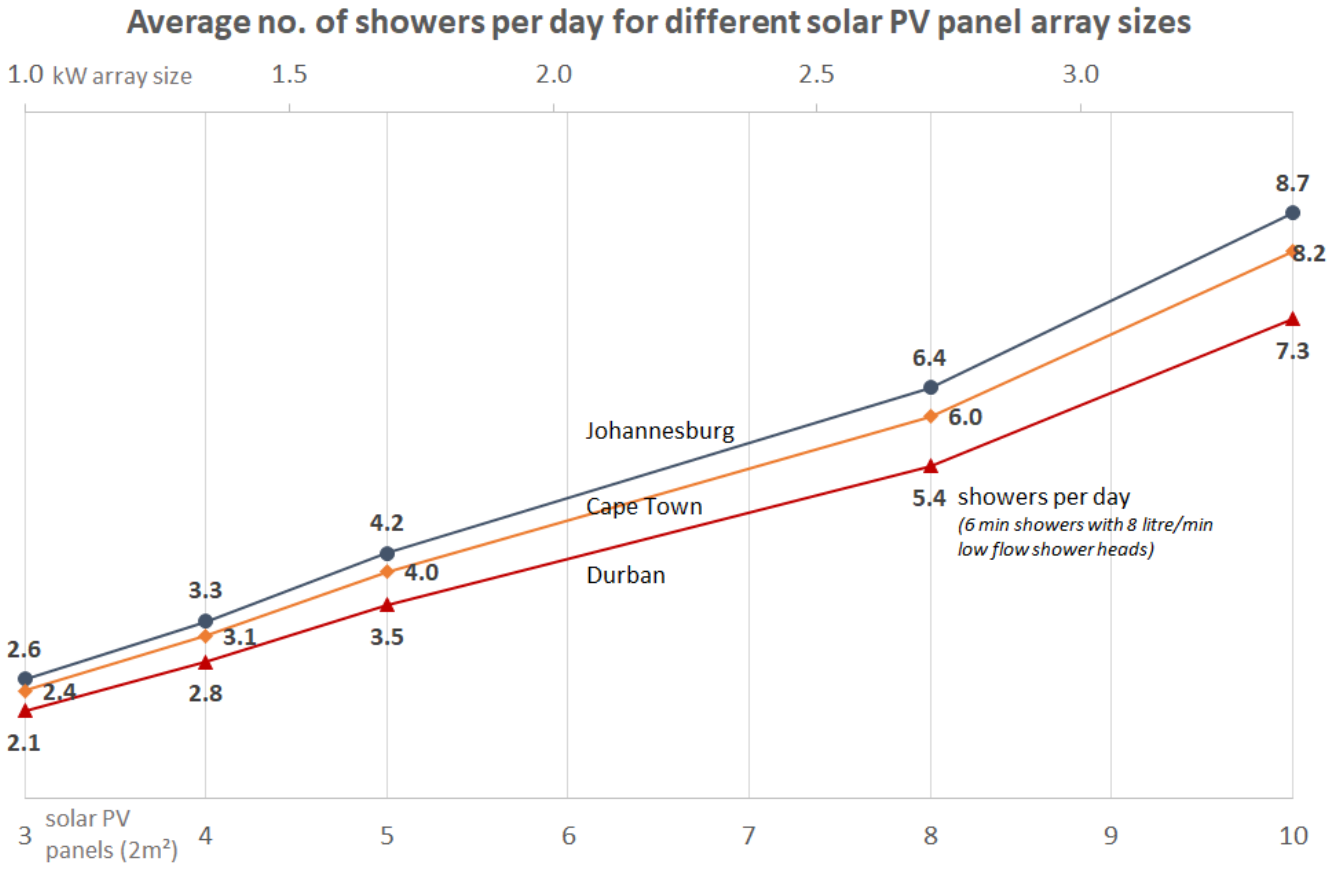
5. Look for any shading problems, such as trees that may have grown.
6. An electrician can check solar power production on a sunny day to ensure that the system is still producing power at expected levels. A thermal imaging camera can be used to inspect modules for hot spots.
7. Follow any specific maintenance instructions from the solar PV module manufacturer.

