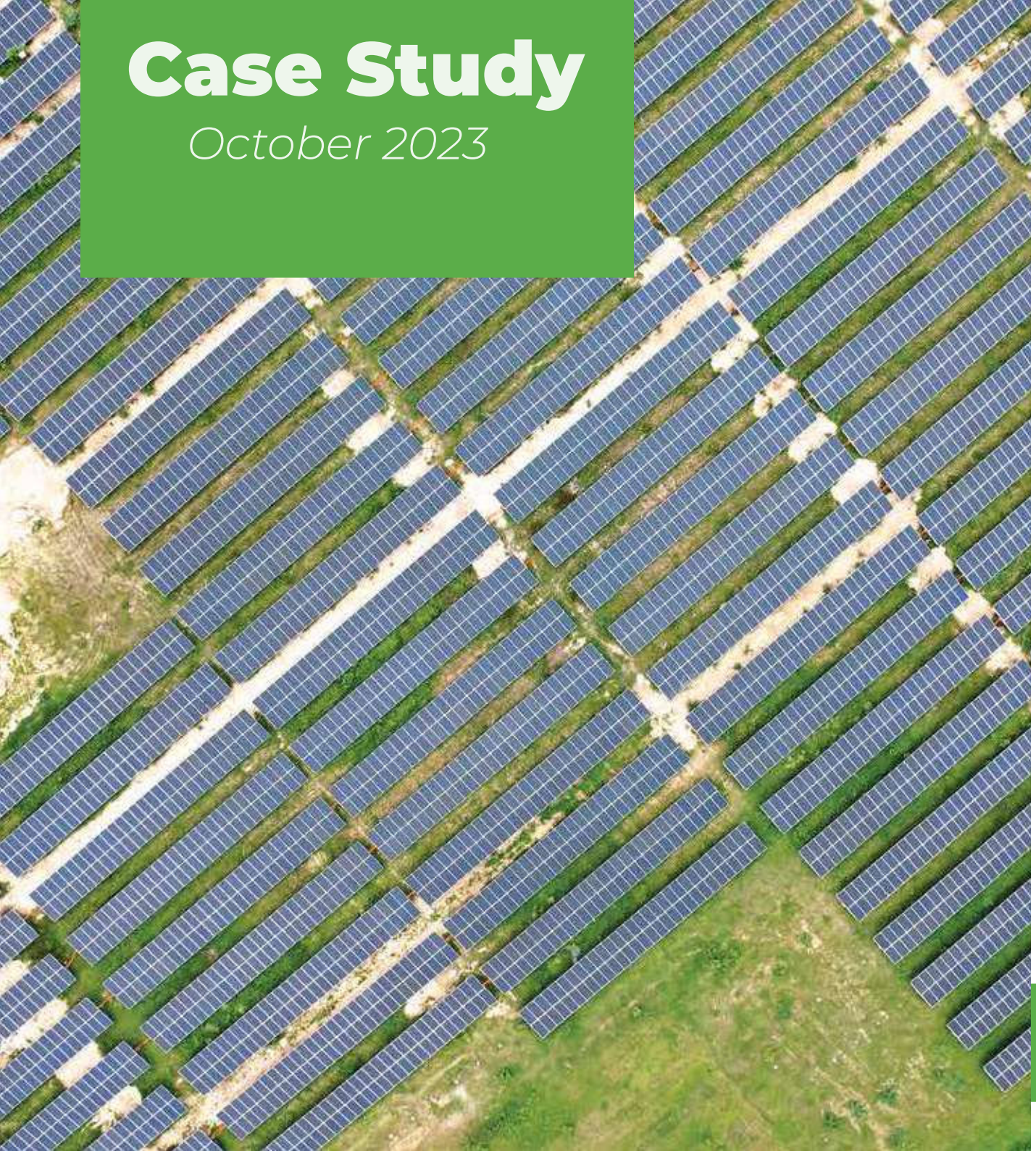


Case Study

October 2023

JMK Research & Analytics

C&I RE Sector

Project Owner

SOLARA
Active Pharma Sciences

JMK Research & Analytics is a specialist consultancy firm that provides research and advisory services to Indian and International clients across Renewables, Electric mobility, and the Battery storage markets.

W: www.jmkresearch.com
A: 5th Floor, Enkay Tower, Sector-19, Udyog Vihar, Gurgaon,Haryana-122015
Ph: +91-7428306655
Email: contact@jmkresearch.com

SED Fund is a philanthropic initiative to support the Sustainable Development Goals (SDGs) of clean air, access to energy, clean water, climate action and equity, by backing efforts of governments and civil society on clean energy transition, according to principles of sustainability, diversity and equity. The fund intends to amplify impact by consolidating philanthropic resources, strengthening country level institutions and civil society groups and supporting initiatives that will have the most impact in support of these goals.

W: www.sed.fund

Authors: Jyoti Gulia, Prabhakar Sharma, Nagoor Shaik

GLOSSARY

Abbreviation	Definition
API	Active Pharmaceutical Ingredients
AC	Alternating current
CRAMS	Contract Research and Manufacturing Services
CO2	Carbon dioxide
C&I	Commercial and Industrial
DISCOM	Distribution Company
DG	Diesel Gensets
EaaS	Energy-as-a-Service
EV	Electric Vehicle
EPC	Engineering, Procurement, And Construction
FPEL	Fourth Partner Energy Limited
FTE	Full-time Employees
FY	Financial Year
gCO2eq	Expression of the equivalent amount of CO2
GW	Giga watt
GWh	Gigawatt-Hour
GDP	Gross Domestic Product
GNA	General Network Access

Abbreviation	Definition
INR	Indian rupee
IEX	Indian Energy Exchange
ISTS	Inter-State Transmission System
Kwp	Kilowatt-peak
KWh	Kilowatt-Hour
KV	KiloVolt
MW	Megawatt
MWp	Megawatt peak
MWh	Megawatt-hour
OPEX	Operational Expenditure
OA	Open Access
PPA	Power Purchase Agreement
RE	Renewable Energy
R&D	Research & Development
SEZ	Special Economic Zone
USD	United States Dollar
Wp	Watt-Peak
ZLD	Zero liquid discharge

CONTENTS

ABOUT
SOLARA ACTIVE PHARMA

Solara Active Pharma is a leading global provider of Active Pharmaceutical Ingredients (API) and Contract Research and Manufacturing Services (CRAMS). The Company has a portfolio of over 60+ commercial APIs. The Company has a presence in over 75 countries across the globe. The Company has 6 API manufacturing facilities in India and two Research and Development (R&D) centers.

