

Solar O&M Gets Set For The Big League In India

By [Prasanna Singh](#)/ Updated On Mon, Apr 19th, 2021

As India's solar footprint has grown, from a tentative 3.7 GW in 2015 to over 40 GW now, a little appreciated, but growing opportunity is finally getting its place in the sun too. The Solar Operations and Maintenance (O&M) business.



Ashish Khanna



Sudershan Bhosale



Nalin Sharma



Rananjay Singh

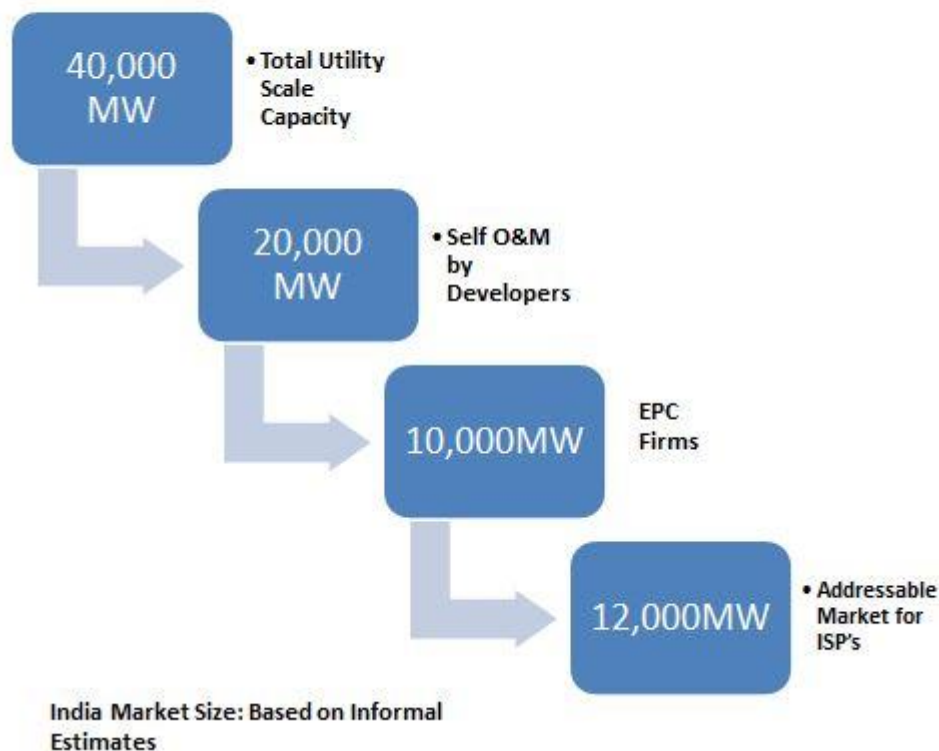


Bikesh Ogra

A \$4 billion business worldwide in 2019, it is set to be a \$9 billion business by 2024.

Long divided between developers doing 'self-maintenance', EPC contractors and Independent operators, it is the latter that could potentially come into their own in the next wave of contracts and changes. Or as [Ashish Khanna](#), President-Renewables, Tata Power told us, "We are convinced that once most of the projects in pipeline and those already announced then O&M services of Solar will have similar to IT industry potential in terms of business opportunity".

The Solar O&M View: Potential Market in 2020



For firms in India, the new opportunities in Solar O&M are real. Not only is there a growing domestic market, but learnings here can also potentially open up opportunities globally. That is because, like many other businesses linked to the solar sector, the focus here is on lowering costs and technology upgrades. Of course, like any new opportunity, the players are also many, including small local players. States like Rajasthan and Gujarat, where a lot of large projects are coming up now, have an especially high number of local players vying to win O&M work, making it a very competitive business indeed. However, at this stage, we have refrained from going into a listing of the top players, catch that in a future issue of Saur Energy.

