



BEST COMMERCIAL SOLAR INVERTER OPTIONS

E-BOOK BY KUGA ELECTRICAL

INVERTERS

Goodwe 50kW MT Series
Goodwe 80kW MT Series
Goodwe HT Series
Sungrow SG110CX inverters
Sungrow SC110CX MPP
Sungrow SG250HX

Sungrow Central inverters
FIMER PVS-100/120TL (6 MPPT)
FIMER PVS-100/120TL (2 MPPT)
FIMER PVS-175-TL
SMA SC 2200
SMA SC 2475

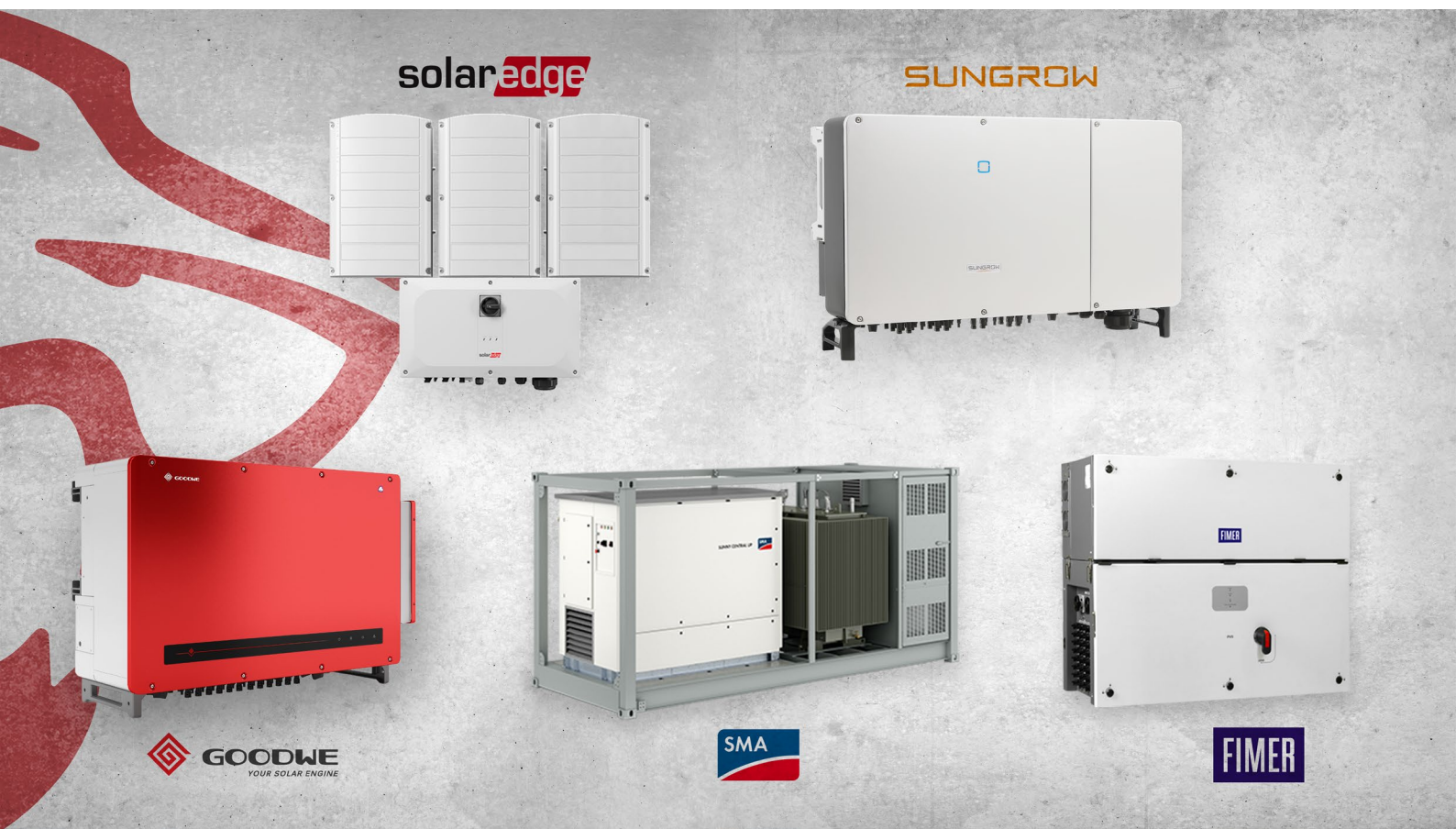
SMA SC 2660 UP - SC 4600 UP
SolarEdge inverters