Table 1: "Solara Active Pharma" Company Overview

Parameter	Details
Name	Solara Active Pharma
Registered office	201, Devavrata, Sector 17, Vashi, Navi Mumbai Mumbai - 400 703, Maharashtra, India
Year of Establishment	2017
Type	Active Pharmaceutical Ingredients (APIs) manufacturer
Facilities	Seven (Six are manufacturing units)
States Served	6
Number of employees	2361
Number of scientists	137
Revenue (FY2023)	INR 1,466.36 crore (US$ 176.4 million)
On-Site-Rooftop solar capacity	1 MW operational (1.1 MW under construction)
Off-site Solar Capacity	6.3 MW
Wind Capacity	6.5 MW
Total Scope 1 and Scope 2 emissions (per rupee of turnover)	3.724 gCO2eq/INR

Source: Solara Active Pharma Annual Report 2022-23

ABOUT
FOURTH PARTNER ENERGY

Fourth Partner Energy (FPEL) is India's leading Renewable Energy Solutions Company, serving commercial and industrial (C&I) businesses. The Company has set up onsite and offsite plants across multiple sites for Solara Active Pharma in India. FPEL was founded in 2010 as solar products and EPC Company that offers a comprehensive range of services, including energy analysis, design, financing, procurement, construction, operation, maintenance, and more. Currently, FPEL also offers wind, energy storage and EV charging infrastructure solutions for C&I segment. FPEL has a presence in India and South and Southeast Asian countries such as Vietnam, Indonesia, Bangladesh, and Sri Lanka. It also offers Energy-as-a-Service (EaaS) to help businesses offset almost 100% of their energy requirement through clean and green sources.

Table 1: Fourth Partner Company Overview

Parameter	Description
Name	Fourth Partner Energy Private Limited
Headquarter	Hyderabad, Telangana
Type	Renewable energy solutions provider
RE portfolio	1.3 GW
CO2 emissions reduction	17,85,638 tons/year
Number of clients	200+
Solution Offering	Solar, Wind, Technical Services, Wind-Solar (Hybrid), Energy storage, EV charging infra-structure.
Number of Full time Employes	400+
Presence in India	PAN India
Global Presence	Vietnam, Indonesia, Bangladesh, Sri Lanka.

Source: Company Website

PHARMACEUTICAL INDUSTRY IN INDIA

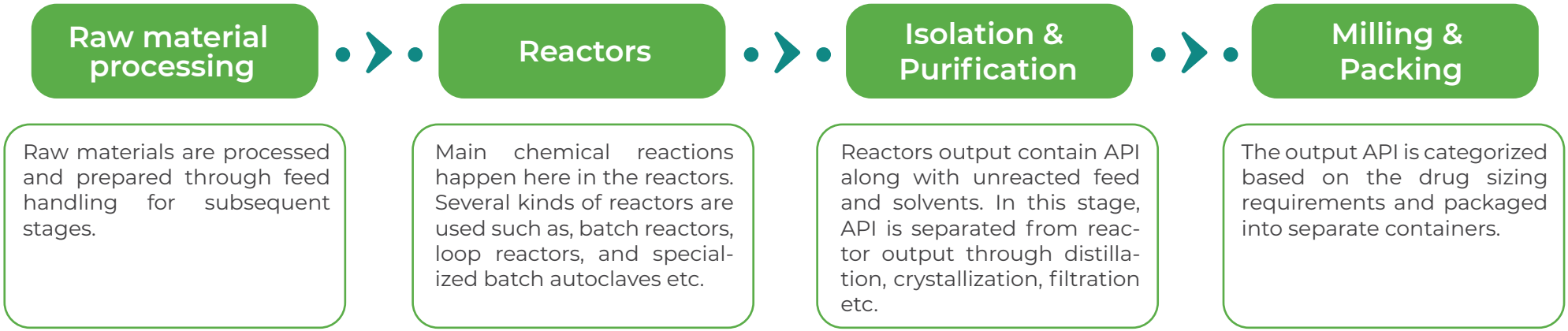
India leads the global market in generic pharmaceuticals, providing over half of the world's vaccine supply, 40% of generic drugs in the United States, and a quarter of pharmaceuticals in the United Kingdom. It's the third-largest pharmaceutical producer by volume and the fourteenth-largest by value, supported by a network of 3,000 medicinal businesses and 10,500 manufacturing units. The pharma sector currently contributes around 1.72% of the country's Gross Domestic Product (GDP).

In FY2023, India's pharmaceutical exports reached Rs. 2,08,231 crore (US$ 25.3 billion). The **Indian pharmaceutical industry is estimated to be valued at around US$ 50 billion, with over half of that value (more than US$ 25 billion) originating from exports.** India meets approximately 20% of the global demand for generic drugs.

Globally, the Pharmaceutical industry emits 48.55 tonnes of CO2 per US$ million revenue. **Thus, for India, the total C02 emissions from Pharmaceuticals are estimated to be around 2.4 million tonnes/annum viz. ~ 1% of the total carbon emissions of India.**

The pharmaceutical manufacturing process can be classified into four stages: raw material processing, main reactions, isolation and purification of reaction output and final packaging. Across these stages, electricity is the primary energy source. The main electricity load comes from electric motors utilized at almost every stage of the manufacturing process and lighting of the facility.

Figure 1: Process flow of active pharmaceutical ingredient (API) manufacturing



Source: JMK Research

Through this case study of a leading pharmaceutical manufacturer in India, we aim to analyze pharmaceutical corporations' sustainability efforts towards decarbonization.

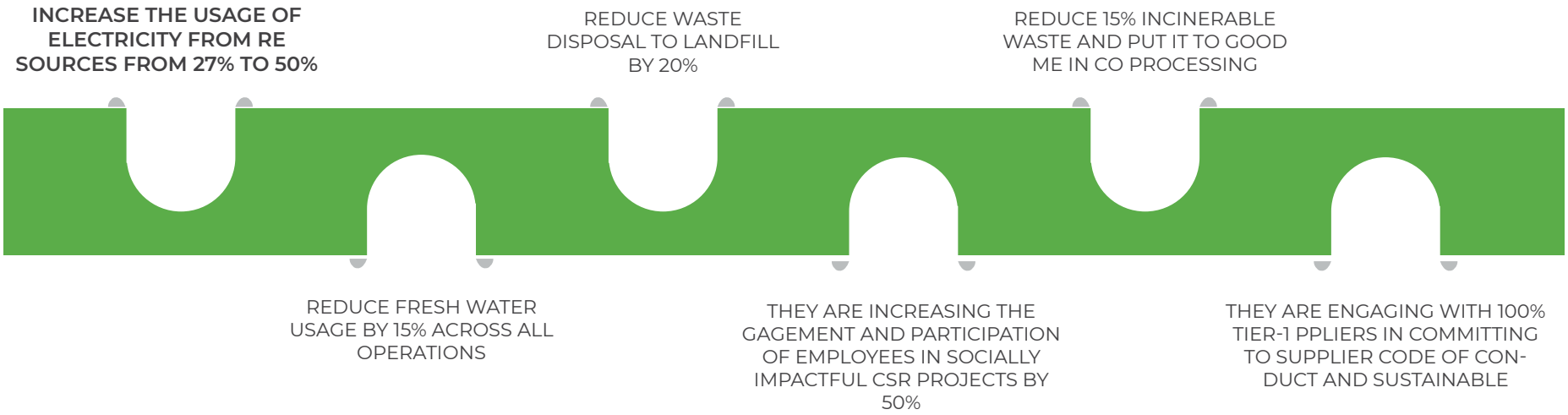
SOLARA ACTIVE PHARMA SUSTAINABILITY INITIATIVES

Solara Active Pharma focuses on reducing GHG emissions through renewable sources or alternative fuels and is actively involved in reducing water usage through zero-liquid discharge (ZLD) projects.

