



Solar PV component pricing report 2020



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1. Component pricing breakdown

The market for solar PV is dynamic due to various market forces. This report will investigate the current contribution each of the components have in a rooftop solar installation. The information gathered was from various industry members and overall averages were used to give an idea of how the industry is currently operating.

GreenCape shared a survey and held structured engagements with several of relevant members including the larger industry partners who do installations in the ranges of 50kWp to <1MVA. The market is still dominated by systems in this size range.

The purpose was to identify the current breakdown of the various component costs of a rooftop solar PV system. The following components were considered:

- PV modules;
- inverter;
- protection and switches;
- mounting and structures;
- metering;
- engineering design;
- construction;
- storage
- other (unallocated).¹

The information gathered was captured and has been detailed within the following ranges:

- smaller than 100kW;
- between 100kW and 500kW; and
- above 500kW.

Across the larger system sizes there is no noticeable difference in the breakdown of the component contribution to overall costs. As such, these bands have been averaged to give a single percentage contribution. This will change when smaller systems, for example residential systems, are considered.

The PV modules contribute to the largest portion of the component cost breakdown with the inverter being the second largest portion (see Figure 1). It is important to note that there is considerable range in the R/kWp component cost amongst installers.

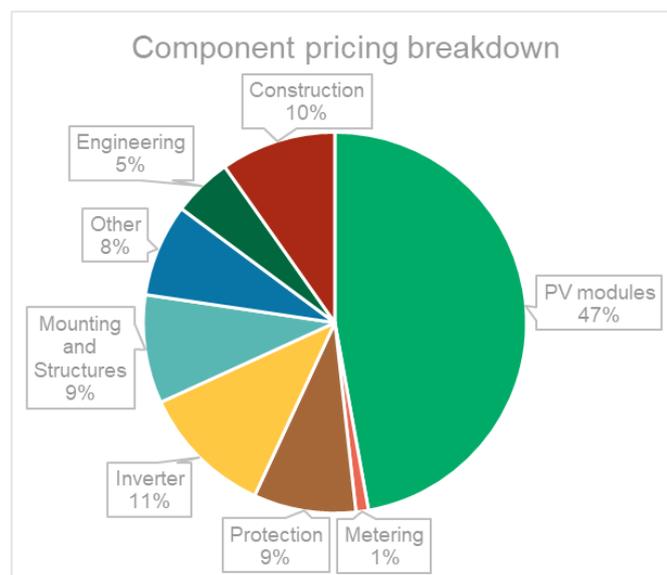


Figure 1: Component pricing breakdown

¹ Other is open ended as some installers have significant costs associated with depending on their business model for example rigging, transportation and some contingency on the project but it differs from each installer but doesn't form part of the main contributors.

2. Component pricing range

From an overall system cost perspective the R/kWp value is fairly constant, the range within the various component categories is wide (see Table 1 below). The wide range is mainly attributed to the EPC's having preferred technology suppliers and/or having a greater focus on specific design areas; for example, more robust structures or more complex control systems.

Table 1: Component cost ranges

Component	<100kWp (R/kWp)	100kWp to 500kWp (R/kWp)	>500kWp (R/kWp)
PV modules	4000 – 7500	4200 – 5500	4000 – 5100
Metering	150 – 350	50 - 200	30 – 200
Protection and switches	450 – 2700	350 – 2500	350 – 2000
Inverter	950 – 1500	700 – 2400	700 – 2000
Mounting and Structures	450 – 1700	400 – 2000	400 – 1700
Engineering	150 – 850	70 – 1500	40 – 1000
Construction	500 - 2000	750 - 1500	650 - 1200

3. Inclusion of energy storage

Current battery pricing ranges are shown in Table 2 below. Battery pricing is measured in R/kWh which correlates to the amount of kW the system can produce in an hour. The technology most widely used in new builds in the commercial and industrial sector is Li-ion and the ranges in Table 2 have been provided by various local Li-ion suppliers. These cost ranges do not include the inverter cost.