4. What to expect in terms of performance

4.1 Hot water production

Heating water takes a LOT of energy. A household geyser can use up to 40% of a house's electricity. Heating a single 200 litre geyser from 15 °C to 60 °C will use over 10 kWh. This is about the same amount of energy burnt by a person running a distance of over 100 km at 10 km/hr, or enough energy to watch more than 120 hours of TV[2].

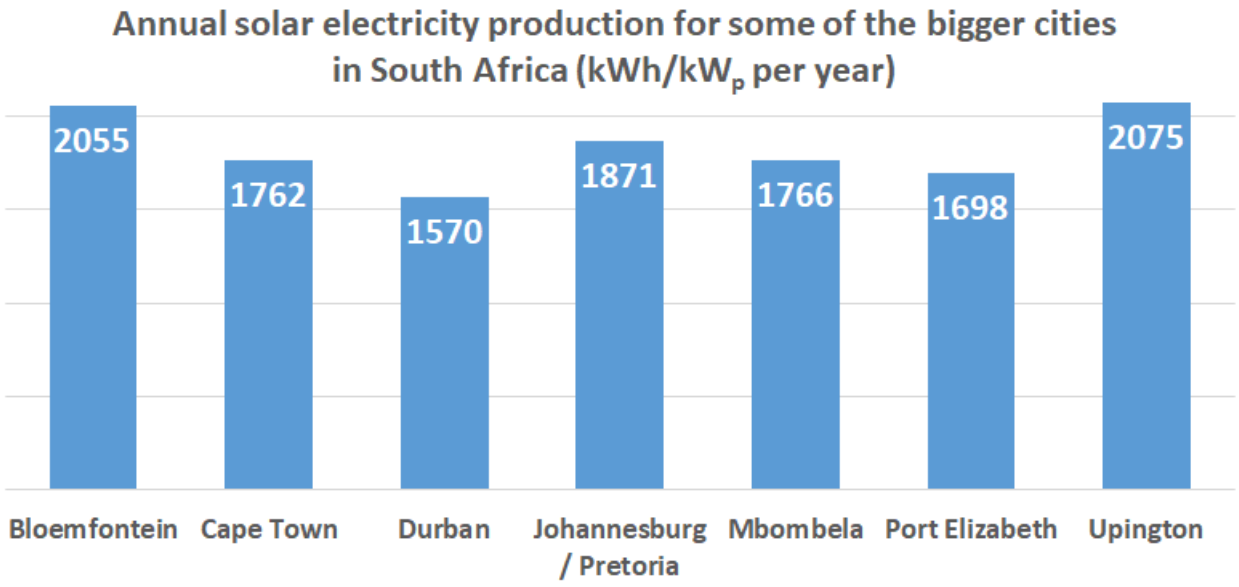
The more solar panels you have on your roof, the faster the Elon 100 system will heat your water. Typically, the number of panels has been selected to heat water over most of the sunlight hours (from morning to afternoon). This will be slower than heating water using grid electricity. So you can expect **a gradual temperature rise from morning to afternoon**.