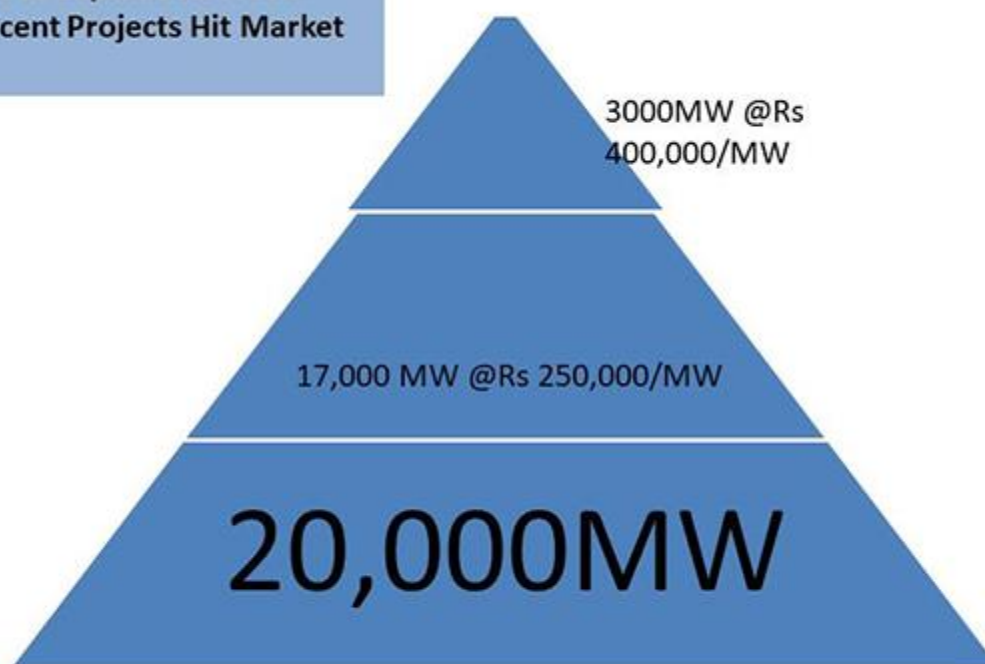
For Sterling and Wilson Solar limited, the leading global EPC firm in solar from the Shapoorji Group, the O&M business is more than just a business opportunity. O&M earnings can also smoothen out its revenue flow, unlike the lumpy EPC business. And it has used its international presence to make inroads here too.

Speaking at its analyst call in February, [Bikesh Ogra](#), Director, and Global Chief Operating Officer said “ Coming to operation and maintenance business, we currently manage around 8.1 gigawatts as our portfolio; we have acquired a substantial amount of third-party operation and maintenance business for India. On the international front operation and maintenance market for those projects where the EPC was undertaken by third-party companies is expected to grow in the coming financial year. Our objective is to acquire an additional third-party O&M portfolio of at least 1 gigawatt each in the domestic and international market for FY2022, this obviously would

be incremental to our regular self-EPC executed O&M business. I am very happy to share that we have recently won our first O&M project outside India on a competitive basis in Oman.”

The firm’s CFO added that O&M revenue increased by 27% to Rs 180 crores in the nine months of FY2021 compared to Rs 132 crores in the corresponding period of FY2020 with an EBIT margin of 36.9%. For SW Solar, the O&M business contributed 4.8% of revenue in nine months FY2021 as compared to 3.8% in nine months FY2020. With a positive margin impact, since the EPC business rarely crosses 10-11 percent margins.

A Market Set to Explode As Fresh Capacity, Recent Projects Hit Market For O&M



Estimated Market Value of Rs 545 crores per annum.

[Rananjay Singh](#), Head of Marketing at Gensol Power Group, whose 2.8 GW O&M portfolio makes them the largest Independent Service provider in the space, agrees on the potential.

“Solar O&M is a growing business and set to grow well going forward. If you consider the majority of large projects today, most started coming up post-2017-18. Most contracts come with a defect liability period of between 3-5 years. If we consider a 5-year exit clause, the majority of these assets will come into the market by 2022-23. Plus the 30 GW project pipeline currently. That is a very large market up for grabs”.