Table 2: Battery pricing ranges for Li-Ion

System size	R/kWh
<15 kWh	R6000 - R6600
15kWh to 800 kWh	R4500 – R5000
>800 kWh	R4000 - R5000

Battery storage is common in off grid solutions and for small business and residential energy security. The commercial and industrial sector currently interested in PPA's are still hesitant to invest in battery backup due to the high costs. Most rooftop solar PV systems are installed with the option to extend to a backup power source, being either batteries or a diesel generator. Most rooftop solar PV customers opt for a diesel back up a few months after installing their PV system to ensure energy security.

A scenario was modelled to show the anticipated cost of battery storage from a component cost perspective in a SSEG application. Most rooftop solar PV systems are designed to have a kWp value below the maximum demand of the system. This is to optimise the investment pay back by reducing capital expenditure and preventing surplus energy production. It also forms part of the NRS-097-2-3 requirements to be at least below 75% of the Notified Maximum Demand (NMD) when on a dedicated feeder.

The case built is for a 300 kWp Solar PV system where the NMD of the facility is 400 kW. The requirement from the customer is to have a system that would allow them to be operational during a 2-hour load shedding interval. At this stage the assumption is that there will only be a single load shedding occurrence a day which does not exceed 2 hours and the operation would not necessarily operate at the full NMD during the interval. The targeted energy storage size is 850 kWh. This will allow a NMD to be serviced for 2 hours and allowing for depth of discharge conservation which is critical for prolonging battery life.

This is a hypothetical case and not all consideration was given for changes in mounting, inverter design and additional protection. The purpose is to give an idea of how the contribution of component costs will be affected when energy storage is included. It is unusual to find industry examples in the SSEG space that try and include storage. This is because the cost is too high. The cost of such a system would range between R 7 000 000 and R10 000 000 and the percentage contribution of the system can be seen in Figure 2 below, where storage would contribute to more than half of the total system cost.

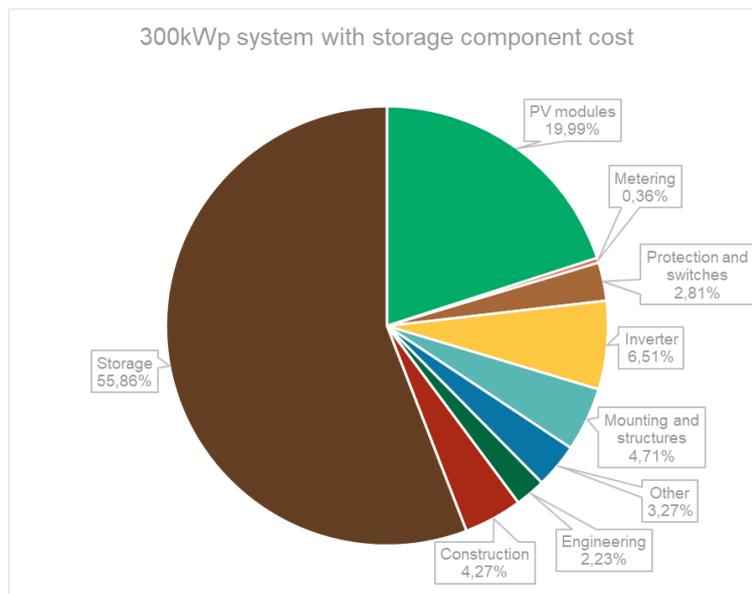


Figure 2: Component cost breakdown for a hypothetical 300kWp system with 850kWh storage

4. Conclusions & insights

With the increased interest in rooftop solar PV in the C&I sector it is valuable to understand what contributes towards the cost of a system, whether it's a turnkey or PPA project. The PV modules account for roughly 47% of the cost of the system, the largest contributor in the total system cost. The rest of the components have a very similar contribution relative to each other.

Most of the components scale similarly as system size increases. The areas most affected by scaling are meter costs, engineering and logistical costs (categorised under 'other'), although these still change less than 5% when scaling. The main component cost like PV modules, Inverters, construction, mounting and structures all scale similarly.

Including energy storage to a rooftop solar PV system in the C&I space can effectively double the system costs and should only be considered if full energy security is the goal. Energy storage is therefore not a viable solution at its current market price, most businesses would then rather use Diesel generation as a short term solution. Currently business are opting for small battery storage systems which would focus only on the emergency and critical services portion, and not for full operational security.