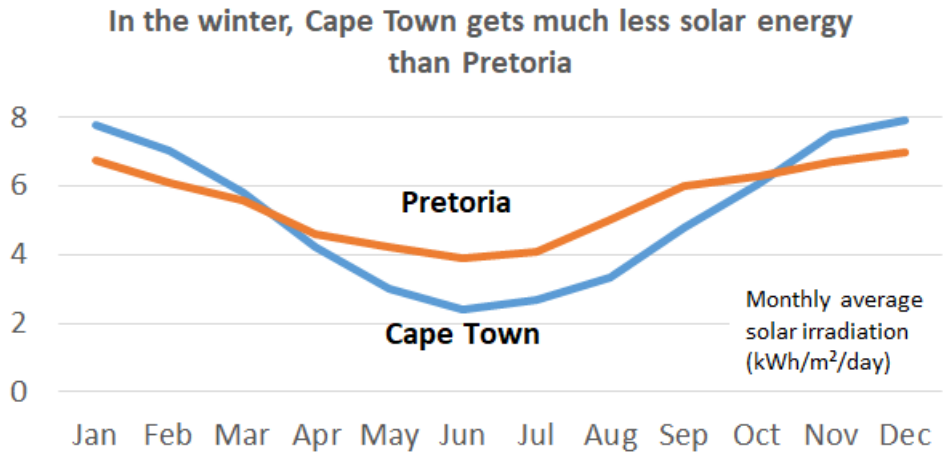
As one would expect, hot water production increases with increase in number of solar panels. Keep in mind that these numbers are averages over the year. This means that you should expect a lower number in winter and a higher number in summer.

4.2 Impact of location and seasons

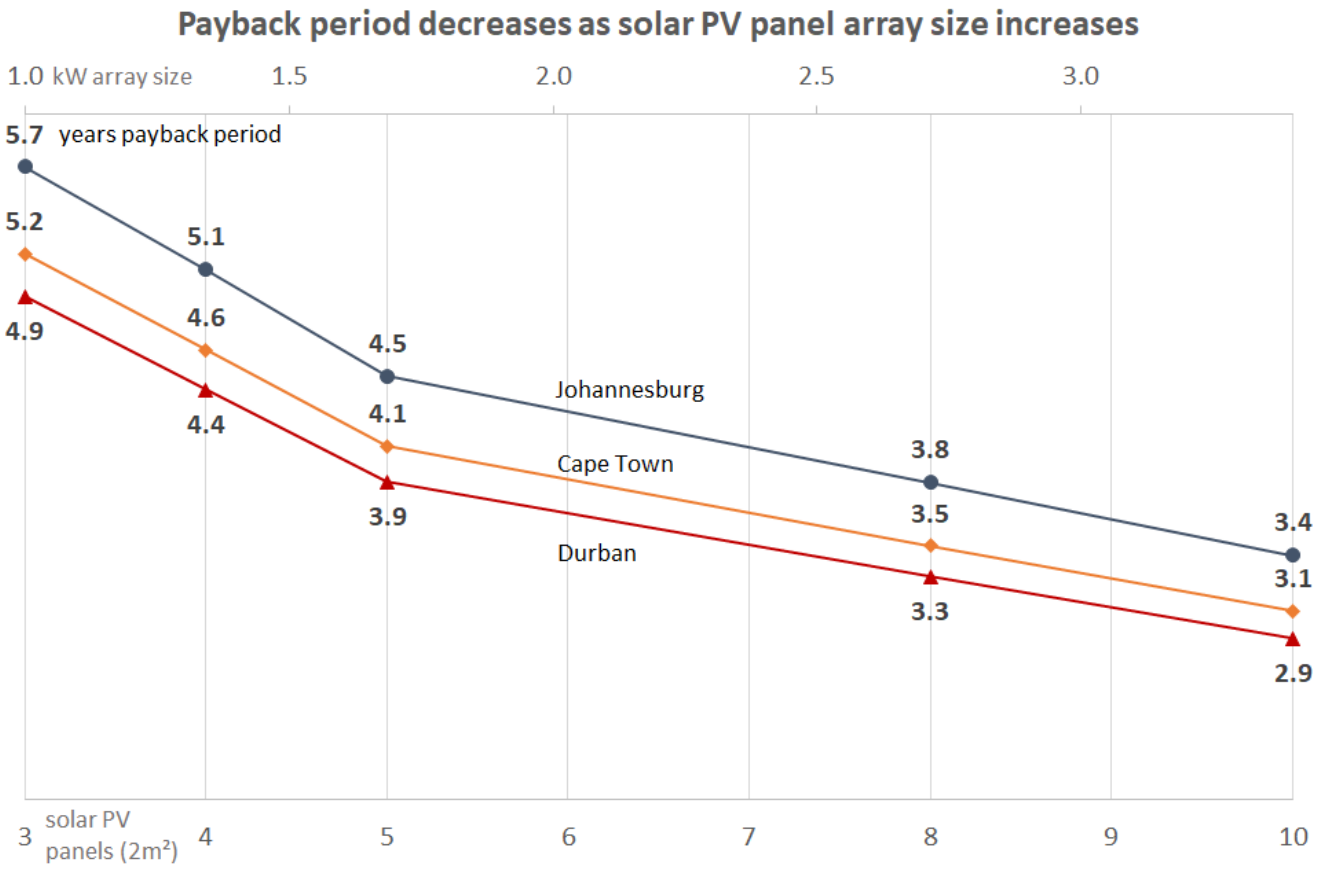
The amount of energy from the sun depends on your location, the time of year as well as the orientation of your solar panels. The best direction for panels in South Africa is to face north, at an angle of about 25 to 35° from horizontal.