BEST COMMERCIAL SOLAR INVERTER OPTIONS

The best commercial solar inverter depends on the project. For rooftop commercial solar installations using a String Inverter, Goodwe or Sungrow are the best options. When faced with multiple arrays or shading or if safety is a priority paying extra for SolarEdge would be Kuga Electricals inverter of choice. If the country of origin is important Fimer Inverters are made in Italy and are a really good option. For ground mount solar installations you need to consider if the project is low voltage, high voltage, or requires a central inverter. Kuga Electrical recommends either Fimer, Sungrow or SMA for ground mount solar installations. **In this article, we discuss the advantages of each of these major brands.**

When selecting a commercial solar inverter for your project from the 18th December 2021, it's important to **make sure the inverter is AS/NZS 4777.2 compliant**. Read more about the AS/NZS 4777.2 standard [here](#).



solar edge



SUNGROW



GOODWE
YOUR SOLAR ENGINE



SMA



FIMER



GOODWE, KUGA'S NUMBER 1 COMMERCIAL SOLAR INVERTER FOR ROOFTOP APPLICATIONS

Kuga Electrical's very first commercial solar installation was a 200kW at Spa Industries back in 2017. The installation won a Master Electricians award for best commercial project of the year. solar inverter for rooftop applications

4 x 50kW Goodwe MT series inverters were used and the team at Kuga has never been back for a warranty claim on the inverter. Since then, hundreds of installations at Kuga have used Goodwe MT Series and SMT Series solar inverters. Some notable installations are the 525kW installation at Della Rosa using 11 x 50kW MT Series inverters and the 300kW installation at Maxton Fox using 4 x Goodwe 80kW MT Series inverters.

Kuga Electrical can speak for first had experience and have been installing Goodwe inverters for 5 years now. We can tell you that Goodwe:

- Is a **very reliable inverter** and is a very good brand for **commercial rooftop applications**
- Has a **large start-up voltage range** to maximise solar production by turning on earlier and turning off later than other inverter brands in the market.
- Has a very **experienced technical support team** that includes Mike Zhang. Kuga has been dealing with Mike for 5 years now and like everyone at Goodwe, he is really knowable about the Goodwe range of products and the market
- **Has an Australian registered company and office**, so long term they will support with after installation service
- Been in the Australian market since 2012
- Has achieved **EuPD Research's Top Brand PV** in the Australian market in 2019 and 2020.

With the recent launch of the Goodwe HT Series 100kW to 120kW range, Goodwe is back at the top of the list for commercial rooftop applications at Kuga. Business customers can buy with confidence as from the 18th December 2021 the Goodwe range of inverters is AS/NZS 4777.2 compliant.



SUNGROW

SUNGROW, THE WORLDS MOST BANKABLE INVERTER BRAND

Kuga Electrical has been installing Sungrow commercial inverters for 2 years now. Sungrow early in the market launched a 110kW inverter called Sungrow SG110CX model. For the past 2 years, Kuga Electrical has been installing 2 - 3 Sungrow SG110CX inverters per week. The major advantages of this inverter are:

- Up to 146kW of PV can be installed on this inverter
- In-built DC Isolators
- Factory-built DC isolator cover to protect and also improve the visual appeal of the installation

In January 2021 Kuga Electrical installed a 450kW commercial solar installation at Medline located in Marsden Park, Sydney, NSW Australia. The project used 4 of the 110kW Sungrow SG110CX inverters.

Optimised solar installations using the Sungrow SG110CX inverter

Kuga Electrical has reviewed 2 years of installation data and the team has worked out to get the best performance only 6 MPPTs are used and the string length has 17 panels.



Why not use all 9 trackers on the SG110CX Inverter? It's simple. It's rare that commercial solar installations have more than 3 arrays or are impacted by shading. Usually, optimising for shade or 9 different roof orientations isn't required.