"Pharmaceutical manufacturing demands maintaining specific process/conditions in terms of temperature, pressure, crystallization, sterilization, containment etc. which makes it very energy intensive. As part of decarbonization goals, Solara continuously strives for energy efficient processes, green chemistry, increased renewable energy contribution, etc. Renewable energy projects help us with cost savings and contribute towards sustainability. Our aim is to bring the overall renewable energy contribution to 50% by FY 2025."

– M.Mohan, COO, Solara Active Pharma Sciences

Figure 1: Solara Active Pharma Targets 2025 Sustainability Goals



Source: Solara Active Pharma Annual Report 2022-23

ELECTRICITY CONSUMPTION MIX OF SOLARA ACTIVE PHARMA

In FY2023, the total electricity consumption by Solara Active Pharma was 90,766 MWh. Of this total, 62% was supplied by Discoms, which is 2% less than the previous year. This fall can be attributed to the commissioning of solar plants in Tamil Nadu and Maharashtra in the past year.

As a result, the share of solar energy in electricity consumption rose to 9% in FY2023. Wind power contributed 22%, and diesel generation units contributed 2%. Notably, the Company also procured power from power exchange in previous years. However, there was no energy procurement from power exchanges (IEX) in FY2023, mainly due to an increase in captive solar and wind generation across different sites of Solara. Another critical factor for this trend was the high prevailing energy prices on power exchanges in FY2023.

During power breakouts, the Company also uses Diesel Gensets (DG) across various sites. In FY2023, power consumed from DG gensets was about 2% of the total annual electricity consumption by Solara Active in India.

Figure 3: Monthly electricity consumption trend

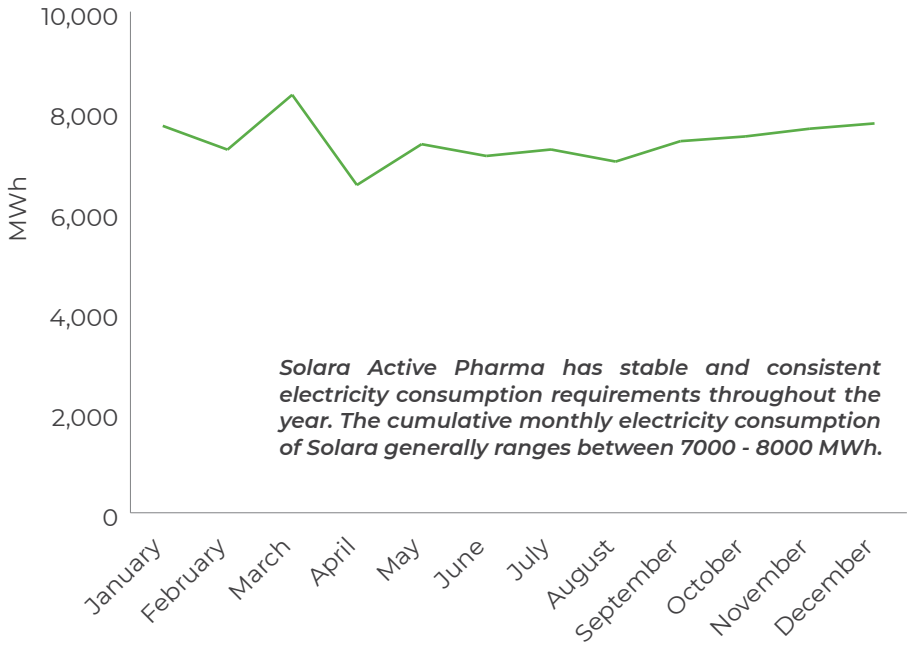
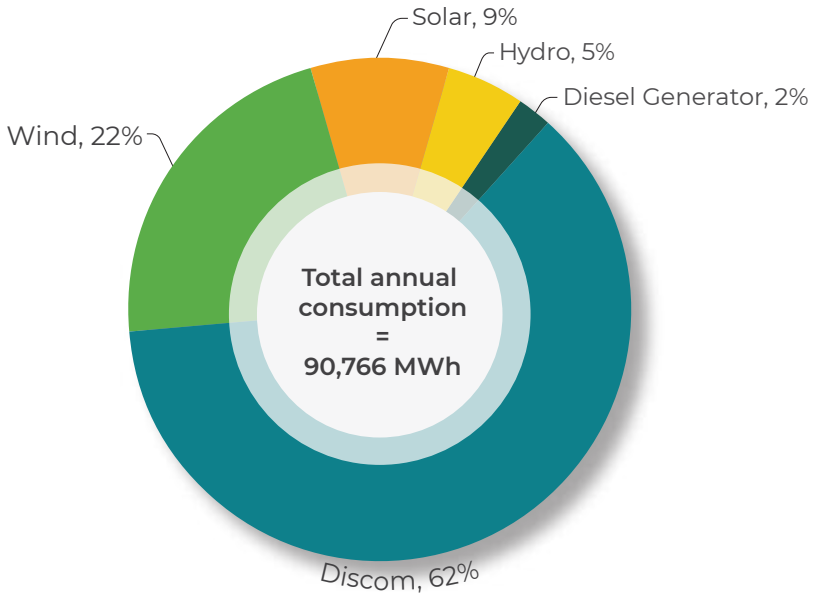


Figure 2: Electricity consumption, by source (FY2023)