Singh however has a warning for firms eager to get in.

“We expect to see more competition because the barriers to entry are not very high in O&M. However, margin pressures will remain. We are happy to work with even 3-5percent margins, as long as there is a bonus clause in the contract linked to say plant output or low downtime.”

Add to that, people going for multiple contractors instead of EPC. So O&M contractor can pitch in from day 1.

Ashish Khanna of Tata Power, which manages its own O&M in-house, adds his own firm's view. "Tata Power has more than 2.6 GW of its own assets and 1.2 GW under its operation & maintenance management program. With highest level of plant performance being our focus, we have an average availability of more than 99.9% for most of our plants.

We have our own Central Control Room for Renewable Assets (CCRA) to centrally monitor and undertake predictability analysis of our assets and similarly for the operations and maintenance of solar rooftops, we have set up a state-of-the-art network operations centre, giving instant business insights as a value-added service to our customers. We have also developed Apps for our customers of Pumps and Rooftops to overview the performance of the assets."

What's New In Solar O&M?

PV Diagnostics, a Mumbai-based solar specialist firm that offers technology, consulting, and advisory for its clients, is very clear on what a solar plant owner should expect a solar OM to deliver.

Compiled by its expert **Sudarshan Bhosale**, Lead Backend Analyst, and his team, the firm lists the following terms of reference for an O&M contract

- Generation guarantee terms and associated liquidated damages
- Plant availability guarantee
- Warranty terms
- Cleaning cycles and their maintenance
- Scope coverage for the O&M of the plant & GSS bay
- Conditions for effective monitoring and reporting system
- Documented insurance for an operation period
- Well-defined clauses for response time, sub-contracting, spares and consumables, etc.
- Defined qualification for operations team personnel with respect to standard industry practice
- Preparation and maintenance of records and documents related to work permits, checklists, and SOPs
- Documentation of training records, LOTO system, proper housekeeping, safe work area, and vegetation clearance
- Forecasting and Scheduling: Appointment of Qualified Contracting Agency (QCA) & executing QCA agreement; and assessment of F&S, deviation settlement mechanism with offtaker and associated penalties

He adds that the major difference between the Indian and global markets is the requirement of manpower on the site for the O&M activities. "In the Indian solar plants, the manpower requirement is usually high as compared to the other developed nations."

However, Gensol's Singh believes this is changing very fast now. "There are two major issues driving change today. One, the business is changing from a conventional manpower service to tech-driven. At the project level, there are anticipated challenges like water usage and rising wage pressures for workers. That is driving firms towards implementing robotic systems for one. Using data and implementing analytics remotely is another way to both improve efficiency and reduce manpower requirements at the site," he adds.

Tata Power's **Khanna** adds that "to integrate renewable energy with the grid, various state governments have come up with strict scheduling, forecasting and deviation settlement regulations, which penalise over- and under-generation of electricity from renewable energy plants. This has encouraged O&M players to invest in the automation of predictive maintenance services. Efficient and artificial intelligence (AI)-enabled monitoring platforms are already in use for predictive O&M. Use of Drones and mobile vans to evaluate component as well cable level fault detections and rectifications has already transformed this industry".

Sameer Chaudhary, Senior Manager(Operations) at Amplus Solar highlights the typical exclusions too. "Key exclusions which shall be in the scope of the owner are plant insurance, land lease payments, internet charges, forecasting and scheduling, regulatory approvals, DISCOM payments, CEIG inspection and renewal, factory license, energy meter calibration, payments to state bodies (unless due to negligence of contractor), among others".

So technology and manpower. And no one would their impact know it better than one of the world's largest robotic cleaning firms, the Israeli firm Ecoppia. **Nalin Sharma**, Vice President, Asia and Pacific highlights how until a few years ago, solar O&M was limited to module cleaning, plant security and vegetation removal. "As of today, it has evolved into a stand-alone business vertical. Many 3rd-party O&M service providers now offer a range of services to solar plant developers. An emerging trend we see today in 3rd-party solar O&M is the adoption of automation and digitalisation to reduce project downtime and improve plant performance.