Although Gauteng (Johannesburg / Pretoria) & Cape Town may seem quite similar in terms of total solar energy per year, Cape Town has winter rainfall and Gauteng has summer rainfall. This leads to Cape Town having much lower solar electricity production than Gauteng in winter.



4.3 Payback period



As can be seen from the graph above, payback period decreases as number of solar panels increases, and is also different for Johannesburg, Cape Town and Durban[3].

The reason that payback period improves (decreases) as number of solar panels increases, is because there are some fixed costs (such as engineering design & safety components) and some costs that do not scale linearly with array size (such as labour, wiring, mounting kit costs, etc.).

5. Troubleshooting

Below is a table with basic troubleshooting tips. If you cannot resolve the problem using the below table, please contact your installer.

Issue	Possible causes	What to do
Water temperature too low	1. High hot water usage levels 2. Cloudy or rainy day 3. Dirty solar modules 4. Mains circuit breaker has tripped 5. Thermostat connection or thermostat defective	1. Press override button (3.3) OR Reduce efficiency setting (3.2) OR Reduce hot water use (3.5) OR Add additional solar modules to your solar installation (**first consult** with your installer) 1. See a. above 2. Inspect solar modules. If they are soiled, clean them with water and sponge (4.1) 3. Check mains circuit breaker 4. Call electrician for inspection
Water temperature remains low after mains power boost	1. Sufficient time has not been provided for water to be heated after override button has been pressed 2. It is a cloudy day and there is a mains power failure 3. There is an electrical fault or the Elon 100 is defective 4. Thermostat connection or thermostat defective	1. Wait for 2 hours after pressing the override button 2. You will have to wait until either the solar or grid power returns to heat the water 3. Check if only the mains light on the Elon 100 controller starts flashing after you press the override button for 10 seconds. If it does not and your water remains cold, call your electrician to inspect the installation for any electrical fault. 4. Call electrician for inspection

Issue	Possible causes	What to do
Water temperature too high	1. Thermostat temperature setting is high and you are using hot water from a tap close to the geyser 2. Thermostat connection or thermostat defective	1. Reduce thermostat temperature set point OR Open the cold water tap first OR Install a thermostatic mixing valve 1. Call electrician for inspection.
Hot water production is lower than it used to be	1. Dirty solar modules 2. Trees / plants have grown and are causing shaded areas on solar modules 3. Damage to solar modules	1. Inspect solar modules. If they are soiled, clean them with water and sponge (4.1) 2. Trim trees and plants 3. Installer or electrician should test solar array power production in sunny conditions and compare with specifications. If one or more modules are damaged and they are still under warranty, contact manufacturer for replacement
Both indicator lights off	1. Power failure and overcast / night-time 2. Geyser breaker at DB board switched off	1. Wait until power or sun returns and check if any indicator light comes on. 2. Switch on breaker at DB board.
Red or green indicator light flashing very fast	1. Isolation fault	1. Please call your electrician.