Source: Solara Active Pharma

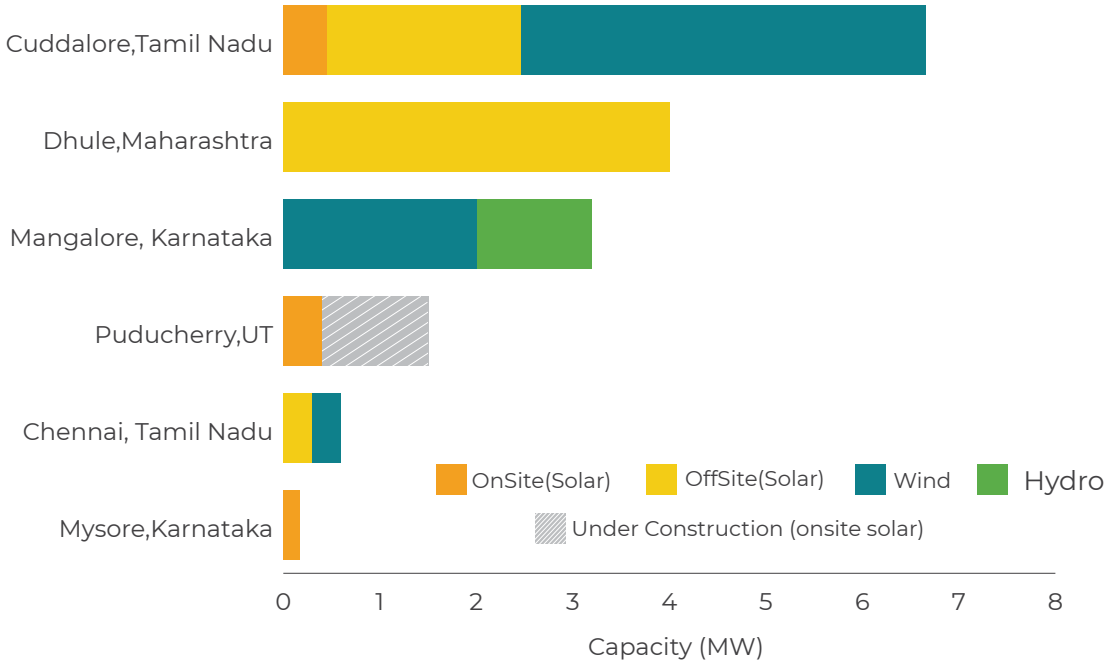
RE CAPACITY AT SOLARA ACTIVE PHARMA MANUFACTURING FACILITIES

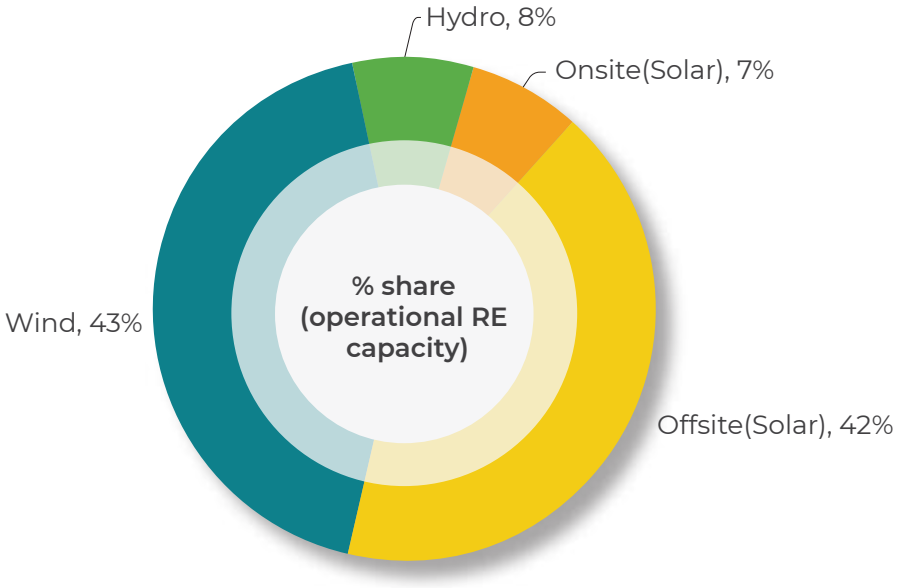
Solara Active Pharma operates six manufacturing units in different locations across India, including Tamil Nadu, Karnataka, and Maharashtra, Andhra Pradesh and Puducherry. In Andhra Pradesh, the manufacturing site is located in Visakhapatnam, which comes under the Special Economic Zone (SEZ), and complete power for this site is procured from the local grid.

Over the last few years, Solara Active Pharma has initiated significant projects to enhance renewable energy electricity procurement across all its sites, particularly solar and wind electricity. It is collaborating with companies engaged in group captive solar power projects.

The total RE capacity of Solar Active Pharma is 15.022 MW operational and another 1.1 MW under construction. Of this, 42% is contributed from off-site solar, 7% is on-site solar, and the remaining is from wind (43%) and hydro (8%).

Figure 4: Solar and Wind Installations across sites by Solara Active in India



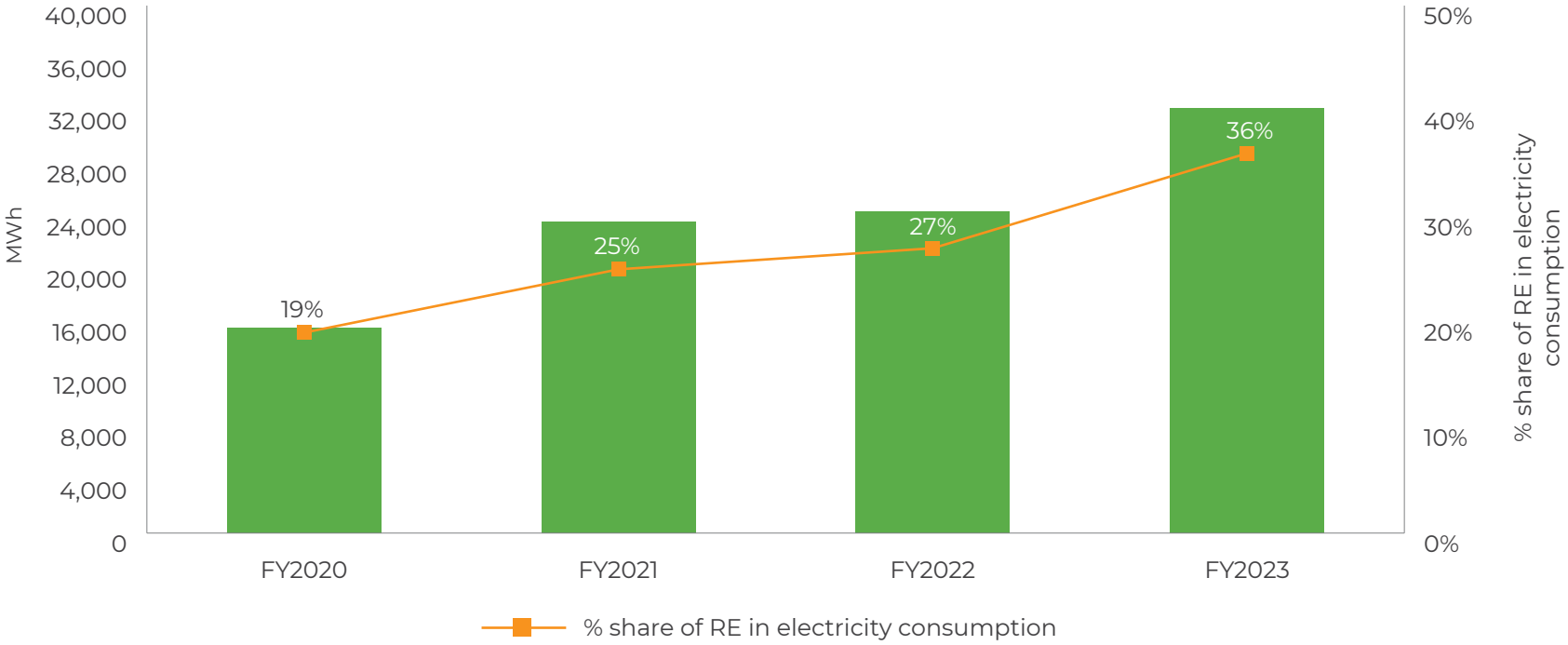


Source: Solara Active Pharma Annual Report 2022-23, FPEL, JMK Research
Note: Plants in Mangalore and Tamil Nadu currently also procure power through bilateral short-term contracts with RE traders. Thus, estimated equivalent capacity for the same is provided.