Tech-based solutions and increased automation also reduce O&M costs. The module cleaning and associated manpower costs together constitute the major component for plant O&M costs in India. We see that automation significantly reduces such costs by allowing O&M firms to reduce manpower costs and maintain profitability. Furthermore, O&M firms are moving from corrective and preventive maintenance to predictive and prescriptive analytics-based maintenance performance to reduce downtime and improve operational costs of solar projects.

Sharma adds that firms like Ecoppia have adapted to the new challenges and opportunities "Cleaning accounts for almost 40 percent of the cost of Solar O&M typically. With the new breed of large utility-scale projects, we believe annual cleaning is simply not an option anymore."

He's right. Automation is coming, and not just for cleaning. Deep inroads have been made into plant monitoring, data collection, and analytics, often the difference that wins projects for players today.

In the US and China, we have seen autonomous drone inspections, module-washing robots and robotic lawnmowers already put to use at large projects.

Besides reducing labour costs, in the Covid period, technology products have also aided the protection of staff, besides providing safe and reliable service with low risks. In fact, the low downtime of renewables during the Covid lockdowns and beyond has been a standout feature of 2020 for the sector.

From being tried by a few early adopters, the Covid pandemic has simply accelerated the development process of these tools, as buyer interest has grown. In India, we currently have a clutch of start-ups trying to build a robotic cleaning solution for solar panels and beyond. While some have even received investor funding, others are charging ahead on the back of ever-lower costs and bigger promises.

Analytics platforms today forecast component failures, while drone-based remote monitoring can reduce the need for site visits

The Big Drop. Prices

However, by far the biggest change in Solar O&M has been pricing. Prices have mirrored the fall in module prices, dropping from as high as \$12-20/KW in 2015 to barely \$5-8/KW now. In India, that has meant a drop from Rs 8 to 10 lacs per MW per annum to Rs 2.5 lacs per MW per annum now.

However, it is not lower module prices and higher efficiency, but a learning curve in other areas that have aided this price drop. From more efficient robotic cleaning options, to better capturing of data and its analysis, to better performance of inverters, especially the newer string inverters, a lot has changed to make the pricing more aggressive.

Ashish Khanna prefers to benchmark solar o&M costs with project capex costs, at 1 percent of project cost, with an annual escalation of 5 percent.

Earlier O&M models used to be all in contracts, covering hardware as well as replacement risk. This was partly because the firms providing O&M services on those smaller projects were also the manufacturers themselves, the EPC contractors and even worked with inverter manufacturers, giving them the confidence to offer such terms. It was also driven by client needs, with most customers not really keen on dealing with multiple vendors with barely a record in sight. With scale, risk has been pushed back to project owners, even as technology finds ever newer ways to provide better inputs.

Ecoppia's Sharma explains. "As Ecoppia secured over 11.5 GW in this region, we see that most commonly solar sites are faced with construction quality issues, which includes structures, wiring, inverters, and panel degradation from hot spots due to improper cleaning. Ecoppia's sophisticated cloud-based solution allows site developers full visibility of the site.

Robotic Solar Panel Cleaning Solution Providers in India	
Firm	Highlights
Skilancer Solar	Clients include: Hindustan Petroleum, Adani, Ambit Energy and Unilink Group.
Nocca Robotics	Raised Rs 12.4 crore (\$1.7 Mn) in a seed funding round led by Indian Angel Network Fund in September 2019.
Solabot	Clients Include*: Brookfield, Avaada, Susten by Mahindra, ACME, Shapoorji Pallonji, etc.
Aegus Technologies	The firm claims to have 5 operational installations on site.
Taypro	Clients Include: Rolls Pack, Infinity Enterprises. Claims to have covered solar projects worth 280 MW+ capacity.