Here is the reason why Kuga Electrical typically uses only 6 trackers on the Sungrow SG110CX Inverter:

- The more panels that are installed in a single string the higher the voltage. The higher voltage will produce more electricity throughout the year.
- Sungrow SC110CX MPP voltage range for nominal power is between 550V to 850V. This is important because:
 - Installing 17 panels per string will typically operate between 550V to 750V keeping the string in optimal voltage range for longer throughout the year compared to;
 - Installing 14 panels per string will typically operate between 400V to 600V. The string voltage is outside the optimal voltage range therefore the inverter efficiency drops dramatically. This will ultimately produce less electricity.
- Keep in mind that installing 17 solar panels per string isn't possible to do all the time but it's important to optimise the design as much as possible.

Good Sungrow Inverter options for Ground Mount systems

Sungrow is also a really good choice for ground-mount projects and AC coupled battery storage projects. The most commonly used inverters for ground mount systems are:

Sungrow SG110CX inverter - This inverter is suitable for 1100V system designs for a behind-the-meter three-phase project. This inverter is IP66 rated, the largest capacity three-phase inverter from Sungrow and has been used in projects across Australia. Ground mount solar installations from 0kw to about 1.7mW that are low voltage would typically use the Sungrow inverter.

Sungrow SG250HX inverter - This inverter is used for ground-mount systems up to 2mW and where there is a high voltage connection. Its important to note that the ACThe advantage of this inverter is:

- The string can be designed up to 1300V as the nominal power range for voltage is between 860V to 1300V.
- **The higher string voltage will result in:**
 - Lower DC cable cost because a smaller cable will be required. Example - Cable run of 200m. Voltage drop under 3%. 1100V inverter with a string design at 600V would need a 10mm DC cable. The Sungrow SG250HX 1500V inverter with a string design of 1100V would need a 4mm DC Cable. 4mm DC cable is over 70% cheaper than 10mm. Jcalc is a good entry-level calculator to play around with for cable sizing.
 - Max efficiency of 99% or 98.8% euro efficiency.
 - Increased solar production.
 - High power output of 250kW is one of the largest inverter options in the market. With Sungrow, the project will have fewer inverters than a competitor.

SUNGROW CENTRAL INVERTERS

The central inverter range from Sungrow is available up to 6.8mW capacity. Central inverters aren't viable on projects that are small or under 2mW. When considering central inverters, the engineers at Kuga would consider Distributor approval requirements and costs. Often the Distributed Network Service Provider (DNSP) would make applications under 1.5mW AC easier and cheaper vs applications up to 5mW. At project feasibility phase Kuga include the best size and inverter recommendation for your project objectives.



FIMER INVERTERS (FORMERLY ABB) MADE IN ITALY

Fimer (ABB back then) was the first inverter manufacturer to launch the 100kW 1100V inverter range in the Australian market. They have 2 key inverter options for the commercial rooftop market. Kuga Electrical is fresh off a new round of training provided by the Australian team at Fimer. Thanks to Jason and Warren for providing the opportunity to learn more about the Fimer commercial solar inverter range.

The main Fimer Inverters that Kuga Electrical use is the PVS-100/120TL and the PVS-175-TL.

- **FIMER PVS-100/120TL (6 MPPT) three-phase string inverter:**
 - 6 trackers to optimise string voltage and performance
 - Inverter replacement is easy (one of the best in the industry). Separate power module and wiring compartments make the inverter change over very quick.
 - Very good and usable monitoring software
 - String sizing tool (nice to have)
 - Fast MODBUS & SUNSPEC integration
(keep the cost down on MODBUS integrated solar projects)
- **FIMER PVS-100/120TL (2 MPPT) three-phase string inverter:**
 - Cost competitive option
 - Limited to 2 trackers but this is ok for the right project
 - String sizing tool
 - Suitable for commercial rooftops with up to 2 directions

FIMER PVS-175-TL (1500V DC and 800V AC)

- Best suited for ground mount installations and small-scale solar farms under 5mW.
- Can be supplied with a factory-made transformer skid making design and installation simple.
- Heavy-duty cooling fans make the PVS-175-TL a better inverter option on solar farms.

The team at Kuga has been putting forward Fimer for ground mount solar projects because of the technical team's detailed knowledge of large-scale systems, utility projects and solar farms.