RE CONSUMPTION ACROSS DIFFERENT SITES

In Solara Active Pharma, over the years, the electricity consumption from RE has risen steadily from around 19% in FY2020 to approximately 36% in FY2023. The growth is driven primarily by the growth of solar (both offsite and onsite) and wind capacity.

Figure 4: Yearly RE generation trend of Solara Active Pharma

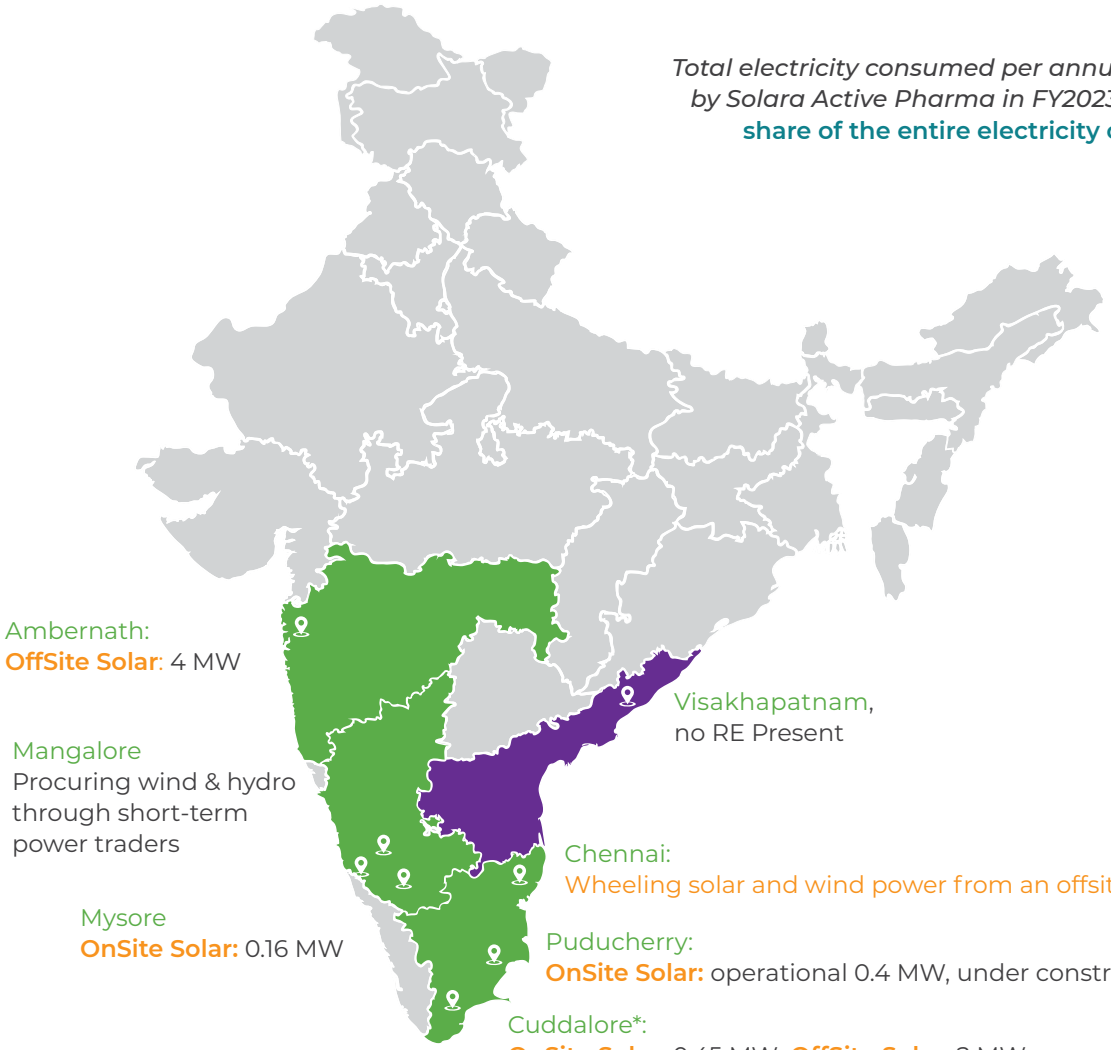


Source: Solara Active Pharma annual report 2022-2023

In FY2023, about 36% of their electricity came from renewables. RE power contributed 70% in Ambernath(Maharashtra), 24% in Mysuru (Karnataka), and 69% & 2% in Cuddalore(Tamil Nadu) & Puducherry, respectively.

Figure 6: Location of Solara Active Pharma Manufacturing units and respective share of RE in total electricity consumption

Total electricity consumed per annum, from RE sources by Solara Active Pharma in FY2023 is **32.6 GWh (36% share of the entire electricity consumption)**