* as per the company website

While traveling nightly on the panel the robotic cleaning solution collects millions of data points related to cleaning performance, weather conditions and the correlation between them, using both physical input from the actual site and external data sources such as APIs. Our robust AI platform integrates these multiple data sources and by applying machine-learning layers, can offer an optimal operation while constantly improving our offering and services.”

However, while Independent Service providers Gensol will point to the liquidated damages as a key reason why they hold an edge over in-house teams, others are not so comfortable yet. Both Ecoppia’s Sharma and Gensol’s Singh agree that over 50 percent of large solar capacity is self-maintained. A senior executive at a large EPC developer we spoke to said this on condition of anonymity. “We usually find that our in-house team, thanks to their involvement with the vendor negotiations and technical expertise, can keep O&M costs low. And yes, they are incentivised also to ensure high uptime and output. EPC’s come close on the cost front at times, but we find that they can slack off on maintenance after a year or two, as other pressure points on the business emerge. It is a very competitive business, and with an asset that has a 25 year lifetime, it will take some more time before many of the largest developers trust someone else to manage it.”

However, with financial investor-backed projects increasingly in vogue, the future remains bright for independent service providers as well as EPC’s like Sterling and Wilson Solar, as financial modelling will be decisive in deciding contracts.

On the advantages Gensol brings, Singh of Gensol adds that “when it comes to an analytics model clubbed with our O&M portfolio, it gives us an advantage. He also urges potential developers not to underestimate the value of outsourcing. “In-house O&M can make employees accountable, but you cannot penalise them. Whereas, when you outsource, you can have liquidated damages after 6 months or a year.”

Inverters, probably the most important component after the modules, are a key point of discussion. Most come with a 5 to 10-year warranty, and are the first to require retrofitting. Right now, in a vast majority of the cases, such extension of AMC or overhauling is being done directly by the owner. Besides proprietary items like SCADA.

Currently, some of the biggest developers like Acme, Renew Power, Azure, Greenko are all managing their assets in-house. But as their portfolio sizes expand, expect changes soon, as lower costs linked to guarantees become too attractive to be missed for at least some of them soon. Add to that the new trend seen in some cases, for a developer to contract out the work to multiple vendors, instead of a single EPC. That means the O&M contractor can pitch in from day 1.

What About Smaller Projects and Rooftop Category?

This is where the situation becomes interesting in India. While the share of this category is just about 6 GW out of a total 40 GW of solar capacity, the number of projects are in the thousands, if one considers residential rooftop. Take that out, and you still have a large addressable market. Add to that the fact that even in the residential rooftop market that is subsidy backed, the typical maintenance contract is for 5 years, and you see some real potential.

However, the economics can be very different here.

Amplus Solar's Chaudhary states that "the cost depends on several factors including siting at a particular location, security situation, quality of water available, location and accessibility, etc. and there are no stringent criteria, but the prerequisites might differ from case to case. However, as per our experience, we can say the overall cost including statutory cost is around 5.5 LPA for RT and around 3.5 LPA for Open Access plants". That premium is supported by all the other EPC's we spoke to.

A massive stumbling block of course is the singular focus on costs over everything else, by a majority of owners. **Anurag Paliwal**, Founder at Infisolar, a Rajasthan-based EPC firm, laments the cost focus as a major reason why solar O&M does not interest him yet. "Another problem is that many EPC's at this scale, when they run up against a cost obsessed client, tend to downplay O&M needs and costs, to close the deal".

PV Diagnostics **Bhosale** adds that the smaller plants "surely present an opportunity for O&M companies. However, it is challenging to make these O&M contracts profitable especially for small rooftop solar power plants. For small project sizes, the cost of O&M is approximately the same whether it's a 5 kW plant or a 20 kW plant, or even more. Therefore, it is important to have multiple plants under management in the same vicinity to make it financially viable. Additionally, the quality of these assets is very different from a standardisation perspective, therefore, its standardization becomes very difficult. Also, PR/CUF commitment becomes a challenge. In recent times, we have seen multiple companies taking up and exiting O&M contracts of rooftop power plants."

