GreenEnco
Maximising Asset Values

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Is Adding DC Capacity to Underperforming Solar Assets a Sustainable Solution?

Introduction

It is an unfortunate truth in the Solar PV industry that at some point you've run up against the problem of an underperforming asset. There are many reasons that you could find yourself in this predicament, but could post-construction DC oversizing possibly be the sustainable solution?

DC oversizing or overbuild is simply adding DC capacity to increase the DC:AC ratio. This is achieved by installing a greater module peak power than the output rating of the inverters. Module peak power is the expected generation output of the modules at Standard Test Condition (STC, 1,000 W/m^2 & 25 °C).

This strategy is widely employed at design and build stage but is now seeing increasing interest as an aftermarket add-on. While adding DC capacity can improve performance and economics, its sustainability depends on factors specific to the asset.

Background: Understanding DC/AC Ratios

Solar power systems are described using two different capacity ratings: the DC nameplate capacity of the photovoltaic modules and the AC capacity of the inverters, the DC and AC in our DC/AC ratio. The DC rating reflects the sum of the panels' output at STC, a laboratory benchmark that panels often don't achieve in real world operation. The AC rating represents the maximum power the inverters can deliver from converting the array's DC output into AC electricity. As modules don't regularly operate at their nameplate power, systems are designed with higher DC capacity than AC capacity to optimise annual energy production rather than peak output.

The Case for Adding DC Capacity

Increasing DC capacity will improve the energy harvest of your asset. The inverters will start-up earlier in low irradiance, and spend more time at peak output, all while compensating for module degradation. In short, it provides higher energy yields for extended time.

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Focusing, briefly, on a more holistic approach to sustainability, increasing the DC capacity of existing assets makes better use of existing infrastructure. Adding more PV modules is less energy and resource intensive than building brand new assets with new grid connections. Further to these ecological benefits, the price of modules is as low as it has been making DC expansion a cost-effective solution.

The Limitations and Risks

You would be right to say that adding DC capacity can't possibly be a catch-all solution for underperforming assets, this is where the asset specific factors really start to have an impact. Some causes of underperformance, such as clipping losses and export limitations, will not be improved by increasing DC capacity.

Increasing DC capacity requires a financial outlay, and this is not always suitable for the gains that are available.

Sustainability in Focus

Adding DC capacity can be a sustainable solution for underperforming assets both environmentally and economically. The improved functionality of existing assets without the need for any major new infrastructure provides a lower carbon footprint per kWh produced. DC expansion can be a more viable financial solution than full repowering. The manufacture and transport of new modules will still have an environmental and financial impact which should be considered.

Grid sustainability is also improved by adding DC capacity, higher DC:AC can smooth export profiles and reduce volatility.

Conclusion

Additional DC capacity is one of many solutions that could be employed to counter Solar Farm underperformance, but it is not a universal fix. It offers significant uplift that can be highly sustainable and cost effective for the right asset. It can also be a financial misstep if the source of the performance issues is found elsewhere.

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