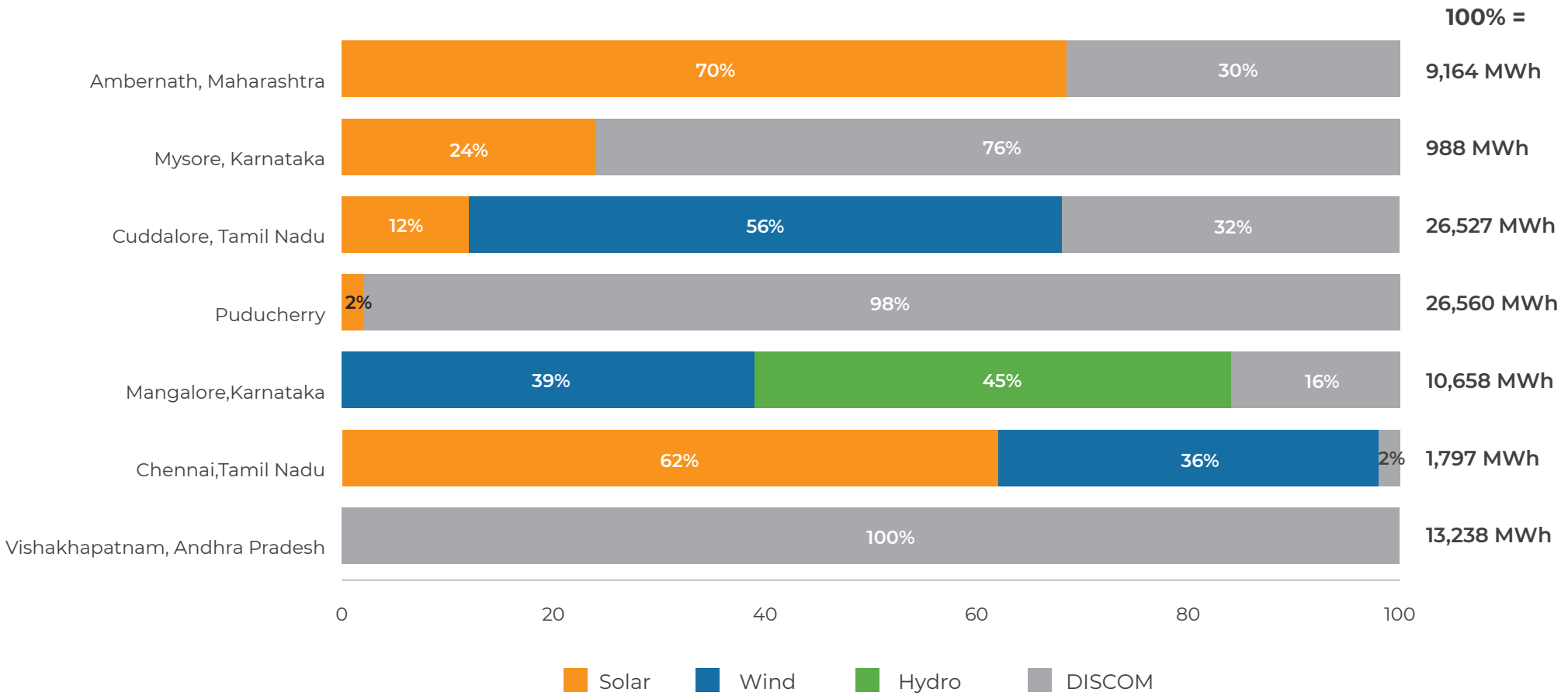


Site	% Share from RE	% Annual Cost Saving
Puducherry	2%	<1%
Cuddalore	69%	17%
Mysore	24%	11%
Mangalore	84%	13%
Ambernath	70%	13%
Chennai	98%	39%

Source: Solara Active Pharma, JMK Research

Note: Cost savings have been estimated from the reference of variable grid tariff in the respective state

Figure 7: Annual Electricity mix of Solara Pharma sites



Source: FPEL, Solara Active, JMK Research

In Tamil Nadu, there is a shared off-site wind (4 MW) and solar (2 MW) power source for both Chennai (which primarily houses a R&D facility of Solara) and Cuddalore locations. Remarkably, Chennai location procures 98% of its energy from RE sources. However, DISCOM remains the primary electricity procurement source for three Solara sites at Vishakapatnam, Mysore and Puducherry. The Mysore manufacturing plant is smaller, accounting for only about a tenth of the electricity procured at Cuddalore and Ambernath.

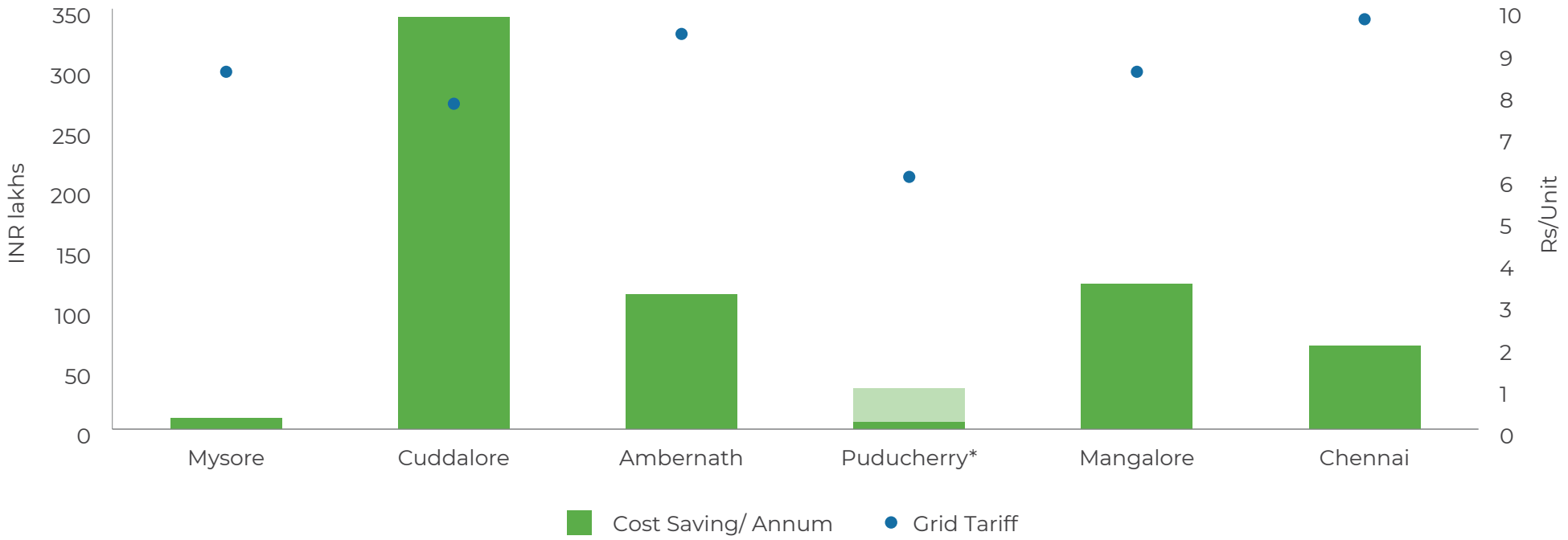
Cost Savings

From its RE procurement, **Solara Pharma can save around Rs. 659 lakhs in annual electricity costs and an equivalent carbon reduction of 25201 tonnes/annum.**

Puducherry manufacturing plant's onsite rooftop project has the highest onsite solar PPA tariff among the sites analyzed. As this project was the first to be commissioned in 2019, its PPA tariff is according to the solar project costs at that time.

For Maharashtra, even though the state has a high industrial grid tariff of Rs 9-9.5/kWh, the per unit savings from solar is lesser vis-à-vis other sites at Cuddalore and Mysore, mainly due to the imposition of additional Open Access(OA) charges in case of power procurement from open access offsite solar plant. Even though per unit cost savings in onsite solar are higher vis-à-vis offsite/open access solar, the capacity of onsite solar is limited subject to the suitability of the available project area.