Appendix A. IEC/SANS Test Certificate: Elon 100

TEST Africa

Room S166, Building 33
CSIR Grounds
Brummeria
Pretoria

PO Box 36335
Menlopark
Pretoria, 0102
South Africa

sanas Testing Laboratory T0146

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Internet : http://www.testafrica.co.za

ilac-MRA

Test Report

IEC 60669-2-1:2009
Particular requirements – Electronic Switches
Switches for household and similar fixed-electrical installations

REPORT # : WCT 17/0079

CLIENT:	*Power Optimal (Pty) Ltd* *PO Box 1098* *Cramerview* *2060*
	Attention: Mr J Theron
	Order #: J100117
	Date of Order: 10 January 2017
SAMPLE:	*AC/ DC Controller*
TEST SPESIFICATION:	*IEC 60669-1:2007/ SANS 60669-1:2007* *IEC 60669-2-1:2009/ SANS 60669-2-1:2009*
SUMMARY OF RESULTS:	*Complied with all tested Clauses*
DATE STARTED:	*2017-01-18*
DATE COMPLETED:	*2017-01-31*
DATEOF ISSUE:	*2017-01-31*

TESTED: GH Holtzhausen (Technical Signatory)

APPROVED: LP Kuisis

NOTE:
" The South African National Accreditation System (SANAS) is a member of the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Arrangement (MRA). This Arrangement allows for the mutual recognition of technical test and calibration data by the member accreditation bodies worldwide. For more information on the Arrangement please consult www.ilac.org."

Appendix B. Warranty

If the PowerOptimal Elon™ 100 ("the Product") is found to be defective, you will be entitled to a repair or replacement

within 2 (two) years of the date of delivery of the Product to you. Please keep your receipt as proof of purchase. If you are a consumer as defined in the Consumer Protection Act No. 68 of 2008 (“the CPA”), you will be entitled to such remedies as are made available under the CPA in relation to the return of goods.

PowerOptimal will not have any liability or obligation to you where the Product has been subjected to abuse, misuse, improper use, improper testing, negligence, accident, alteration, tampering or repair by a third party.

To the maximum extent permitted by applicable law, in no event shall PowerOptimal be liable for any special, incidental, indirect, or consequential damages whatsoever, including, without limitation, damages for loss of business profits or business interruption, arising out of the use or inability to use this product.

Please note that this unit must be installed by an electrical contractor registered with the Department of Labour. Failure to do so may invalidate this warranty.

Appendix C. Terminology

AC Alternating Current – an electric current that reverses its direction many times a second at regular intervals, with voltage typically varying in the form of a sine wave.

CoC Certificate of Compliance – to be issued by the electrician installing your Elon 100 system

CPA Consumer Protection Act No. 68 of 2008

DB Distribution board – the main electrical distribution board / panel in your home, containing circuit breakers and switches.

DC Direct Current – an electric current flowing in one direction only. Solar PV modules produce direct current electricity.

Geyser South African term for a water heater

IEC International Electrotechnical Commission

kWh A derived unit of energy equal to 3.6 MJ (megajoules). The amount of energy used by a 1 kW electrical device over a period of 1 hour.

kW_p or W_p The peak power rating in kilowatt (kW) or watt (W) of a solar module or array – i.e. the output power achieved under full solar radiation. This is usually reported at STC and NOCT.

PV Photovoltaic – referring to the production of electric current at the junction of two materials exposed to light.

SANS South African National Standards

Notes

1. See for example: http://www.eskom.co.za/sites/idm/Documents/Legionaires_Fact_sheet_hot_water_bacteria_simple_facts.pdf and http://standards.nsf.org/apps/group_public/download.php/30413/How%20to%20Avoid%20LD%20at%20Home.pdf ↑
2. 46” OLED TV at 82W. ↑
3. Calculations based on actual Elon performance, assuming a 20% reduction due to non-optimal user behaviour, an initial electricity tariff of R2/kWh and an annual electricity price increase of 8%. ↑

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✎Updated 2026-06-21 09:14:34 UTC by Sean Moolman