Options like robotic cleaning are also not practical yet for these smaller plants. Paliwal does add that for plants in the MSME sector that are say, sub 500 KW, most firms will usually have their electrical resource at hand, who is usually tasked with maintaining the solar system as well, including warranties and AMC's on key equipment.

But don't count out Indian ingenuity to discover a business model for small plants. In the NCR region, we have already heard of some smaller installers offering rates as low as Rs 500/600 per

KW per year to maintain smaller plants. Work involves a quarterly visit to clean and check all critical components. With a promise to ‘handle’ any breakthrough in terms of coordination with the manufacturers etc.

NEXT STEPS

With almost all the key requirements in place, the solar O&M market is set to grow with the broader solar sector. Perhaps the only slight disappointment is the creation of lesser than expected jobs, as more and more roles are performed by technology interventions.

However, firms looking to make a splash in this business will need to invest, in both people, technology, and credibility.

As PV Diagnostics **Bhosale** adds, even where warranties and retrofits are to be managed by owners, the O&M players will have a role to play. “The onus of ensuring warranty lies with the O&M firm to some extent. Some of the warranty terms are associated with the design and installation. Since these phases are not associated with the O&M firm, certain warranty clauses may become void if O&M is not carried out properly. For example, improper handling of modules may result in the breaking of module glass or backsheet scratches, affecting the warranty of the modules. Similarly, there are no standard training procedures related to repairs which can affect the warranty if not executed effectively.”

On the relative advantages and disadvantages of O&M, between an independent O&M specialist versus the EPC or the developer. He adds that with Large EPC player or module manufacturer that also offers O&M, the advantages are:

- They have a good understanding of the installation of the plant and its design so that they can understand the bottlenecks very well. This will prove beneficial while carrying O&M activities.
- Since they have a substantial team size, they will have an impeccable cross support system, thus helping in quality data analysis, troubleshooting, and implementing long-term solutions for performance improvements and maintenance of the plant.

An independent O&M specialist will have the following advantages:

- Large EPC players, or a module manufacturer that also offer O&M might have a certain bias and may look down upon certain issues related to design and modules. This bias won’t be a concern with an independent O&M specialist. This can be a considerable factor in ensuring proper O&M.
- O&M specialist has a specific focus on O&M related issues which can help in better O&M quality

Amplus’s **Chaudhary** also has no doubts about the growth potential. “The Solar O&M Market in India is undoubtedly bound to grow, and we shall witness all present mid-size players evolving further and competing with the large established players. The market is only going to expand. With

PPA dipping to an all-time low, the market shall be highly competitive and only those with a long-term vision on providing and maintaining quality and prompt service shall fare through.”

As far as the onus of ensuring warranty is concerned, Amplus in all its contracts has entrusted this responsibility of OEM coordination to its contractors and results to date have been satisfactory.

For large rooftop and sub 50 MW ground-mounted projects, he is happy with the experience so far. “As our and general industry experience goes, awarding a combined EPC contract with limited-term O&M, apart from being cost beneficial is the best bet for overall plant performance and stabilisation. There is a seamless takeover from the contractor EPC team by its O&M team, HOTO, and warranty issues are internally resolved without much hassle to the owner.

However, 2-3 years down, once the plant is completely stable, we can re-tender the contract and invite independent O&M specialists for bidding.”

Ecoppia’s Sharma also has positive news on Indian developers, who he finds to be very open to new technology and have astonishingly high adoption rates. With much larger sized projects, the growth of their robotic solutions is a given for them, although price sensitivity remains the final hurdle in most cases “As the engagement with the robotic cleaning supplier is a long one (25 years), it is critical to also verify the financial backing and stability of the supplier, ensuring he is capable of supporting the O&M properly for 25 years.” The financial point is a point well made, and one we have heard repeatedly for this story.