Figure 8: Cost Savings from RE per annum across all sites



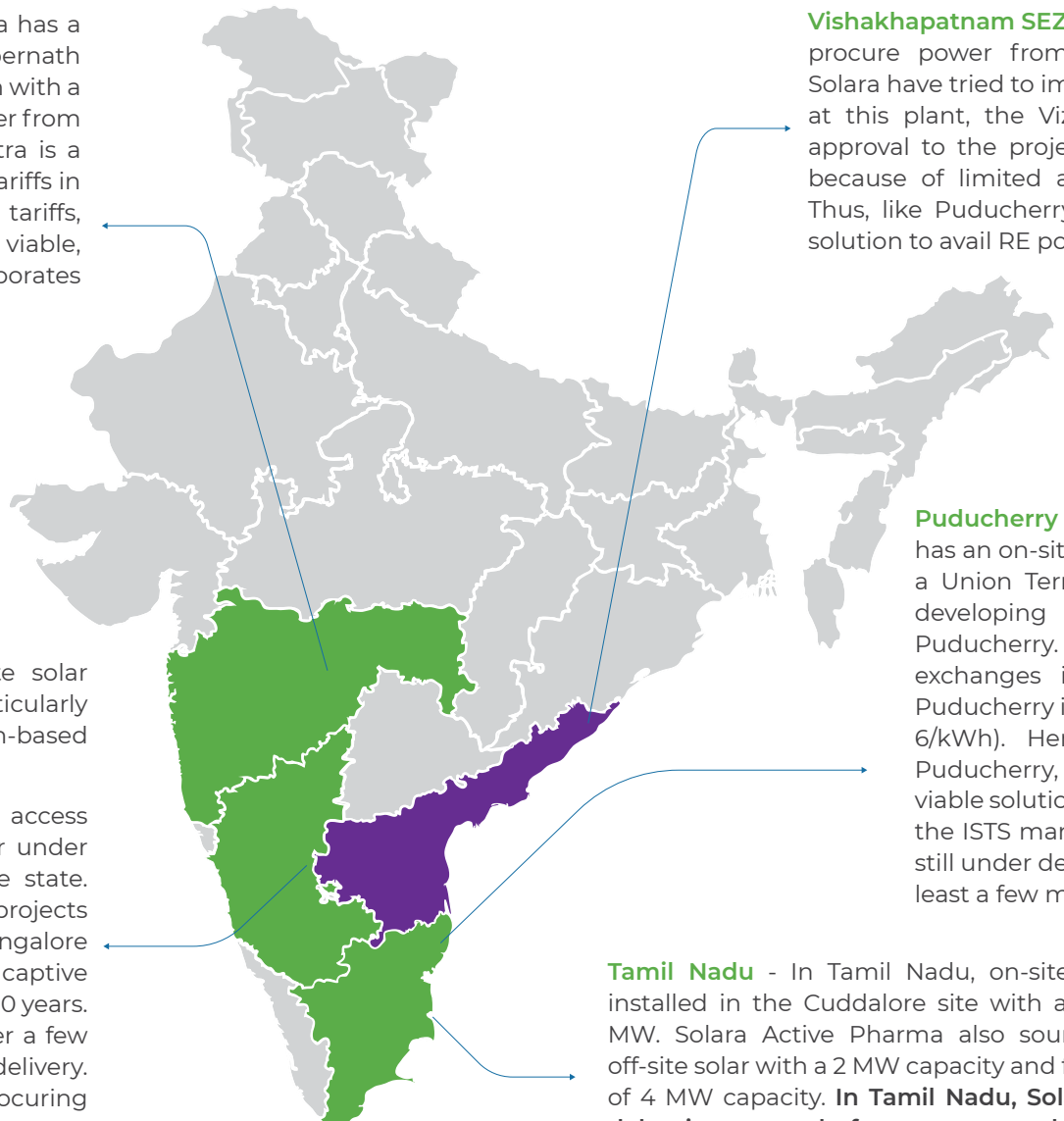
Source: FPEL, JMK Research

Note: * Puducherry estimates are basis data furnished for an under construction of 1.1 MW on-site solar plant and 0.4 MW commissioned solar plant

STATE-WISE ANALYSIS AND CHALLENGES FACED BY SOLARA

Maharashtra - In Maharashtra, Solara Active Pharma has a multipurpose API and Intermediate facility at Ambernath and takes off-site solar power from the Dhule location with a capacity of 4 MW. This facility procures 70% of its power from solar as part of its annual consumption. Maharashtra is a large industrial state having relatively high C&I grid tariffs in the range of Rs. 8-10/unit. Because of such high tariffs, switching to renewable energy sources is not only a viable, cost-effective solution but also helps bigger corporates achieve their sustainability targets.

Vishakhapatnam SEZ – Solara's plant at Vizag SEZ only procure power from the state DISCOM. Although Solara have tried to implement rooftop on-site projects at this plant, the Vizag SEZ have not accorded its approval to the project. Open access is not possible because of limited area availability within the SEZ. Thus, like Puducherry, ISTS remains the most viable solution to avail RE power at Solara Vizag SEZ plant.



Puducherry - In Puducherry, Solara Pharma has an on-site solar capacity of 0.4 MW. Being a Union Territory, there is limited space for developing open-access projects in Puducherry. Procuring RE power from power exchanges is not viable as grid tariff in Puducherry is generally very low (currently Rs. 6/kWh). Hence, for industries present in Puducherry, ISTS based projects is the only viable solution to procure RE energy. However, the ISTS market for C&I consumers in India is still under development and is likely to take at least a few more years to take off.

Karnataka - In Karnataka, Mysore has an on-site solar capacity of 0.169 MW. Industries in the state, particularly those in IT, technology, pharmaceuticals, and iron-based sectors, are increasingly switching to RE sources.

In Karnataka, there was a very attractive RE open access scheme allowing C&I consumers to avail RE power under third party agreement from any developer in the state. Benefits under the scheme was only accorded to projects commissioned until 2018. Under this scheme, at Mangalore plant, Solara also entered a PPA for availing group captive open access power from a solar plant for a tenure of 10 years. The energy supply started in mid-2020 but just after a few months, the solar developer had to sever the power delivery. At present, Mangalore plant is currently only procuring power through short-term bilateral contracts from RE traders in the state.

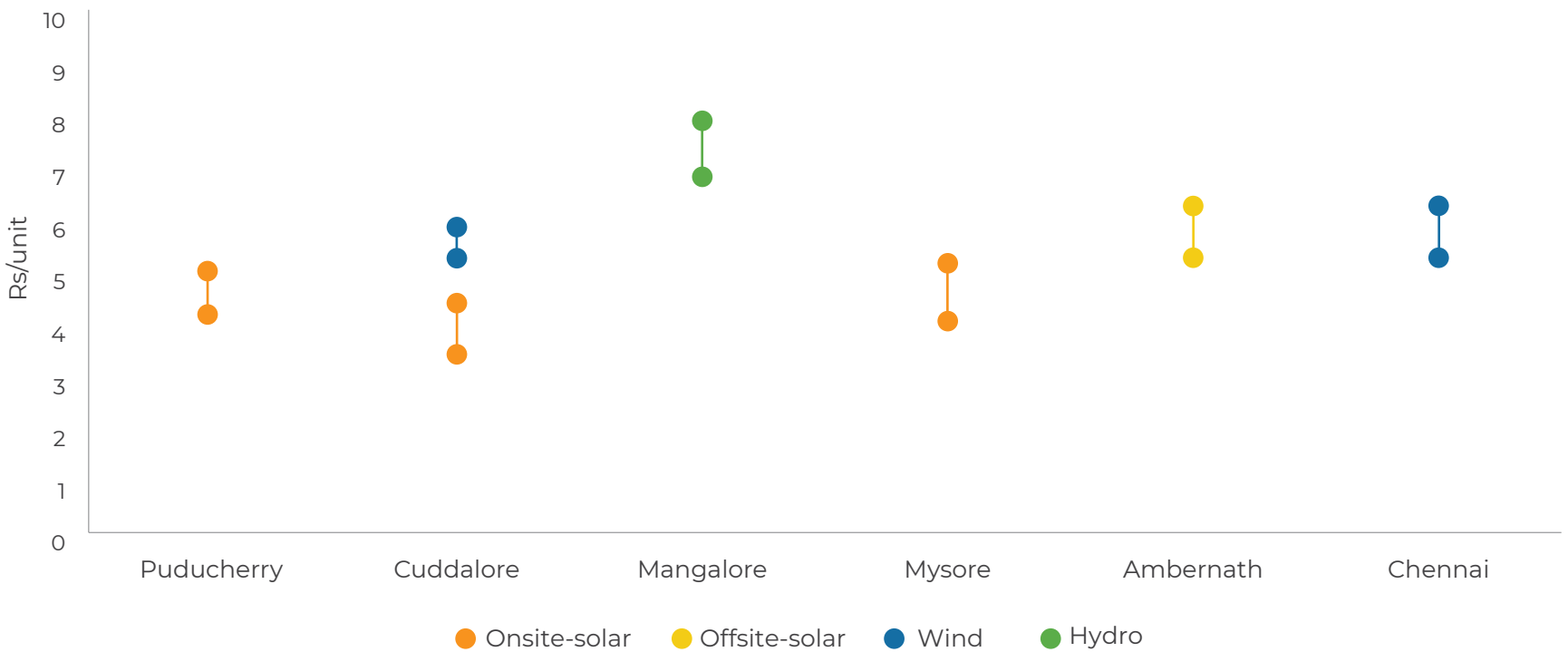
Tamil Nadu - In Tamil Nadu, on-site rooftop solar is installed in the Cuddalore site with a capacity of 0.45 MW. Solara Active Pharma also sources power from off-site solar with a 2 MW capacity and from a wind plant of 4 MW capacity. **In Tamil Nadu, Solara have faced a delay in approvals from state regulators for availing on-site rooftop solar.**