SMA INVERTERS EXCEL IN-GROUND MOUNT, UTILITY AND SOLAR FARM PROJECTS

In Australia, it's a one-horse race for SMA in the Utility market specifically. Reports suggest 95% of all Australian utility-scale solar projects use SMA inverters. For solar farm project below 5mW Kuga Electrical typically recommend the SMA MV Power Station. The capacity ranges between 2.2mW and goes up to 4.6mW. The range also includes a low voltage option that may be used for some "behind the meter" projects. For example, a business that is a high user and roof top isn't an option or has been exhausted, but has empty land next to their building. The minimum size of land that would suit a 2.2mW central inverter with solar panels is around 25,000sqm.

THE RANGE OF SMA MEDIUM VOLTAGE POWER STATIONS ARE:

Inverter	Solutions	Capacity kW
SC 2200	MVPS2200-S2-11	2,200
SC 2475	MVPS2475-S2-11	2,475
SC 2660 UP	MVPS2660-S2	2,660
SC 2800 UP	MVPS2800-S2	2,800
SC 2930 UP	MVPS2930-S2	2,930
SC 3060 UP	MVPS3060-S2	3,060
SC 4000 UP	MVPS4000-S2	4,000
SC 4200 UP	MVPS4200-S2	4,200
SC 4400 UP	MVPS4400-S2	4,400
SC 4600 UP	MVPS4600-S2	4,600



solaredge

SOLAREGE COMMERCIAL SOLAR OPTIMISERS AND INVERTERS

In this article, we have talked a lot about string design and voltage. Along with DC and AC Cable selection, string design and voltage are the most important elements in commercial solar installations. It's the reason why you use Kuga Electrical over XYZ solar company. Like Kuga Electrical, SolarEdge optimisers and inverters exceed in performance in long cable runs, complete roof orientations, for example, shopping centers, schools or Aged Care facilities and rapid shut down safety features.

Kuga Electrical has an example of a SolarEdge installation. The Kuga team installed a 100kW solar system at St Francis of Assisi Primary School in Tarniet Victoria. On this job, SolarEdge had to be used because:

- **Optimisers were required.**

- Multiple short roof arrays meant the number of panels on a string varied and couldn't be optimised for a string inverter. For example, the Sungrow inverter needs 17 panels on a string with the same orientation for the string to be in the inverter optimal inverter range. That wouldn't be possible on this roof.
- The SolarEdge DC optimisers meant regardless of the solar panel mismatch the optimiser will optimise the specific panel to 750V - 830V therefore reducing the impact of solar panel mismatch.
- Kuga Electrical could design string to the maximum panels with SolarEdge as the orientation of the panels can vary as SolarEdge has DC optimisers.
- About 10% of the solar panels were impacted by shading in the afternoon.

- **Rapid shut-down.**

- There is a lot of issues with DC isolators. SolarEdge will automatically shut down the PV system when an arc issue is detected and reduce voltage 1V.

- **Kuga Electrical installed a meter and a solar schools program.** The students can do modules to learn about solar while looking at the actual solar production from the school's PV system (as explained by Clement).

When designing large commercial solar rooftop projects, SolarEdge can dramatically decrease DC cable costs. Kuga Electrical currently has a 1.4mW project on a complex roof and the upgrade to SolarEdge will save over \$60,000 in DC cable cost. The Kuga team finds that SolarEdge products are the best option when optimisers or rapid shutdown are required.

solaredge

solar**edge**



SUNGROW



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SMA



FIMER

WHAT INVERTER SHOULD YOU SELECT?

There is no inverter for commercial applications that will suit all projects. Kuga Electrical has over 5 years of experience in commercial solar. The Kuga Team are quickly becoming leaders and EPC of choice because of the manufacturer relationship, skill and experience in system design and performance and because the installations are completed by Electricians employed full time by Kuga Electrical. A lot of staff at Kuga Electrical have been with the company for many years. Contact our experienced team for your next project.



Commercial project of the year 2018-
For 200 Kw system
- Spa Industries



Energy Efficiency Project of the year 2019-
For 300 Kw system
- Maxton Fox



Energy Efficiency Project of the year 2019-
For 525 Kw system
- Della Rosa Fresh Food



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St, Loganholme
4129

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