PPA ARRANGEMENTS OF SOLARA ACTIVE PHARMA

Across its operational sites, Solara Active Pharma has entered into multiple power purchase agreements (PPA) to source RE power for its operations. For solar, Solara have executed majority of its PPA's with fourth partner energy limted (FPEL) with tariffs ranging from a low of Rs 3.5-4/unit in Cuddalore, Tamil Nadu to Rs 5.5-6/unit (incl. OA charges) in Ambernath, Maharashtra. In Tamil Nadu, a leading wind devleoper (wind developer A) have set up a group captive WSH project (2 MW solar + 4 MW wind) to supply RE power to the two Solara sites within Tamil Nadu.

While majority of them are long-term PPA's with tenure up to 25 years, Solara also procure power through a short-term PPA for procuring Hydro Power (combined with wind) from an energy trading entity. Among all the RE PPA's of Solara, this short-term PPA has the highest tariff of ~Rs 7/unit.

Figure 9: PPA tariff range, by location and RE technology



Source: Solara Active Pharma, FPEL

PROJECT CONFIGURATION (FPEL SOLARA PHARMA PLANTS)

As discussed earlier, Solara Active Pharma has seven facilities located across India. Six are manufacturing plants, while one is a research & development (R&D) facility. Over the years, FPEL has worked closely with Solara Pharma in aiding their decarbonization efforts and has set up solar projects across its facilities. Cumulatively, FPEL has set up ~4.6 MW solar capacity at Solara Pharma facilities, viz. more than 50% of the solar portfolio of Solara Pharma. This capacity includes both onsite and offsite projects.

For the specific site assessment, we considered three Solara manufacturing facilities across four sites wherein FPEL solar projects supply power. These include Solara's manufacturing plants at Cuddalore (Tamil Nadu), Mysore (Karnataka), Ambernath (Maharashtra) and an under construction plant in Puducherry.

- At **Cuddalore, Tamil Nadu** – A 453 kWp onsite rooftop project implemented under OPEX mechanism. Under OPEX, the developer bears the entire initial project investment, while the consumer only pays for the electricity consumption under a PPA. Cuddalore plant also wheels power from an offsite wind (4 MW) and solar (2 MW) project.
- At **Mysore, Karnataka** – A 169 kWp onsite rooftop project implemented under OPEX mechanism.
- At **Ambernath, Maharashtra** - Procuring power from a 4 MWp offsite group-captive open access project at **Dhule, Maharashtra.** Under group-captive, the RE project is partially owned (at least 26%) by the C&I off-taker.
- Additionally, FPEL is constructing a 1.1 MW onsite solar project under the OPEX mechanism at the **Puducherry** plant of Solara, which is likely to be commissioned by the end of 2023.



Table 4: Solar PV Project Details

		Cuddalore, Tamil Nadu	Mysore, Karnataka	Dhule, Maharashtra	Puducherry
Basic Details	Solar Installed Capacity	453 kWp	169 kWp	4000 MWp	1100 kWp
	Project Status	Operational	Operational	Operational	Under Construction
	Solar Module Technology	Polycrystalline	Polycrystalline	Mono PERC	Polycrystalline
	Module Make	RenewSys let there be light	RenewSys let there be light	JA SOLAR	RenewSys let there be light
	Module Capacity	335Wp	330Wp	540Wp	335 Wp
	Project Type	Onsite rooftop solar OPEX	Onsite rooftop solar OPEX	Offsite group captive open-access solar	Onsite Rooftop solar OPEX
	Month of Commissioning	August 2022	November 2019	October 2022	December 2023
	Interconnection Voltage	445 V	445 V	132 kV	445 V
Project Performance	Annual Generation	694 MWh	259 MWh	6424 MWh	1686.3 MWh
	% site consumption met	3%	10%	70%	5%
	CUFdc	17.5%	17.5%	18.3%	17.5%
	PPA tariff range (INR per kWh)	3.5-4	4.5-5	3.5-4	4-4.5

OUTLOOK

Business Model

Increasing rooftop capacity is technically limited to suitable area availability and prevailing government regulations in the state. In most states, the outlook towards setting up rooftop solar (especially the OPEX model wherein no initial investment from the consumer is required) is highly restrictive. These restrictions (in the form of net metering or capacity limitations) are employed by state DISCOMs to prevent revenue outflow from their high-paying C&I consumers. Also, pharmaceutical manufacturing plants are relatively more minor, with smaller rooftop space, further restricting the feasibility of rooftop solar.

Hence, in the future, most of the RE capacity expansion at Solara Active Pharma will likely be under the open-access business model. The annual electricity mix across all manufacturing sites demonstrates that there is still ample scope for increasing the mix of RE in overall electricity consumption, which will ultimately contribute to Solara Pharma attaining its target of 50% share of RE in overall electricity consumption by 2025 (from around 36% currently in FY2023).

RE Technology

For their future RE projects, in terms of RE technologies, Solara Pharma is focusing more on solar than wind. All major under-construction or planned projects are based on solar. These include the 1.1 MW under construction onsite rooftop solar project at Puducherry and a probable ISTS based solar project for the Puducherry plant.

Intra-state tranmission system (In-STS) vs. Inter-state transmission system (ISTS)

Puducherry is a union territory with limited scope of solar project development within its territories. Hence, Solara Pharma is also looking to source power for its Puducherry manufacturing plant through ISTS open access.

The Government of India (GoI) has been actively working to streamline obstacles in developing C&I ISTS RE projects in the past few years. This includes waivers to transmission charges and losses formulating the general network access (GNA) guidelines. The industry has welcomed these ISTS provisions positively, and many ISTS projects in the C&I segment have been announced within the past year.

JMK Research & Analytics

JMK Research & Analytics
E: contact@jmkresearch.com
M: +91-7428306655
A: 5th Floor, Enkay Tower, Udyog Vihar, sector-19,
Gurugram, Haryana
W: www.jmkresearch.com